"MANAGEMENT OF DAIRY DEMONSTRATION FARMS IN ANAND DISTRICT"

A

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Dedicated to
My Beloved Parents
and
Family

Abstract

Management of Dairy Demonstration Farms in Anand district

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ABSTRACT

The study was conducted in Anand district of Gujarat with the objectives of to know personal, socio-economic status of dairy farmers, existing dairy husbandry practices, and economics of dairy farming on Dairy Demonstration Farms (DDF). Twelve dairy farms having 25 or more than crossbred dairy cows and have completed minimum one year of operation were selected for this study. Respondents (dairy farm owners) were interviewed and the desired information was collected in a questionnaire (schedule). The questionnaire was designed to study the socio-economic status of dairy demonstration farm owners, various management practices under which dairy animal are reared, cost of feed, shed and other expenses were calculated. The collected data were tabulated and subjected to statistical methods to draw meaningful inferences.

All DDF were managed by male, majority of them were from middle age group (66 per cent) and belonging to general category (83.3 percent) and 83.3 per cent having joint family of more than 4 members with average family size of 6.33 members. All farmers were having some land holding, 41.7 per cent farmers were having more than 2.5 acres with an average land holding of 3.54 acres at all DDF.

The various systems of housing of DDF were tail to tail (41.7per cent), head to head (25 per cent) and single line (33.3 per cent). Most of sheds were in East- West direction (75 per cent). All farmers provide improved housing facility to animal like pucca floor with adequate average floor space of 51.27 sq. ft and back word slope of floor, sufficient light, good natural ventilation by constructing wall of house half, regular cleaning of shed with pucca drainage system, firm houses using brick and cement material in construction and adequate manger space for feeding.

Improved feeding practices were followed by DDF like growing leguminous and non leguminous fodder, chaffing of both green and dry fodder, feeding of compound concentrate cattle feed, feeding of concentrate to calf and heifer, special feeding after calving, feeding of salt, and free access to drinking water with automatic water supplier.

It was found that majority (75 per cent) farmer follow machine milking twice a daily at 12 hour interval. Washing of udder before milking using antiseptic solution, using scientific milking pail, washing of utensils with hot water stripping at end of milking, using Masti-strip for mastitis detection and teat dipping after milking were followed for clean milk production by DDF owners.

Herd strength of DDF was ranging 31 to 99 animals with wet: dry ratio of 76:24. Herd average and wet average of DDF was 8.17 (10.12 – 5.76) and 10.68 (12.05 – 9.6) litre, respectively. The average parity of animal was observed in between 3.2 to 4.58. All DDF were having some level of mechanisation in their farm for efficient management of herd. Production and reproductive performance of crossbreed cows like calving interval, lactation length, lactation yield, milk yield per day lactation length and milk yield per day calving interval were 402 (day), 342 (day), 3663.14 (lit.) 9.83 (lit) and 9.12 (lit.), respectively.

Dairy Demonstration Farms owners follow good healthcare managemental practices on farm like regular vaccination, deworming of cows and followers at regular interval of three month, control of ecto- parasites and treating sick animal by a qualified veterinarian.

Average cost of milk production for high, medium and low profitable farm was ₹ 17.27, 18.11 and 19.72 per litre of milk. It was observed that a total expense per animal per day was ₹ 166.80, 166.46 and 163.06 for high, medium and low farm, respectively. While, the return per animal per day was ₹ 232.02, 221.59 and 201.02 with average benefit cost ratio of 1.39:1, 1.33:1 and 1.23:1 on high, medium and low profitable farm, respectively.

Over all result showed that DDF owner adapted improved managemental practices in housing, feeding, milking, and healthcare.

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CERTIFICATE

This is to certify that the thesis entitled **"Management of Dairy Demonstration Farms in Anand district"** submitted by Hannure Wasim Mustafa in partial fulfillment of the requirements for the award of the degree of **M. V. Sc.** in the subject of **Livestock Production and Management** of the Anand Agricultural University is a record of bonafide research work carried out by him under my guidance and supervision and the thesis has not previously formed the basis for award of any degree, diploma or other similar title.

Place: Anand
Date: 24/06/2013

(V. P. Belsare)
MAJOR ADVISOR

CERTIFICATE

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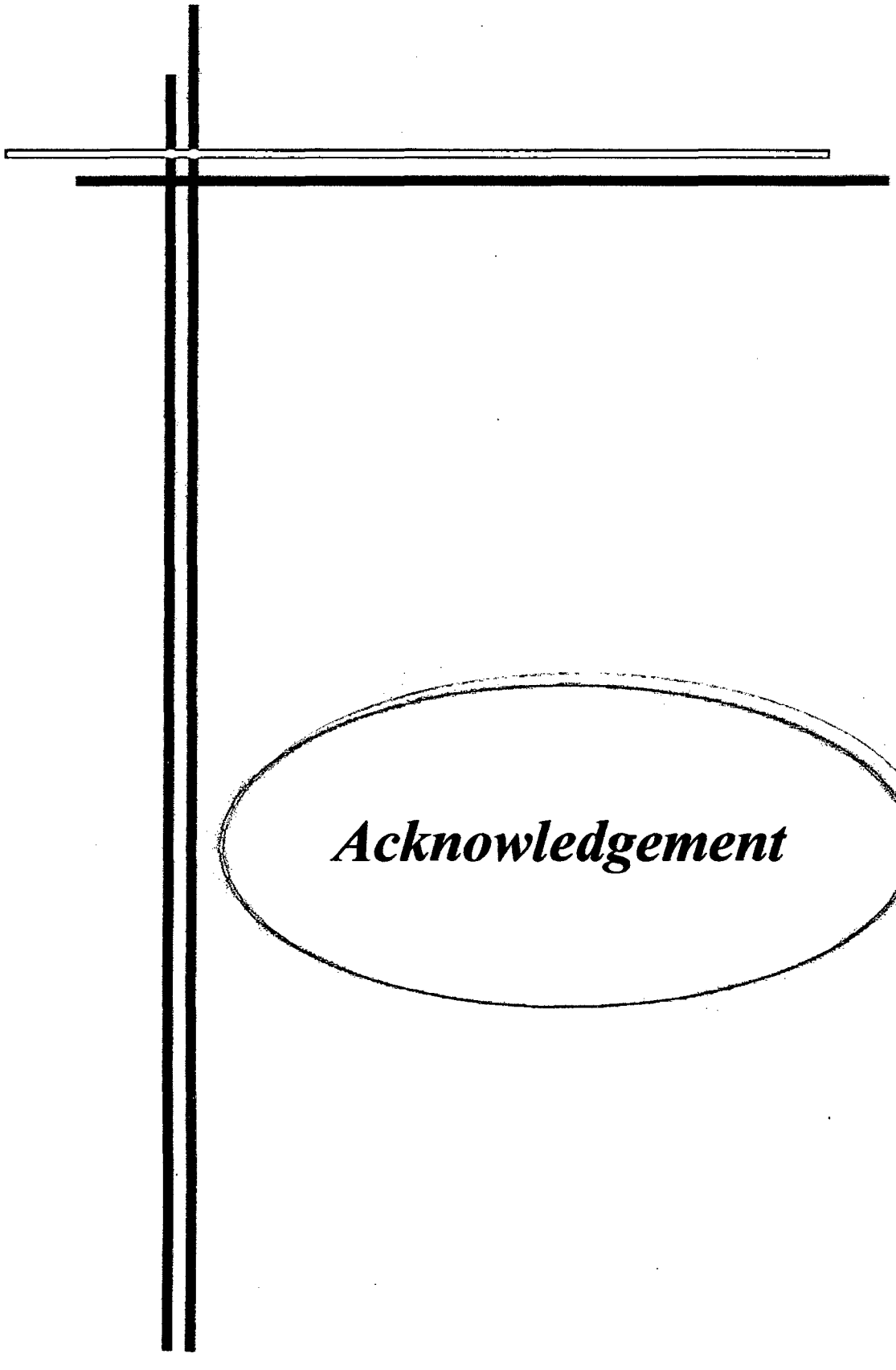

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(Hannure Wasim Mustafa)

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ACRONYMS

DDF	Dairy demonstration farm
A. I.	Artificial Insemination
Av.	Average
BMC	Bulk Milk Cooler
CI	Calving Interval
et al.	*Et alli* (and associates)
FMD	Foot and Mouth Disease
g	Gramm
GCMMF	Gujarat co-operative milk marketing federation
GOI	Government of India
H. F.	Holstein Frisian
HS	Hemorrhagic Septicemia
Kg.	Kilo gram
Lit.	Liter
LL	Lactation length
LRS	Livestock Research Station
m	Meter
No.	Number
OBC	Other backward classes
Sq. Ft.	Square feet
Std.	Standard
Symbols	
>	More than
<	Less than
≤	Less than or equal to
≥	More than or equal to
±	Plus or minus
₹	Rupees

Introduction

Chapter I

Introduction

In the face of economic liberalization the sustenance of rural livelihood is currently at stake than ever before. Livelihood options are shrinking in rural areas in general and more so in eco-fragile regions, such as drought, desert prone, hilly areas and other under developed / backward districts. Rapidly growing markets for livestock products in general and dairy products in particular (owing to rise in per capita income) are opening new avenues for enhancing rural incomes. Dairy farming plays significant role in sustaining the rural livelihood, although the phenomenon of farmer's suicides, migration, malnutrition / ill health are widely prevalent in rural India. However, some of the dairy farming based drought prone districts made rapid strides in ameliorating poverty by substantially contributing to the District / State agriculture economy.

As per the 18th livestock census, India has about 199.07 and 105 million cattle and buffalo population respectively which, contributes to around 14% and 56% of the world cattle and buffalo population, respectively. Milk production in India grew at a compound annual growth rate of 3.77 % in the last decade and reached a volume of 121.5 million tonnes milk in the year 2010-11 (GOI, 2011). Buffalo is the largest contributor to the milk pool with about 59.2 million tonnes followed by crossbred cows (25.3 million tonnes) and indigenous cows (22.4 million tonnes). The vast resources (more than 50 percent of the world's buffalos and 20 percent of its cattle) of livestock in the country play an important role in the national economy as well as in the socio-economic development of millions of rural households. Hence the importance of dairying in our country hardly needs to be emphasized. The operation flood programme, which was launched during 1970,

organizing dairy farmer's cooperatives in rural areas and linking them with urban consumers created a strong network for procurement, processing, and distribution of milk over a lakh villages in rural India.

Livestock sector provides employment to 18 million people and nearly 70 per cent of them are women. Further, dairy sector is the major source of income for an estimated 27.6 million people (Naidu, 2004). Among these, 65 to 70 per cent are small, marginal farmers and land-less labour. The dairy sector supports around 10 million members / farmers through one lakh cooperative societies existing in the country. Apart from employment generated by rearing of animals, the procurement of milk and its processing also provides substantial employment.

In dairy development sector, Gujarat occupied pride place, due to impressive stride organizing chain of co-operative dairies in the state, with around 4.43 percent of cattle's and 9.09 percent of buffalo's (Anonymous, 2010).

Gujarat is an important state in milk production and marketing in India on co-operative dairy system. It contributed around 8.84 million tonnes (7.85%) of milk to the total milk pool of India and per capita milk availability was 418 g / day during 2009-10 (GOI, 2011). Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF) is India's largest food product marketing organisation with annual turnover (2011-12) of US$ 2.5 billion. Its daily milk procurement is approx 13 million litre (peak period) per day from 16,117 village milk cooperative societies, 17 member unions covering 24 districts, and 3.18 million milk producer members. Amul dairy had established about 176 Dairy Demonstration Farms (DDF) spread over 8 talukas covering 62 villages. These DDFs serve as production hubs for Amul dairy producing 43587 lit of milk per day. The bank provide loan to the farmers for establishing dairy farms ranging from 5 to 25 high yield cows, cattle housing shed,

grass cutter, water sprinkler and water facility. The period of recovery is three to seven years. Amul provides health services, concentrate for feeding & technical guidance for dairy farming. This help in increase milk production in dairy farm and there by profit to the dairy farmer.

Production potential of livestock depends mostly on the genetic makeup animal and management practices under which they are reared and these practices vary significantly across various agro-ecological regions due to many factors. Understanding of livestock management practices followed by farmers in a region is necessary to identify the strengths and weaknesses of the rearing systems and to formulate suitable intervention policy (Gupta *et al.*, 2008). Each component of management practices interacts either independently or in combination to affect the productivity of the livestock. Proper housing reduces the energy wastage in maintaining thermo neutral zone as well as reduces the incidence of diseases (Sabapara *et al.*, 2010). Balanced and proper feeding results in better utilization of nutrients and optimum milk production. The animals fail to prove its genetic potential for higher production when fed at low levels. Underfeeding of young stock leads to undergrowth, delay in maturity and lower productivity than optimum after attaining the breeding age. For increasing the milk production and making the dairy business more remunerative it is imperative to go for adoption of improved management practices. Health care management, preventive measures like vaccination, deworming and timely treatments ensure proper health of animals that promotes their productivity (Singh *et al.*, 2007). Calves are the future dairy herd and require good management skills and constant attention.

The present study therefore has been designed to know about management of dairy demonstration farms, their productivity and economics with the following objectives.

OBJECTIVES:

1. To study socio-economic status of farmer holding dairy demonstration farm in Anand district.
2. Management of animal and housing at dairy demonstration farms.
3. Feeding management on dairy demonstration farms.
4. Milking management on dairy demonstration farms and their productivity.
5. Healthcare management on dairy demonstration farms.
6. Economics of dairy demonstration farms.

Review of Literature

Chapter II

Review of literature

A brief account of the research works done having a direct or indirect bearing on dairy farm management presented in this section under the following sub headings.

2.1 Socio-economic status of dairy farmer.

2.2 Management of dairy animal and housing of dairy farms.

2.3 Feeding management on dairy farms.

2.4 Milking management on dairy farms and their production.

2.5 Healthcare management on dairy farms.

2.6 Economics of dairy farms.

2.1 Socio-economic Status of Dairy farmer

It is usual to study the personal, social-economic status of the dairy farm owners while studying the various aspects of dairy husbandry practices. These characteristics contribute greatly in understanding and extent of adoption of improved dairy husbandry practices by dairy animal owners. Some of them are reviewed briefly below.

2.1.1 Age

Singh and Sastry (2002) conducted a study of tribal dairy farmers in Dirang circle of West Kameng district of Arunachal Pradesh and observed that 68.00 per cent dairy farmers were in middle age group (31-46 years), 20.00 per cent dairy farmers were in young age group (up to 31 years) and 12.00 per cent dairy farmers in old age group (above 46 years). While Ray *et al.,* (2004) reported that 60.50 per cent dairy farmers were in middle age group whereas 24 and 15.50 per cent dairy farmers belonged to old and young age group, respectively in Kamrup district of Assam.

Gangil and Dabos (2005) conducted their study in Udham Singh Nagar district of Uttaranchal to ascertain the socio-economic profile of livestock farmers and assess the effect of the socio-economic factors on their level of knowledge and training needs of livestock farmers. They revealed that the majority of farmers belonged to middle age group followed by old age group and young age groups. About 44 per cent Gir owners belonged to middle age (36 to 50 years) followed by 33 per cent and 23 per cent to young (up to 35 years) and old age (above 50 years) categories were reported by Divekar and Saiyed (2009) while studying the socio-economic status and milking practices followed by professional Gir cattle owners in and around Anand, Gujarat.

2.1.2 Education

Level of education help in adopting improved animal husbandry practices and decision making dairy business.

Kumar *et al.,* (1999) reported that 22.22 per cent of the respondents have studied up to high school level or above, 38.89 per cent up to intermediate level and 16.67 per cent have studied up to graduation and above. While Bordoloi *et al.,* (2005) reported that 50.67per cent of landless farmers were illiterate while 41.33 and 41.67 per cent of marginal and small farmers were illiterate, respectively.

Chowdhry *et al.,* (2006) conducted a survey in Banaskantha district of North Gujarat region and found that 15.00 per cent farmers were illiterate whereas, 46.00, 32.00 and 7.00 per cent farmers were educated up to primary, matric and above matric level respectively. While Dixit *et al.,* (2006) observed that 38 per cent of respondents had education up to primary level, 27 per cent respondents had education up to high school and 35 per cent respondents were above high school level. Whereas Divekar and Saiyed (2009) found that about 91 per cent of adult Gir owners were illiterate (cannot read & write), while only 5 per cent had primary education (1^{st} to 7^{th} std.) and 4 per cent had secondary and above level of education.

2.1.3 Caste

Kumar *et al.,* (1999) reported that in western parts of Uttar Pradesh majority respondents (91.67 per cent) belonged to general category, 5.56 per cent respondents were of other backward category (OBC) and 2.77 per cent respondents from scheduled caste category. While, studying socio-personal correlation with decision making and adoption of dairy practices in Varanasi district of Uttar Pradesh, Gautam *et al.,* (2007) observed that 66.3 per cent of respondents belonged to scheduled caste whereas 27.1 per cent and 6.1 per cent belonged to other backward (OBC) and general category respectively.

Divekar and Saiyed (2009) reported that majority (84 per cent) of the Gir owners belonged to Bharwad community; however 16 per cent of them were of Rabari community. Basically both these castes are categorized, under other backward castes (OBC).

2.1.4 Size of family

About 53.70 per cent dairy farmers had large family (7 members and above) while 30.90 per cent of them belonged to medium sized family (5-7 members), and only 15.40 per cent of the dairy farmers had small sized family (up to 4 members) in Punjab state (Dhammu and Gill, 2002)

Gautam *et al.,* (2007) concluded that 69.2 per cent had small family size, where 29.6 and 1.3 per cent were medium and large family size.

Singh *et al.,* (2008) observed that 20 per cent household have up to 4 members and 80 per cent household have above 4 members.

Divekar and Saiyed (2009) reported that 72 per cent of Gir owners had big size family (above 4 members) and 28 per cent had small family size (up to 4 members) of family.

2.1.5 Family type

Type of family joint and nuclear has impact on dairy management. Dhammu and Gill (2002) found that majority (67.90 per cent) of the dairy farmers of Punjab had joint type family while 32.10 per cent nuclear families. While, Shukla *et al.,* (2007) observed that majority of the families of farmers in Pithoragath district of Uttarakhand were nuclear with family size ranging from 4.67 to 5.80

Halakatti *et al.,* (2007) conducted a study in Haveri district of Karnataka and found that majority of the trained (59.85 per cent) dairy farm women had nuclear family.

Divekar and Saiyed (2009) observed that 65 per cent joint family and 35 per cent nuclear family were involved in rearing of Gir cattle in Anand district.

2.1.6 Land holding

Size of land holding has an impact on rearing practice of dairy animal. Patange *et al.,* (2001) found that the dairy farmers with large size of land holding tended to increase the milk production as compared to dairy farmers who had small land size.

Prasad *et al.,* (2001) revealed that, out of the total milk producers, 61 per cent possessed land and 39 per cent had no land. The average wetland holding was 4.82 acres among milk producers while, the dry land average was 6.29 acres among the milk producers who possessed dairy animal.

Singh and Sastry (2002) observed that 76 per cent respondents had up to two acre of land and those were having more than two acre land were only 8 per cent, whereas rest were landless.

Shukla *et al.,* (2007) studied the animal husbandry practices in Pithoragarh district of Uttarakhand state and found that the land holding of 73.34 per cent farmers fell in marginal category followed by 16.67 per cent, 6.66 per cent and 3.34 per cent in small, medium and landless category respectively.

Gangil *et al.,* (2005) observed that relationship between the land holding and level of knowledge of livestock farmers in animal husbandry practices was significant and positive. He further, concluded that large land holding farmers possess more knowledge as compared to small and marginal land holding farmers because large farmers have better resources and more exposure to mass media and they have more opportunities to acquire knowledge.

Divekar and Saiyed (2009) reported that 64 per cent farmers were landless, 30 per cent farmers had small holding up to 2.5 acres and 6 per cent had medium holding above 2.5 acres.

2.1.7 Vocational Diversification

Kumar *et al.,* (1999) observed that majority of the respondents (88.89 per cent) had agriculture farming as their main occupation, only 5.55 per cent of them have dairying and remaining 2.78 per cent were found to be engaged in agriculture labours.

Singh *et al.,* (2004) reported the out of total agriculture income (crops + livestock) about 67 per cent income generated from livestock components. Gautam *et al.,* (2007) observed that 79.1 per cent respondents had dairy as a main occupation

Divekar and Saiyed (2009) he reported that 56 per cent farmers generated income only from livestock and 44 per cent livestock and others.

2.2 Management of Animal and Housing Management of Dairy Farms

Understanding of livestock management practices followed by the farmers is crucial to identify the strengths and weakness of the animal rearing system so that appropriate intervention policies can be devised in order to have optimum production from the animals and more benefits to the farmers.

2.2.1 Management of animal

2.2.1.1 Herd strength

Mundhawa and Padheria (1998) reported that in Mehsana district of Gujarat majority of the respondents (63.56 per cent) had medium herd size (4 to 10 animals) followed by small herd size (1 to 3 animals) and large herd size (above 10 animals) constituting 7.11 per cent and 29.33 per cent respectively. while, Patel *et al.*, (2004) observed that majority of farmers (55.00 per cent) of Patan district preferred medium herd size (6-10 animals) followed by 28.00 percent large herd size (>10 animals) and 17.00 percent small herd size (1-5 animals).

Dixit *et al.*, (2006) he reported that 43 per cent respondents was having 1-2 buffaloes, 51 per cent having 3-5 buffaloes and only per cent more than 5 buffaloes. While, Divekar and Saiyed (2009) reported that 6 per cent of farmers had small size herd size up to (2 milch animal), 21 per cent medium (3-4 milch animals) and 73 per cent large size (more than 4 animals).

2.2.1.2 Wet and dry ratio

Wet and dry ratio of animal maintain on farm was essential better productivity of farms. Crossbred cow were maintain at Livestock Research Station farm of Anand Agriculture University, Anand. Where, average wet dry ratio of farm was 78: 20, (Anonymous, 2013).

2.2.1.3 Herd average and wet average

Singh (2007) reported that herd average of crossbreed cow was 9.91 lit in Imphal West District of Manipur while, herd average and wet average of crossbreed cow maintain at Livestock Research Station, Anand was 10.77 and 8.39 lit, respectively, (Anonymous, 2013).

2.2.1.4 Parity

Sahu *et al.*, (2011) reported that majority (78 percent) of commercial dairy farmer in Haryana district of Punjab prefer their animals to be in between first to fifth lactation as this is most productive age of animal.

2.2.1.5 Level of mechanisation

The farm mechanisation refers to extent of farm activity done with help of machines and equipment. Sahu *et al.*, (2011) reported that about 91.7 percent famers use milking machine while, 75 percent farmers having feed grinder with them.

2.2.2 Housing Management of Dairy Farms

2.2.2.1 Type of housing

Srivastava and Promila (1983) reported that in villages around Ludhiana city of Punjab as high as 78.00 per cent animal houses were close type. Remaining was only partially open and 92.00 per cent of sheds were having only one side open (poorly ventilated). While, Sharma (1996) observed that majority of the farmers kept their buffaloes in closed house made up of wood, bricks and mud and provided bedding of waste fodder and sand.

Kalyankar *et al.,* (2008) planned investigation to study the management practices of buffaloes in the nine agro-climatic zones of Maharashtra states and reported that 75.00 per cent farmers provides kuchcha type of stall to their livestock.

In Banaskantha district 44.62 per cent household kept their animals in the open throughout year and 31.72 per cent kept under close type housing reported by Chaudhary and Patel (2009)

Sabapara *et al.,* (2010a) reported that close type of animal house was provided by 98 per cent of the farmers. The Kaccha type of floor was observed in 87 per cent of the houses in the tribal area of Vansada Taluka of Navsari district in south Gujarat.

2.2.2.2 Location of shed

Patel *et al.,* (2005) surveyed the animal husbandry practices in dairy animals of semi-arid area of Patan district of North Gujarat and reported that majority (76.00 per cent) of the farmers were rearing the animals away from their own residence whereas 9.0 per cent farmers preferred to keep their animals along with their residence. While, 64.25 per cent respondents kept their buffaloes near to their dwelling house (Rathore *et al.,* 2009)

The study on bovine herd management in rural, semi-urban and urban areas of Bareilly Tahsil in Bareilly district of Utter Pradesh observed that brick floor in 65.56, 72.22 and 80 per cent of houses in rural, semi-urban and urban areas, respectively. Sizes of the houses were optimum in more than 73.33, 68.89 and 92.22 per cent of the farmers in rural, semi urban and urban areas. Rural farmers (63.3 per cent) shared their residence with the animals and this percentage was higher in semi-urban areas (83.3 per cent). Only around 26.67 per cent of farmer houses in rural and semi-urban areas had slope towards back 33.33 per cent and urban areas 65.56 per cent mostly slope toward back in (Sinha *et al.,* 2009).

Rathore *et al.,* (2010) in his study conducted in Churu district of Rajasthan, observed that majority (58.50 per cent) of the respondents kept their animals near dwelling house followed by separate from dwelling house (38.75 per cent) and inside dwelling house (2.75 per cent). While, Sabapara *et al.,* (2010a) reported that two types of houses found in the tribal area of Vansada Taluka of Navsari district in south Gujarat, 51 per cent of animals houses were attached to human dwelling and 49 per cent were separate from their own dwelling but nearer to it .

2.2.2.3 Direction of house

Sinha *et al.,* (2009) studied regarding direction of houses, in rural areas 55.6 per cent of the respondent's houses were in East-West direction, while majority of houses in semi urban (53.3 per cent) and urban areas (51.1 per cent) were in North-South direction.

2.2.2.4 System of housing

In rural area of Chhattisgarh state majority of the respondents (80.46 per cent) in the area of the study had single row system of animal housing and remaining 19.57 per cent of the respondents had double row system of animal housing, out of which 17.24 and 2.33 per cent of the respondents had tail to tail and head to head type of housing system reported by Deoras *et al.,* (2004).

Ahirwar *et al.,* (2010) reported that in rural areas most of the farmers have animal house of single line system. Whereas in urban area 58 per cent farmers keep their animals in single line and significantly higher number (30 per cent) had double row system of keeping their animal's preferably tail to tail system of housing.

2.2.2.5 Floor space

Deoras *et al.,* (2004) reported that in rural area of Chhattisgarh state and concluded that adequate floor space was available in animal houses of around 93 per cent of the respondents whereas, it was inadequate in animal houses of around only 7 per cent respondents. While, Sinha *et al.,* (2009) found that in the rural area 74.4 per cent of the dairy farmers provided adequate floor space, while, floor spaces provided by 25.6 per cent of the farmers were inadequate. In urban areas floor space was adequate in the animal houses of 86.7 per cent of dairy farmers while it inadequate in the animal houses of 13.3 per cent.

2.2.2.6 Light

Ninety three per cent of the cow sheds had provision of sufficient light while, it was not sufficient in the houses of only 7 per cent in rural area of Chhattisgarh (Deoras *et al.,* 2004)

The study was conducted on livestock husbandry scenario at high altitude of kumaon Himalaya and it was reported that, about 18.33 per cent of the respondents had provision of sufficient light in the animal house while it was not sufficient in the houses of 81.67 per cent of the respondents (Meena *et al.,* 2008). Whereas, Ahirwar *et al.,* (2010) found that 75.50 and 86 per cent of the respondents had adequate light in animal shed and light was inadequate in 24.5 and 16 per cent of animal shed in rural and urban areas respectively.

Rathore *et al.,* (2010) reported that only 18.25 per cent of the respondents had proper light provision in the animal sheds in Churu district of Rajasthan.

2.2.2.7 Natural ventilation

Pawar *et al.,* (2006) conducted a study on adoption of bovine heeding practices and constraints faced by tribal farmers of Pune district and found that significantly higher number of farmers provided ventilation in shed (86.70 per cent).

Bainwad *et al.,* (2007) studied the feeding and management practices adopted by buffalo farmers under watershed area of Parbhani district in Marathwada. They observed that all the respondents provided ventilation in the animal houses.

Sinha *et al.,* (2009) found that most of animal houses in rural (64 per cent) and urban (84.4 per cent) areas had provision of either good or fairly good type of ventilation. While, Swaroop and Prasad (2009) studied housing systems followed by dairy cattle and buffaloes farmers of Trans-Yamuna rural area of Allahabad district and he observed that 85 per cent of the respondents had no special provision of ventilation in the animal house.

2.2.2.8 Protection of animals from extreme weather conditions

Bhardwaj (1999) reported that most of the farmers were aware of protecting their buffaloes against inclement weather conditions. Whereas, Only 8.50 per cent of farmers followed the practices to protect their animals from extreme weather observed by Modi *et al.*, (2003) while studying degree of awareness of animal owner in Sabarkantha district

2.2.2.9 Cleanliness of house

Bainwad *et al.,* (2007) studied the feeding and management practices adopted by buffalo farmers under watershed area of Parbhani district in Marathwada and reported that sanitary condition in majority 93 per cent of the respondent's buffalo houses found clean.

Meena *et al.,* (2008) the study was conducted in livestock husbandry scenario at high altitude kumaon Himalaya and reported that, majority 91 per cent of the respondents had clean animal houses and remaining 9 per cent of the respondents had dirty animal shed.

Sinha *et al.,* (2009) found that around 85.6 and 64.4 per cent of the respondents had clean animal houses in rural and urban areas, respectively.

2.2.2.10 Type of floor

Patel *et al.* (2005), Chowdhry *et al.,* (2006) in North Gujarat and Singh *et al.,* (2007b) in Rajasthan in their study observed that most of the animal houses had kuchcha floor.

Singh *et al.,* (2007) studied the housing and health care management practices followed by dairy owners in Tonk and Jhunjhunu district of Rajasthan. They observed that all the respondents had Kuchcha type floor to their animal house.

Ahirwar *et al.,* (2010) carried out study to find out the prevailing managemental practices of dairy animals in rural and urban area of Indore district of Madhya Pradesh and reported that in rural area majority (65.33 per cent) of the respondents had mud floor animal house while, 31.33 per cent of the respondents had concrete type and 3.33 per cent of the respondents had brick type floor, Whereas in urban area only 13 per cent of the respondents had mud type floor and significantly higher number (82 per cent) of shed had concrete and 5 per cent of the respondents had brick type floor animal houses.

Majority of Gir cattle owners (94 per cent) provided kuccha type floor and only 6 per cent provided pucca type floor to their animal house (Divekar and Saiyed 2009).

Sinha *et al.,* (2009) reported that as far as type of floor was concerned, 85.6, 72.2 and 80 per cent of the respondents had brick type floor to their animal houses in rural, semi-urban and urban areas, respectively.

Sabapara *et al.,* (2010a) observed that majority of animal houses (87 per cent) had kuchcha type floor. This kuchcha floor was earthen and muddy floor type in 79.5 and 7.5 per cent, respectively.

Rathore *et al.,* (2010) reported that majority (87.50 per cent) of the buffalo owners had Kutcha type floor in the animal shed.

2.2.2.11 Slope in floor

To maintain cleanness in shed proper type of flooring with proper slope is important. Sinha *et al.,* (2009) observed that in the rural areas 36 per cent and 65.6 per cent of the respondents in the urban areas had floor slope towards back in their animal shed.

Rathore *et al.,* (2010) reported that regarding slope of floor, about half (51.50 per cent) of respondents had floor slope towards back in their cattle shed.

2.2.2.12 Type of pillar/pole

Divekar and Saiyed (2009) observed that the majority 50.33 per cent of the respondents used cemented type poles while 49.67 per cent of the respondents used wooden poles to support the roof. While, Sabapara *et al.,* (2010a) reported that majority 85.5 per cent of the tribal farmers used wooden type poles while 14.5 per cent of the trible farmers used cemented type poles in the shed of their animals.

2.2.2.13 Materials used in walls

Rathore *et al.,* (2010) from his study in Churu district of Rajasthan reported that around 51.75 per cent of the respondents used brick & lime and 44.75 per cent of the respondents used brick in mud to construction the wall of the animal house

2.2.2.14 Wall of house

Sinha *et al.,* (2009) reported that majority of the respondents had full wall their animal houses, which was 74.4, 63.3 and 54.4 per cent in rural, semi-urban and urban areas, respectively.

2.2.2.15 Type of roof

Patel *et al.,* (2005) surveyed the animal husbandry practices in dairy animals of semi-arid area of Patan district of North Gujarat and reported that the percentage of farmers providing asbestos sheets, galvanized iron sheets, earthen plates, thatched or no roof for their animal shelter were 12.00, 27.00, 11.00, 17.00 and 33.00 per cent, respectively.

Singh *et al.,* (2007) studied the housing and health care management practices followed by dairy owners in Tonk and Jhunjhunu districts of Rajasthan. They observed that majority of the respondents 57.50 per cent of the respondents had thatched roof.

It was observed that majority (94 per cent) of Gir owners did not provide any roof to their animals and kept them in open or under the tree shade, while 6 per cent Gir owners used asbestos or galvanized sheets (Divekar and Saiyed 2009).

Sinha *et al.,* (2009) reported that asbestos sheets, thatched material and galvanized iron sheets was the roofing material for the 25.6, 22.2and 12.2 per cent of the animal houses in rural and 58.6, 14.4 and 14.4 per cent of the animal houses in the urban areas, respectively.

In Churu district of Rajasthan large percentage (70.50 per cent) of the respondents used thatch material for roof of cattle shed. Only 26.50 and 3.00 per cent used asbestos and stone slab for roofing the shed, respectively (Rathore *et al.,* 2010).

Sabapara *et al.,* (2010a) reported that 94, 4.5 and 1.5 per cent of the respondents used earthen plates with thatched roof, cemented sheets roof and galvanized iron sheets asbestos as roofing material for their animal shed.

2.2.2.16 Slope of roof

Rathore *et al.,* (2010) the study was conducted in Churu district of Rajasthan and reported that 45.50 per cent of the respondents had single slope roof of shed followed by flat (36.75 per cent) and double slope (17.75 per cent) roof of shed.

2.2.2.17 Manger

Modi (2003) observed in his study of Sabarkantha district 75 per cent of the respondents had pucca type of manger while 25 per cent of the respondents had wooden assisted manger.

Singh *et al.,* (2007) studied the housing and health care management practices followed by dairy owners in Tonk and Jhunjhunu districts of Rajasthan. They observed that 43.75 per cent of the respondents had wooden mangers.

Rathore *et al.,* (2009) studies on existing management practices followed by the buffalo owners in Jhunjhunu districts of Rajasthan and concluded that manger feeding was a common practice but only 34.25 per cent of the respondents had pucca and optimum size manger.

Rathore *et al.,* (2010) the study was conducted in Churu district of Rajasthan and reported that 30.50 per cent of the respondents had pucca type of manger while 12 per cent of the respondents had wooden assisted manger.

Sabapara *et al.,* (2010a) observed that only 36 per cent tribal farmers provided manger. Out of those who provided manger majority, i.e. 86.11per cent respondents provided wooden assisted temporary manger of varying size and shape, while 13.89 per cent made the arrangement of pucca constructed manger.

2.2.2.18 Drainage system

Modi (2003) observed in his study area of Sabarkantha district, 18.00 percent respondents did not provide drainage and urine was allowed to be soaked in earthen floor of animal shed, while 82.00 percent respondents provided Pucca drainage. While, Deoras *et al.,* (2004) reported in rural area of Chhattisgarh state that about 52.87 per cent of the respondents had pucca drainage facility while remaining 47.12 per cent of the respondents had no drainage facility in their animal houses.

Patel *et al.,* (2005) surveyed the animal husbandry practices in dairy animals of semi-arid area of Patan district of North Gujarat and reported that only 16.00 per cent farmers provided pucca drainage in cattle sheds.

Chowdhry *et al.,* (2006) observed that 90.00 percent of cow shed had no drainage but allowed urine to be soaked in earthen floor, while 10.00 per cent had Pucca drainage in their study area of Banaskantha district.

Bainwad *et al.,* (2007) studied the feeding and management practices adopted by buffalo farmers under watershed area of Parbhani district in Marathwada. They observed that provision of pucca urine drain was made by 9.50 per cent farmers in animal houses.

Sinha *et al.,* (2009) reported that around 6.7 per cent of the respondents in rural and 25.6 per cent of the respondents in the urban areas have pucca type of drain in their animal houses. While, Rathore *et al.,* (2010) reported only 12 per cent had drainage channel in Churu district of Rajasthan.

Sabapara *et al.,* (2010a) conducted study in tribal area of Vansada Taluka of Navsari district in south Gujarat and reported that 6 per cent of the respondents had pucca drainage facility while remaining 94 per cent of the respondents had no drainage facility in their animal houses.

2.2.2.19 Use of bedding materials in winter season

Meena *et al.,* (2008) the study was conducted in livestock husbandry scenario at high altitude of kumaon Himalaya. The bedding material tree leaves was provided by the 91.66 per cent of the respondents while only 8.34 per cent of the respondents do not provided tree leaves as bedding materials in the winter.

Sinha *et al.,* (2009) observed that around 73.3 per cent of the rural farmers were using sugarcane leaves and 13.3 per cent of the farmers using straw as bedding material in winter, but in semi urban areas, 44 per cent of the farmers were using straw and 41.1 per cent of the farmers using sugarcane leaves whereas, in urban areas 28.9 per cent of the farmers were using straw and 22.2 per cent of the farmers using sugarcane leaves. A considerable large percentage (66 per cent) of the respondents used bedding material during winter season in Churu district of Rajasthan (Rathore *et al.,* 2010).

2.2.2.20 Location of manure pit

Sinha *et al.,* (2009) reported that majority of the respondents both in the rural (86.7 per cent) and urban (57.8 per cent) had manure pit located distantly to their animal houses. While, Tiwari *et al.,* (2007) reported that the 54.44 per cent of the respondents had manure adjacent to their animal houses.

2.3 Feeding Management on Dairy Farms.

2.3.1 Feeding system

Bhople and Varade (1998) surveyed Yavatmal district of Maharashtra and revealed that majority of cattle owners (52.22 per cent) maintained their cows only on grazing while 4.44 per cent owners used stall feeding and 43.33 per cent owners used both grazing and stall feeding.

In rural area of Chhattisgarh state, all the farmers sent their animals for grazing where as 93.00 per cent farmers sent their animals for grazing in urban areas (Deoras *et al.*, 2004)

Malik *et al.,* (2005) conducted a survey of existing dairy farming practices in Uttar Pradesh and reported that Grazing of animals was the most prevalent practice adopted by the cattle owners, whereas, stall feeding was followed by only 13 per cent of the respondents.

Kushwaha *et al.,* (2007) surveyed 217 villages in Etawah, Jalaun, Jhansi and Lalitpur districts in Uttar Pradesh and Bhind and Morena districts in Madhya Pradesh to study the status of Bhadawari breed of buffalo in its breeding tract and its conservation and reported that the majority of the respondents (62.1 per cent) followed both the practices stall feeding as well as grazing for their dairy animals and around 37.9 per cent of respondents followed stall feeding for their dairy animals.

Feeding and management practices adopted by buffalo farmers under watershed area of Parbhani district in Marathwada indicated that all owners send their buffaloes for grazing during day and tie them during night and stall feeding were not allowed. (Bainwad *et al.,* 2007)

Gupta *et al.,* (2008) reported that stall feeding (84.5 per cent) was the most prevalent practice adopted by the cattle and buffalo owners, whereas Grazing of animals was followed by only 8.1 per cent of the respondents by cattle and buffaloes owners in Rajasthan

Animals were allowed for graze by only 41.1, 32.2 and 20 per cent farmers in rural, semi–urban and urban areas, respectively (Sinha *et al.,* 2009). While, Rathore *et al., (2010)* reported that all the respondents grazed their animals in Churu district of Rajasthan.

Ahirwar *et al.,* (2011) reveals significant differences in feeding and breeding management practices of buffaloes reared under rural and urban areas of Indore District of M.P and observed that the 69.33 per cent of farmers of rural and 13 per cent farmers of urban area sent their animals out for grazing.

2.3.2 Feeding of milch animal

In Sabarkantha district all dairy respondent adopted individual feeding of dairy animals (Modi, 2003). Similarly Chowdhry *et al.,* (2006) also observed that all the respondents of their study area of Banaskantha district adopted individual feeding of dairy animals.

Gupta *et al.,* (2008) studied feeding management practices of cattle and buffaloes in Rajasthan and reported that 64.5 per cent of the farmers followed both individual as well as group feeding of milch animal while 19.1 and 16 per cent of the farmers followed individual and group feeding of milch animal, respectively.

Singh *et al.,* (2009) reported that in rural areas 54.4 per cent of the farmers fed (fodder and concentrate) their animals separately which was also similar in semi-urban areas (63.3 per cent), but 51 per cent of farmers fed (fodder and concentrate) to their animals in urban areas. Whereas, Majority (68.75 per cent) of the respondents fed their animals in groups while 31.25 per cent of the cattle keeper fed their animals individually (Rathore *et al.,* 2010).

2.3.4 Feeding of fodder

2.3.3.1 Green fodder

In Sabarkantha district most of the respondents (60 per cent) of the respondents fed both leguminous and non-leguminous green fodder, while 40 percent of the respondents fed non- leguminous feed only (Modi, 2003).

Dairy animals in semi-arid region of Patan district, most of the farmers (76 per cent) of the respondents provided both leguminous and non leguminous green fodder while 24 per cent of the respondents provided only non leguminous green fodder (Patel *et al.,* 2005). Whereas, Banaskantha district majority of the farmers (63.00 per cent) provided both leguminous and non-leguminous green fodder throughout year, while 37.00 per cent farmers provided only non-leguminous green fodder to their animals (Chowdhry *et al.,* 2006)

Hodshil *et al.,* (2007) studied the feeding practices adopted for Gaolao breed in Wardha district and reported that 14 per cent farmers fed balanced ration to their animals. Feeding of legumes and non-legumes green fodder/ straw in mixture was adopted by 38 per cent farmers.

Divekar and Saiyed (2008) studied feeding practices followed by professional cattle owners of Anand district and revel that majority (87.00 per cent) of the Gir owners grazed their animals on natural border grass of cultivated plot (shedha grass) followed by supplementation of green maize (38.00 per cent) as a green fodder, while majority (97.00 per cent) of them also preferred paddy straw as a dry fodder supplement.

Gupta *et al.,* (2008) studied on management practices and productivity status of cattle and buffaloes in Rajasthan and reported that the majority 88.8 per cent of the respondents fed green as well dry fodder whereas 9 per cent of the respondents fed dry fodder and only 1.8 per cent of the respondents fed green fodder to their animals.

2.3.3.2 Dry fodder

Sinha *et al.,* (2009) reported that Wheat straw was the best choice as dry fodder and was fed by 85.6, 90 and 97 per cent of farmers in rural, semi-urban and urban areas respectively.

Sabapara *et al.,* (2010a) found that around 98 per cent of farmers fed their animals only paddy straw as dry fodder and rest fed paddy + Jowar straw (2 per cent). In addition to paddy straw and paddy with Jowar straw 34 per cent of the respondents provided the dry border grasses (shedha) to their animals as dry fodder.

2.3.4 Chaffing of green and dry fodder

Chowdhry *et al.,* (2006) observed that in their study area of Banaskantha district, most of the farmers (92.00 per cent) fed green fodder to their dairy animal as such, while only 8 percent farmers fed chaffed green fodder. Nearly 35 per cent farmers fed chaffed dry fodder and 65 per cent farmers fed dry fodder as such.

Hodshil *et al.,* (2007) studied the feeding practices adopted for Gaolao breed in Wardha district and reported that chaffing green and dry fodders was adopted by 36 per cent farmers. While, Gupta *et al.,* (2008) reported that that chaffing green and dry fodders was adopted by 79.3 per cent of cattle and buffalo owner in Rajasthan.

Studies on existing management practices followed by the buffalo owners in Jhunjhunu districts of Rajasthan and revels that dry fodder chaffing was common practices in the area while only 42.50 per cent of the buffalo owners chaffed green fodder (Rathore *et al.,* 2009).

Sabapara *et al.,* (2010a) observed that almost all farmers (99 per cent) practiced to feed green / dry fodders as such only 1 per cent of the farmers offered chaffed green / dry fodders to their animals. While Rathore *et al.,* (2010) reported that only 32.50 per cent of the respondent's chopped green fodder.

2.3.5 Concentrate feeding

Modi (2003) observed that majority of the respondents (98.00 per cent) provided both balanced cattle feed and homemade concentrate to their animals.

Sohane *et al.,* (2004) conducted a survey in seven selected district of North Bihar, it was observed that different concentrate feeds viz., home mixed, compounded and home mixed plus compounded were used by 35, 22 and 43 per cent of farmers, respectively.

Patel *et al.,* (2005) reported that majority of the respondents (77.00 per cent) fed both homemade concentrates along with compounded cattle feed, while 23.00 per cent farmers provided compounded cattle feed only. While, Gupta *et al.,* (2008) reported that the majority (45.6 per cent) of the respondents fed to their animal homemade ingredients while, 31.4 per cent and 16.5 per cent owner fed compound cattle feed and both, respectively in Rajasthan.

Sabapara *et al.,* (2010a) reported that homemade and compounded cattle feed was provided by 89 per cent of the farmer whereas 7 per cent of the farmers provided only home produced ingredients as concentrate and remaining 4 per cent provided only compound cattle feed to their animals

Rathore *et al.,* (2010) concluded that majority (60.50 per cent) of the respondents fed home prepared concentrate mixture to their animals followed by readymade (21.50 per cent) and mixture of home prepared and readymade (18.00 per cent).

2.3.6 Method of concentrate feeding

Sinha *et al.,* (2009) observed that the feeding of concentrate mixed with fodder was practiced by 74.4 and 85.6 per cent of the farmers in the rural and urban areas, respectively.

Ahirwar *et al.,* (2011) reported that the in rural areas only a few (30 per cent) progressive and commercial farmers use concentrate mixture comprising of cotton seed cake / linseed cake, gram / chunie and wheat bran mixed with crop residues.

2.3.7 Criteria for concentrate feeding

Malik *et al.,* (2005) conducted a survey of existing dairy farming practices in Uttar Pradesh and reported that most of the farmers (89.00 per cent) adopted milk production criteria for concentrate feeding to their animals.

Divekar and Saiyed (2008) conducted a study on feeding practices followed by professional cattle owners of Anand district and reported that more than half (54 per cent) of the Gir owners fed their animals on the basis of their milk production, while 29 per cent did not follow any criterion to feed their animals and 17 per cent fed on the flat rate. While, all Farmers were feeding concentrate to their animal on the basis of their milk production, (Sabapara *et al.,* 2010a).

2.3.8 Time of concentrate feeding

Shirsat *et al.,* (1994) conducted the studies on adoption of improved dairy management practices by cattle owners in five villages of Parbhani district of Maharashtra and found that 90.83 per cent respondents were feeding concentrates at the time of milking. Whereas, study on feeding practices followed by professional cattle owners of Anand district indicate that all the Gir owners offered concentrates twice daily at both morning and evening milking time to their animals, (Divekar and Saiyed 2008)

Sabapara *et al.,* (2010a) it was observed that 91, 7 and 2 per cent of the farmers practiced concentrate feeding after milking, during milking and before milking, respectively. While, Rathore *et al.,* (2010) reported that majority (84.50 per cent) of the respondents were feeding concentrate to lactating cows at the time of milking.

2.3.9 Feeding Concentrate to calf

Practice of concentrate feeding to calf was studied by Rathore *et al.,* (2010) and reported that majority of the respondents (60.25 per cent) fed concentrate to young calf while remaining 39.75 per cent did not follow this practice.

2.3.10 Feeding Concentrate to heifer

Divekar and Saiyed (2008) conducted a study on feeding practices followed by professional cattle owners of Anand district and reported that majority of the Gir owners (77 per cent) fed the concentrate to their heifers. While Tiwari *et al.,* (2007) reported dairy farmers were not feeding any concentrates heifers.

Rathore *et al.,* (2010) reported that 92.25 per cent of respondents fed concentrate to the heifers while remaining 7.75 per cent of respondents did not follow this practice.

2.3.11 Concentrate feeding to advanced pregnant animals

Jagdale *et al.*, (2000) reported that 20 per cent of the respondents adopted the special feeding for 1-2 months before calving of buffalo during survey in Satara district of Maharashtra. Whereas, Modi (2003) observed that 70 per cent farmers fallow extra concentrate feeding during last 2-4 weeks of pregnancy to their dairy animals in his study area of Sabarkantha district of Gujarat.

Chowdhry *et al.,* (2006) observed that 74 per cent farmers of their study area of Banaskantha district allowed extra concentrate during last 2-4 weeks of pregnancy to their dairy animals.

Madke *et al.,* (2006) conducted a survey in three Tahsils of Bhandara district of Maharashtra state to study the adoption of scientific feeding practices by dairy farmers and reported that 44.67 per cent farmers of all categories adopted the feeding extra amount of concentrates to pregnant animals. While, Sabapara *et al.,* (2010a) reported that the majority of respondents (80 per cent) practiced to feed concentrates to their dairy animals during last 2 months of pregnancy.

2.3.12 Feeding after calving

Patel *et al.,* (2005) surveyed animal husbandry practices for dairy animals in semi-arid region of Patan district and observed that feeding of high energy food (bajra, jowar, grained wheat) mixed with ecbolic ingredients (suva, lali, methi) following calving was practiced by all farmers. While, in Anand district majority of Gir owners (66.00 per cent) fed calving mixture consisting of suva, methi, bajari and vegetable ghee to their animals after calving (Divekar and Saiyed 2008)

Sabapara *et al.,* (2010a) reported that practice of special feeding of animals after the calving was practiced by about 96 per cent of the dairy farmer in the tribal area of Vansada Taluka of Navsari district in south Gujarat.

2.3.13 Feeding of mineral mixture

Sohane *et al.,* (2004) observed that about 40 per cent farmers fed mineral mixture to their animals in selected districts of North Bihar. Similarly, Patel *et al.* (2005) recorded that 41 percent farmers were providing mineral mixture to their dairy animals in semi-arid region of Patan district. While, in Banaskantha district of Gujarat state 32 percent farmers were providing mineral mixture to their dairy animal (Chowdhry *et al.,* 2006).

Singh *et al.* (2007a) studied the status of breeding and feeding practices followed by the dairy owners in Tonk and Jhunjhunu districts of Rajasthan and concluded that feeding of mineral mixture was not followed by 91 per cent of the respondents. While, feeding of mineral mixture was followed by 29.75 per cent of the respondents in Jhunjhunu districts of Rajasthan (Rathore *et al.,* 2009)

Tiwari *et al.,* (2007) reported that feeding of mineral mixture to dairy cattle and buffalo was not adopted by 86 per cent of the respondents.

Sabapara *et al.,* (2010a) found that mineral supplements were provided by only 30.5 per cent of farmers to their milch animals where as 69.5 per cent of farmers did not follow this practice.

Aulakh *et al.,* (2011) while study on adoption of recommended feeding practices by the buffalo owners of Punjab and reported that 40.83 per cent of the respondents follow feeding of mineral mixture.

2.3.14 Feeding of salt

Madke *et al.,* (2006) conducted a survey on adoption of scientific feeding practices by dairy farmers in three Tahsils of Bhandara district of Maharashtra state and reported that 32.67 per cent farmers of all categories adopted feeding of common salt to their animals.

Hodshil *et al.,* (2007) studied the feeding practices adopted for Gaolao cattle in Wardha district and reported that use of common salt in diet of animal was adopted by 45 per cent farmers.

Singh *et al.,* (2007a) studied the status of feeding practices followed by the dairy owners in Tonk and Jhunjhunu districts of Rajasthan and concluded that feeding common salt was not followed by 61 per cent of the respondents. Whereas, Rathore *et al.,* (2009) observed that feeding of common salt was followed by 57.50 per cent of buffalo owners in Jhunjhunu districts of Rajasthan.

Tiwari *et al.,* (2007) reported that majority of the dairy owners (51.11 per cent) were not feeding salt regularly to their animals.

Sabapara *et al.,* (2010a) reported that only 18 per cent of the farmers provided extra salt to their milch animals whereas majority (82per cent) of farmers did not follow this practice.

2.3.15 Frequency of watering

Tanmay *et al.,* (2002) observed feeding practices in buffaloes followed by Vangujjars in Tanda forest range of Uttranchal and reported that it is common practice to providing water twice a day in summer and once in winter to the buffaloes.

In Banaskantha district of North Gujarat majority of farmers (97.00 per cent) provided water to their milch animal ad lib in quantity but restricted in frequencies. 72 per cent of the respondents provided water three times a day to their animals; where as 25.00 per cent of the respondents provided water two times a day to their animals. Only 3.00 per cent farmers provided free access of water to their milch animals (Chowdhry *et al.,* 2006).

Sabapara *et al.* (2010a) reported that almost all farmers (99 per cent) provided water to their milch animals ad lib in quantity but restricted in frequencies in which 2 times (1 per cent) to 3 times (98 per cent) a day were common in summer.

2.3.16 Source of water

Deoras *et al.,* (2004) reported that in rural area of Chhattisgarh state, majority of the rural farmers (97.00 per cent) provided water trough. Hand pumps and village ponds were the main sources of water.

Malik *et al.,* (2005) conducted a survey of existing dairy farming practices in Uttar Pradesh and reported that either Bore well or Hand pump was the main source of drinking water for animals as indicated by 98.00 per cent of respondents.

Singh *et al.,* (2007b) observed that majority (73.61 per cent) of the respondents depended on ponds and wells as a source of drinking water and there was no provision of water trough in majority (85.41 per cent) of animal sheds in Tonk and Jhunjhunu districts of Rajasthan.

Sabapara *et al.,* (2010a) reported that majority of the respondents depended on wells (52.5 per cent) followed by Bore well (25 per cent) and Hand pump (22.5 per cent) as a source of drinking water to their dairy animals.

2.4 Milking Management and Production.

2.4.1 Milking management

2.4.1.1 Frequency of milking

Meena *et al.,* (2008) conducted study on livestock husbandry scenario at high altitude of Kumaon Himalaya and reported that 92 per cent of the respondents followed two times milking. While, Chowdhry *et al.,* (2008) observed that all the respondents (100.00 per cent) followed two times milking under co-operative network of Banas milk union of North Gujarat.

Kalyankar *et al.,* (2008) studied the management practices of buffaloes in the nine agro-climatic zones of Maharashtra states and reported that all the households (100.00 per cent) followed two times milking. Similarly, Rathore *et al.,* (2010) also reported that all the respondents practice twice a day milking in Churu district of Rajasthan.

2.4.1.2 Udder washing before milking

Practicing regularly udder washing before milking is importent in clean milk production. Bainwad *et al.,* (2007) observed that almost all buffalo owners washed udder before milking, cleaned sheds and shaved buffaloes regularly in Parbhani District of Maharashtra.

Kushwaha *et al.,* (2007) surveyed 217 villages in Etawah, Jalaun, Jhansi and Lalitpur districts in Uttar Pradesh and Bhind and Morena district in Madhya Pradesh and reported that majority of the farmers (95.90 per cent) practiced cleaning the teats and udder prior to milking and only 3.60 per cent of the farmers reported the washing of whole animal before milking particularly in the evening.

Meena *et al.,* (2008) conducted study on livestock husbandry scenario at high altitude of Kumaon Himalaya and reported that the majority (80.33 per cent) of the respondents washed teats along with udder of milking animal before milking.

Chowdhry *et al.,* (2008) conducted a survey to study the adoption of milking and healthcare practices of dairy animals under co-operative net- work of Banas milk union of North Gujarat and observed that all the respondents followed milking after cleaning teat and udder by splashing water.

Gupta *et al.,* (2008) conducted a survey to know management practices and productivity status of cattle and buffaloes in Rajasthan and reported that nearly 97 per cent households adopted the practices of washing udder before milking.

Kalyankar *et al.,* (2008) studied the management practices of buffaloes in the nine agro-climatic zones of Maharashtra state and reported that all the respondents washed teats along with udder before milking.

Rathore *et al.,* (2010) reported that all the respondents followed milking after cleaning teat and udder by splashing water in churu district of rajasthan.

Sinha *et al.,* (2010) studied milking management practices in rural, semi urban and urban areas of Bareilly district of Uttar Pradesh udder and reported that in rural 90 per cent of the respondent and all the respondents in urban areas followed milking after cleaning teat and udder by splashing water.

2.4.1.3 Method of milking

Malik *et al.,* (2005) conducted a study to know the existing dairy farming practices in Uttar Pradesh and reported that the most commonly used method of milking was knuckling as indicated by 70.00 per cent of the cattle owners, whereas, full hand method was followed by only 24.00 per cent of the respondents. There were 16.00 per cent of the cattle owners who used full hand milking followed by knuckling for milking their animals. While, Pawar *et al.,* (2006) conducted a study on adoption of bovine heeding practices and constraints faced by tribal farmers of Pune district and found that 85.00 per cent farmers followed knuckling method of milking.

Meena *et al.,* (2008) conducted study on livestock husbandry scenario at high altitude of Kumaon Himalaya and reported that 30.66 per cent of the respondents followed full hand milking whereas, 48.33 per cent of respondents practiced stripping method of milking and remaining 21.01 per cent followed knuckling method of milking.

Chowdhry *et al.,* (2008) conducted a survey to study the adoption of milking practices of dairy animals under co-operative net work of Banas milk union of North Gujarat and observed that 99.00 per cent of the farmers were habituated to knuckling method of milking, while only one per cent farmers practiced full hand milking method. Whereas, Deshmukh *et al.,* (2009) observed that full hand method of milking was followed 16 per cent buffalo owners of Parbhani district.

Rathore *et al.,* (2010) reported that 81.75 per cent of the respondents followed knuckling method of milking and 18.25 per cent of respondents followed full hand method of milking in Churu district of Rajasthan.

Sinha *et al.,* (2010) studied milking management practices in rural, semi urban and urban areas of Bareilly district of Uttar Pradesh and reported that in rural (74.4 per cent) and urban (46.7 per cent) respondents followed knuckling method of milking whereas 18.9 per cent of respondents in rural and 46.75 per cent of respondents in urban areas followed full hand method of milking.

2.4.1.4 Stripping at the end of milking

Varma (1989) reported that none of the respondent practiced stripping at the end of milking. While, Malik and Nagpaul (1999) found that 62.22 per cent of the respondents were followed stripping at the end of milking in Murrah buffalos in its home tract of Haryana.

Swaroop and Prasad (2009) reported that 73 per cent of the respondents followed stripping at the end of milking in dairy cattle and buffaloes of Trans-Yamuna, rural area of Allahabad district.

Highest 86.25 per cent of the dairy farmer followed stripping at the end of milking was reported by Rathore *et al.,* (2010) Churu district of Rajasthan.

2.4.1.5 Place of milking

Malik and Nagpaul (1999) conducted the studies on milking and calf rearing management practices of Murrah buffalo in its home tract of Haryana and found that 38.89 per cent of the respondents milked their animal at the same place while 61.11 per cent respondents milked the animals at separate and dry place.

In Rajasthan majority (77.5 per cent) of dairy farmer milked their animal at the same place while only 23 per cent respondents milked the animals at separate and dry place reported by Gupta *et al.,* (2008). Similarly, majority of the 75.5 per cent of dairy farmer milked their animal at the same place while only 19.5 per cent dairy farmer milked the animals at separate and dry place in Trans-Yamuna, rural area of Allahabad district (Swaroop and Prasad 2009).

Rathore *et al.,* (2010) conducted study in Churu district of Rajasthan and reported that 33.25 per cent of the respondents milked their animal at the same place while 66.75 per cent respondents milked the animals at separate and dry place.

Sinha *et al.,* (2010) comparative studied milking management practices in rural, semi urban and urban areas of Bareilly district of Uttar Pradesh and reported that 55.6 per cent of the rural dairy farmer and 86.7 per cent of the urban dairy farmer milked their animal at the same place.

2.4.1.6 Type of milking pail

Meena *et al.,* (2008) observed that 97.33 per cent of the respondents used open mouth bucket for collection of milk at high altitude Kumaon Himalaya. While, the dairy cattle and buffaloes farmers of Trans-Yamuna rural area of Allahabad district about 78 per cent of the respondents used open mouth bucket for collection of milk (Swaroop and Prasad, 2009)

All the respondents used open mouth bucket for collection of milk in Churu district of Rajasthan was reported by Rathore *et al.,* (2010) and Sinha *et al.,* (2010) in rural, semi urban and urban areas of Bareilly district of Uttar Pradesh.

2.4.1.7 Teat dipping followed

Deshmukh *et al.,* (2009) reported that practices of teat dipping using antiseptic solution were followed by only 3 per cent respondents in Parbhani district.

2.4.1.8 Cleaning of milking utensils

Shirsat *et al.,* (1994) reported that 92.50 per cent of the respondents washed their milking utensils by hot water.

Malik and Nagpaul (1999) conducted the studies on milking and calf rearing management practices of Murrah buffalo in its home tract of Haryana and found that all the respondents washed and cleaned their buckets with clean water before milking and Bainwad *et al.,* (2007) also observed that all the buffalo owners cleaned their milking utensils before milking in Parbhani district of Maharashtra.

Kushwaha *et al.,* (2007) surveyed 217 villages in Etawah, Jalaun, Jhansi and Lalitpur district in Uttar Pradesh and Bhind and Morena district in Madhya Pradesh and reported that majority of the farmers 92 per cent of the respondents adopted the practice of cleaning of milking utensils. While, Rathore *et al.,* (2010) reported that 56.50 per cent of the respondents washed their milking utensils with hot water in Churu district of Rajasthan.

2.4.1.9 Disposal of Milk

Kushwaha *et al.,* (2007) surveyed 217 villages in Etawah, Jalaun, Jhansi and Lalitpur district in Uttar Pradesh and Bhind and Morena district in Madhya Pradesh and reported that 87.7 per cent farmers disposed their daily milk through middle men whereas 12.3 per cent farmers disposed their milk through private milk vendor.

Meena *et al.,* (2008) conducted study on livestock husbandry scenario at high altitude Kumaon Himalaya and reported that 56.33per cent respondents disposed off their milk through village primary milk co–operative society.

Chowdhry *et al.,* (2008) studied the adoption of milking practices of dairy animals under co-operative net work of Banas milk union of North Gujarat and observed that all the respondents disposed their major portion of milk through village dairy co-operative society.

Gupta *et al.,* (2008) conducted a survey to know management practices and productivity status of cattle and buffaloes in Rajasthan and reported that 23.90 per cent farmers disposed their daily milk through co-operative society whereas 76.10 per cent farmers disposed their milk through private milk vendor.

2.4.1.10 Test for mastitis diagnosis

Testing animal for mastitis was reported by 44 per cent of the dairy farmer in Ludhiana district of Punjab (Gill and Saini, 2008)

2.4.2 Production and reproductive performance of cows on dairy farm

2.4.2.1 Calving interval

Joshi (1998) was observed that the average calving interval of 411 days in crossbred cattle. Patel (2006) carried experiment on genetic analysis of production and reproduction traits of triple cross cattle on organised farm and reported that average calving interval in case of triple cross was 409 days.

Husain *et al.,* (2012) studied the reproductive performance of dairy cow under field condition of Assam state. They found that calving interval of jersey X local cow and H. F. X local cow was 393 and 422 days respectively. While, Moges *et al.,* (2012) reported the first calving interval of crossbreed cow was 441 days. Anonymous (2013) reported that lactation length of crossbred cow maintain at LRS farm Anand was 359 day.

4.2.2.2 Average No. AI per conception

Anonymous, (2013) reported that average no. of artificial insemination per conception of crossbred cows maintain at Livestock Research Station Anand was 1.33 per animal.

2.4.2.3 Dry period

Chowdhry *et al.,* (2008) conducted a survey to study the adoption of milking and healthcare practices of dairy animals under co-operative net work of Banas milk union of North Gujarat and observed that 90.28 and 9.72 per cent respondents adopted practice of drying off their dairy animals for less than two months and more than two months before calving, respectively.

Sinha *et al.,* (2010) studies management practices in rural, semi urban and urban areas of Bareilly district of Uttar Pradesh and observed that most of the farmers in all the areas were not using any drying off procedure animals got self dried in 96.7 per cent cases in rural areas and 98.9 per cent each in urban areas. While, dry period of crossbred cow on LRS farm Anand was 73 days (Anonymous 2013).

2.4.2.4 Lactation length

Lactation length is the period from day of calving till day on which animal dry off. Joshi (1998) reported lactation length of 322 to 407 days in crossbred cattle. While, Roy and Saha (2003) observed 335 days lactation length in crossbred cows

Dubey and Singh (2005) know estimated lactation length of 280-332 day in Sahiwal crossbred cattle.

Patel (2006) studied the production and reproduction traits in triple cross cattle on an organised farm. He reported that the lactation length of crossbred cow was 305 days. Lactation length of 317.72 days in three breeds' crosses was reported by Madhuri *et al.*, (2009).

Kumar and Pathania (2011) study the economic performance of organised dairy farm at CSKHPKV Palampur reported that lactation length of a crossbred cow was found to be 323.5 to 414 days. While, lactation length of crossbred cow of LRS farm Anand was 359 days reported by anonymous (2013).

2.4.2.5 Lactation yield

Lactation milk yield of 3055 kg per lactation in crossbred cows was reported by Joshi (1998). While, Roy and Saha (2003) recorded lactation yield of 2730 lit per lactation in jersey crossbred cattle whereas, organised dairy farm at CSKHPKV Palampur lactation yield of a crossbred cow was found to be 2259 lit per lactation (Kumar and Pathania 2011)

Singh *et al.*, (2011) conducted a survey to know economic analysis of milk production in peri-urban farms of Punjab. They reported that average annual milk production per animal was 3393.3 lit. per lactation. Moges *et al.*, (2012) studied the genetic and phenotypic parameters of first lactation and lifetime performance traits in crossbred and observed that the first lactation milk yield of 2656 kg. While, average lactation yield of 3781.75 lit of crossbred cow of LRS farm Anand was reported by Anonymous (2013)

2.4.2.6 Average milk yield per day of lactation length

Singh *et al.* (2005) reported that average milk yield per day of lactation length of crossbred cow was 7.53 Kg while, Patel (2006) found 7.34 kg of average milk yield per day of lactation length in cross bred cows

2.4.2.7 Average milk yield per day of calving interval

Patel (2006) reported that average milk yield per day of calving interval was 5.7 kg in crossbred cows, while milk yield per day calving interval was 10.32 lit in cross bred cows (Islam *et al.*, 2013)

2.5 Healthcare Management on Dairy Farm.

2.5.1 Vaccination

To get optimum milk production from farm animals it is desirable to have good health of animal. It is better to follow 'prevention better than cure' to maintain health of livestock. The study of existing dairy farming practices in Uttar Pradesh indicates that very few farmers were getting their animals vaccinated, especially crossbred animals were vaccinated against foot and mouth (22.00 per cent) and Haemorrhagic septicaemia diseases (29.00 per cent) reported by (Malik *et al.,* 2005)

Pawar *et al.,* (2006) studied on constraints faced by tribal farmers of Pune district and found that 99.20 per cent farmers follow disease control practices like preventive vaccination. About 46.00 per cent of dairy owners in Tonk and Jhunjhunu districts of Rajasthan adopted vaccination against haemorrhagic septicaemia (Singh *et al.,* 2007b). While, Kalyankar *et al.,* (2008) reported that 65.00 per cent households were well aware about the vaccination to prevent diseases.

The study on 150 farmers of Ludhiana district of Punjab revelled that 92.33 per cent of the respondents practiced regular vaccination of their animals against Foot and Mouth disease and Haemorrhagic septicaemia (Gill and Saini 2008).

Meena *et al.,* (2008) conducted study on livestock husbandry scenario at high altitude kumaon Himalaya and reported that 26.66 per cent of the respondents practiced regular vaccination of their animals against Foot and Mouth disease and Haemorrhagic septicaemia. While, 47 per cent of cattle and buffalo owner in Rajasthan (Gupta, 2008)

Tiwari *et al.,* (2007) reported that 81.09 per cent of the respondents practiced regular vaccination of their animals against Foot and Mouth disease and Haemorrhagic septicaemia. While, study conducted by Sabapara *et al.,* (2010b) to document information on healthcare management practices followed by the dairy animal owners of Vansada taluka of Navsari district of south Gujarat and reported Regular vaccination was practiced by 79.0 per cent respondents for their animals against foot-and-mouth disease and haemorrhagic septicaemia disease, while 21 per cent respondents did not follow vaccination practice against any diseases.

2.5.2 Deworming

About 85.00 per cent of tribal farmers of Pune district follow deworming their milch animals (Pawar *et al.,* 2006)

Singh *et al.,* (2007b) studied the health care management practices followed by dairy owners in Tonk and Jhunjhunu district of Rajasthan and observed that only very few respondents followed deworming of adult animals. Whereas, only 11.66 per cent of the respondents practiced deworming to their milch animals at regular intervals at high altitude Kumaon Himalaya (Meena *et al.,* 2008)

Chowdhry *et al.,* (2008) conducted a survey to study the healthcare practices of dairy animals under co-operative net- work of Banas milk union of North Gujarat and observed that 13.00 and 34.00 per cent farmers practice deworming for their milch animal at regular and occasional interval, respectively. While, in calf 36 per cent farmers practice deworming on regular basis, however 28 per cent farmer never practice deworming

Rathore *et al.,* (2010) recorded that 22.25 per cent of the respondents practice deworming of their milch animals at regular intervals in Churu district of Rajasthan.

Sabapara *et al.,* (2010b) conducted field study to document information on healthcare management practices followed by the dairy animal owners of Vansada taluka of Navsari district of south Gujarat and reported 25.5 per cent of the respondents practiced deworming to their milch animals at regular intervals. Whereas deworming in calves were followed by only 25.50 per cent respondents whereas 70 per cent respondents followed occasionally and remaining 4 per cent did not give any medication to control the endo-parasites

Existing dairy farming practices in Uttar Pradesh indicate that 49.00 per cent of the respondents adopted the deworming in calves (Malik *et al.,* 2005). While, Gupta *et al.,* (2008) reported that almost one third of the farmers were adopted deworming of calves in Rajasthan.

Kalyankar *et al.,* (2008) studied the management practices of buffaloes in the nine agro-climatic zones of Maharashtra state and reported that 38.00 per cent households followed the deworming of calves.

2.5.4 Control of ecto – parasites

Malik and Nagpaul (1999) found that 91.11 per cent of Murrah buffalo owner in its home tract of Haryana follow the practice of controlling ecto- parasite. Similarly, 86.70 per cent tribal farmers of Pune district follow lice or ticks eradication practices (Pawar *et al.,* 2006)

Yadav *et al.,* (2009) conducted a field survey of indigenous cow management practices followed by the tribal farmers of Dungarpur district of Rajasthan and observed that only 25.00 per cent of the respondents were adopting tick or lice control measures.

Management practices adopted by buffalo farmers in Parbhani district indicated that 86 per cent farmer followed spraying of insecticides in shed and on animal's body at monthly interval for control of ecto parasites (Deshmukh *et al.,* 2009). Whereas, Rathore *et al.,* (2010) reported that 96 per cent respondents follow this practice in Churu district of Rajasthan.

Sinha *et al.,* (2010) reported that in urban area 71.1 per cent of the respondents and rural area 77.8 per cent of the respondents followed practice of controlling ecto-parasite, while studying of calf rearing and milking management practices in rural, semi urban and urban areas of Bareilly district of Uttar Pradesh.

2.5.5 Sanitation of shed / shelter / standing place

Chowdhry *et al.,* (2008) observed that 89.00 per cent farmers cleaned animal sheds, while 11.00 per cent farmers did not give any attention towards sanitary condition of animal shed while, studying the management of dairy animal under co-operative net- work of Banas milk union of North Gujarat.

Gill and Saini (2008) conducted study on 150 farmers of Ludhiana district of Punjab and reported that all the respondents had practice cleaning shed daily. Similarly, Rathore *et al.,* (2010) observed 91.50 per cent of the respondents had clean shed daily in Churu district of Rajasthan.

Management practices followed by the dairy animal owners of Vansada taluka of Navsari district of south Gujarat indicates 20.50 per cent respondents cleaned shed, while 79.50 per cent farmers did not give more attention towards sanitary condition of shed (Sabapara *et al.,* 2010b).

2.5.6 Management of Sick animals

Malik *et al.,* (2005) conducted a study of existing dairy farming practices in Uttar Pradesh and reported that 23 per cent of the respondent's availed services of livestock inspectors for the treatment of their sick dairy animals while remaining 75 per cent of them availed the services of qualified veterinarians for the treatment of their animals.

Singh *et al.,* (2007b) studied healthcare management practices followed by dairy owners in Tonk and Jhunjhunu districts of Rajasthan and reported that majority (53.00 per cent) of the respondents approached to veterinarian for treatment of their sick animals.

The study was conducted in livestock husbandry scenario at high altitude kumaon Himalaya by Meena *et al.,* (2008) and reported that 17.11 per cent of them availed the services of qualified veterinarians for the treatment of their animals. Similarly, Gill and Saini (2008) reported that 98.67 per cent of them availed the services of qualified veterinarians for the treatment of their animals in Ludhiana district of Punjab.

Study on the adoption of healthcare practices of dairy animals under co-operative net work of Banas milk union of North Gujarat indicate that 14 per cent of the respondents availed services of livestock inspectors for the treatment of their sick dairy animals while remaining 86 per cent of them availed the services of qualified veterinarians for the treatment of their animals. Chowdhry *et al.,* (2008)

Rathore *et al.,* (2010) reported that 63.50 per cent of the respondents' availed services of livestock inspectors for the treatment of their sick dairy animals while remaining 18 per cent of them availed the services of qualified veterinarians for the treatment of their animals. in Churu district of Rajasthan

Sabapara *et al.,* (2010b) a field study was conducted on health-care management practices followed by the dairy animal owners of Vansada taluka of Navsari district of south Gujarat and reported only 10 per cent of the respondents took the services of a qualified veterinarian for treatment and remaining 90 per cent took services of livstock inspector.

2.5.7 Housing of diseased animals

Gupta *et al.,* (2008) reported that about 10 per cent of the respondents kept diseased animals together with healthy ones while remaining 90 per cent of the respondents kept these two categories of animals separately in Rajasthan. Whereas, Meena *et al.,* (2008) reported that about 94 per cent of the respondents kept diseased animals together with healthy ones, while remaining 6 per cent of the respondents kept these two categories of animals separately.

Study conducted on 150 farmers of Ludhiana district of Punjab revels that about 26 per cent of the respondents kept diseased animals together with healthy ones while remaining 72 per cent of the respondents kept these two categories of animals separately (Gill and Saini, 2008)

Deshmukh *et al.,* (2009) observed that 96 per cent of the respondents segregated the diseased animals from healthy animals during study of adoption of buffalo management practices by buffalo farmers in Parbhani district.

Rathore *et al.,* (2010) conducted study in Churu district of Rajasthan and reported that about 34.50 per cent of the respondents kept diseased animals together with healthy ones while remaining 65.50 per cent of the respondents kept these two categories of animals separately.

2.6 Economics of Dairy Farms.

Kumar and Rout (1975) in their study on economic response to feed on milk production for different types of feeds of dairy cows in Hariyana, found that feed was the most significant factor influencing milk yield. Feed cost accounted for 60-70 per cent of the total cost of production.

Parthasarathy (1975) studied the economics of milk production on hundred dairy farmers supplying milk to the Integrated Milk Project (I.M.P), Vijayawada, and Krishna district of Andhra Pradesh. The input output ratios, cost components were analyzed. They revealed that the average output input ratio was 1.31 per animal and the average yield was 2024kg per lactation and the total cost of maintenance was ₹ 3112 and 85 per cent of it was on feeds.

Biradar (1999) employed break even analysis technique in dairy enterprise in Udgir taluka, Lathur district of Maharashtra. He observed that the break even milk production (BEP) among beneficiaries was 1291 lt. at the given price of milk i.e., Rs 7.23 further, the average BEP price per litre of milk ₹ 7.55. He concluded that either milk producers should able to procure 1291 litre for BEP level or the price should be raised from ₹ 7.23 to ₹ 7.55. The prices paid to milk producers were not remunerative.

Economics of milk production in Kanpur (dehat) district of Uttar Pradesh, two blocks from the selected district and five villages from each selected blocks were selected randomly in proposition to the number of farmers categorized under three size groups of 0-1,1-2 and above two hectares. The study revealed that the total maintenance cost of a milch animal per lactation increased as farm size increased. On an average the maintenance cost of milch animal during a lactation period came to ₹ 10278. Amongst all labour charges accounted for the highest share followed by fodder and concentrates. The gross income from milk production was higher on large farmers because of excess utilization of concentrates by large farmers. Output input ratio was the highest on small farmers and it was 1.31.Elasticity of production for fodder was the highest followed by human labour and concentrates for all farms (Rao *et al.,* 2009*)*

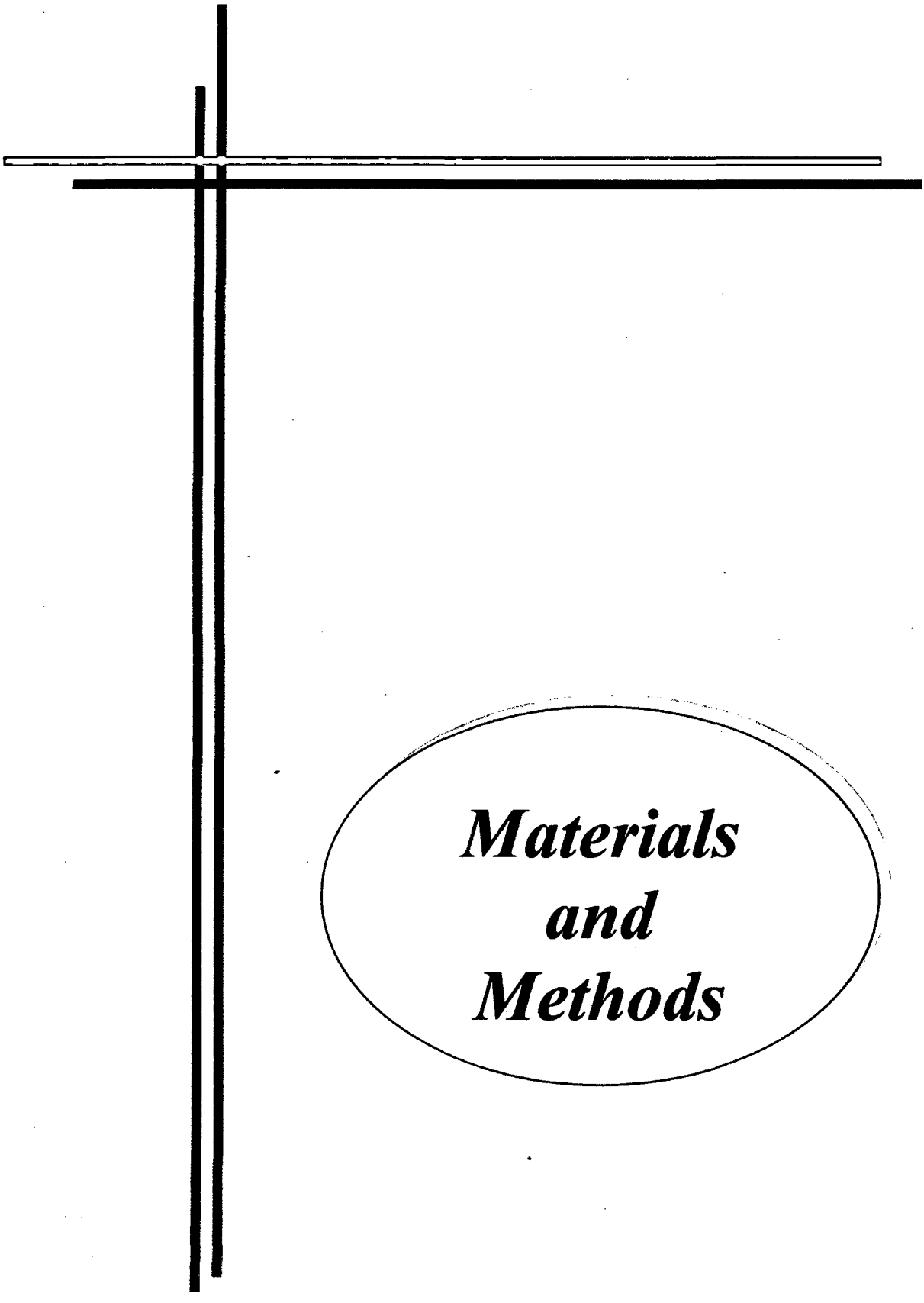
Aitwade *et al.,* (2005) studied the economics of milk production from crossbreed cows in Akola district of Maharashtra state. Who found that cost of feeding dry fodder, green fodder and concentrate were 22.97, 16.33 and 23.44 ₹ daily respectively. They also reported that miscellaneous charges, interest on working capital and total variable cost per animal per day were 1.39, 10.40 and 90.35 ₹ per day. Total fixed depreciation cost of an animal was found to be 9.65 ₹ .per day. Study also revealed that cost of milk production was ₹. 5.71 per litre of milk with profit of ₹. 3.25 per litre of milk.

Singh and Agarwal (2007) workout on economics of milk production in Imphal west district of Manipur and found following results. The overall cost per litre of milk was ₹ 11.02 with daily maintenance cost per animal ₹ 72.95 They also found that cost of feeding dry fodder, green fodder, concentrate, labour and miscellaneous charges were ₹ 6.53, 18.53, 20.23, 8.71, and 5.98 per animal per day. Net return from each crossbred cow was ₹ 14.84 per day.

Sirohi *et al.,* (2007) conducted experiment to study economics of milk production: variation across productivity level in Karnal district of Haryana and found that total fixed cost which includes depreciation on fixed cost and interest on fixed capital was ₹ 12.88, 8.01 and 4.88 per animal per day respectively. She observed that cost of feeding dry, green and concentrate fodder, labour and veterinary & miscellaneous were ₹ 9.86, 13.68, 28.49, 4.42, and 1.55 per animal per day respectively. She also found that Av. milk yield, value of milk, value of dung and net profit per animal per day were 12.41 lit., 107.6, 1.28, 35.32 ₹ respectively.

Triveni *et al.,* (2009) study on cost of milk production in Tahsil of Bareli district cost of milk production for urban areas was ₹. 14.1, 11.7, 14.5, 14.3 and 14.6 for landless, marginal, small, medium and large farmers with per litre profit was ₹. 1.8, 3.2, 1.9, 2.2 and 0.8, respectively.

Singh *et al.,* (2011) study economic analysis of milk production in peri urban dairy farms of Punjab and reported that fixed cost, variable cost, total cost, cost of milk production and net profit per litre of milk were ₹ 16.83, 122.91, 139.74, 14.00 and 5.28 per animal per day. He also found that net profit per animal was ₹ 52.70 per animal per day. While, Singh *et al.*, (2011) conducted study on economic analysis of milk production and disposal of milk in Varanasi district of Utter Pradesh and reported that cost of feeding green, dry and concentrate, labour cost, miscellaneous expenses total variable cost and total fixed cost were found ₹ 10.70, 17.50, 13.30, 7.55, 0.74, 49.79 and 52.35 per animal per day.


Materials
and
Methods

Chapter III

Materials and methods

The study was conducted to collect socio-economic status of the dairy demonstration farm owners, animal management practices and economics of Dairy Demonstration Farms (DDF) of Amul. The DDF owners from which this information was collected referred to as respondent. The study was carried out from October 2012 to April 2013.

3.1 Research methodology

The present study was confined to ex-post facto research design, which attempts to trace an effect that has already occurred to its probable cause (Chandel, 1998).

3.2 Area of the study

The present study was conducted in Anand district of Gujarat (Fig. 3.1). The detail of DDF was studied for the objective of study.

3.3 Sampling technique

Twelve dairy demonstration farms were selected. Each dairy demonstration farm was having more than or equal to 25 crossbred cows and completed minimum one year of operation were included in study. Respondents were interviewed and the desired information was collected and generated.

3.4 Tools for the study

A questionnaire had been designed to study the socio-economic status of dairy demonstration farm owners, various management practices under which dairy animal are reared, cost of feed, shed and other expenses were calculated. The interview schedule was pre-tested with two dairy farms by explaining the purpose of the study to them and on the basis of the experience; questions / statements were modified into the final format of the interview schedule.

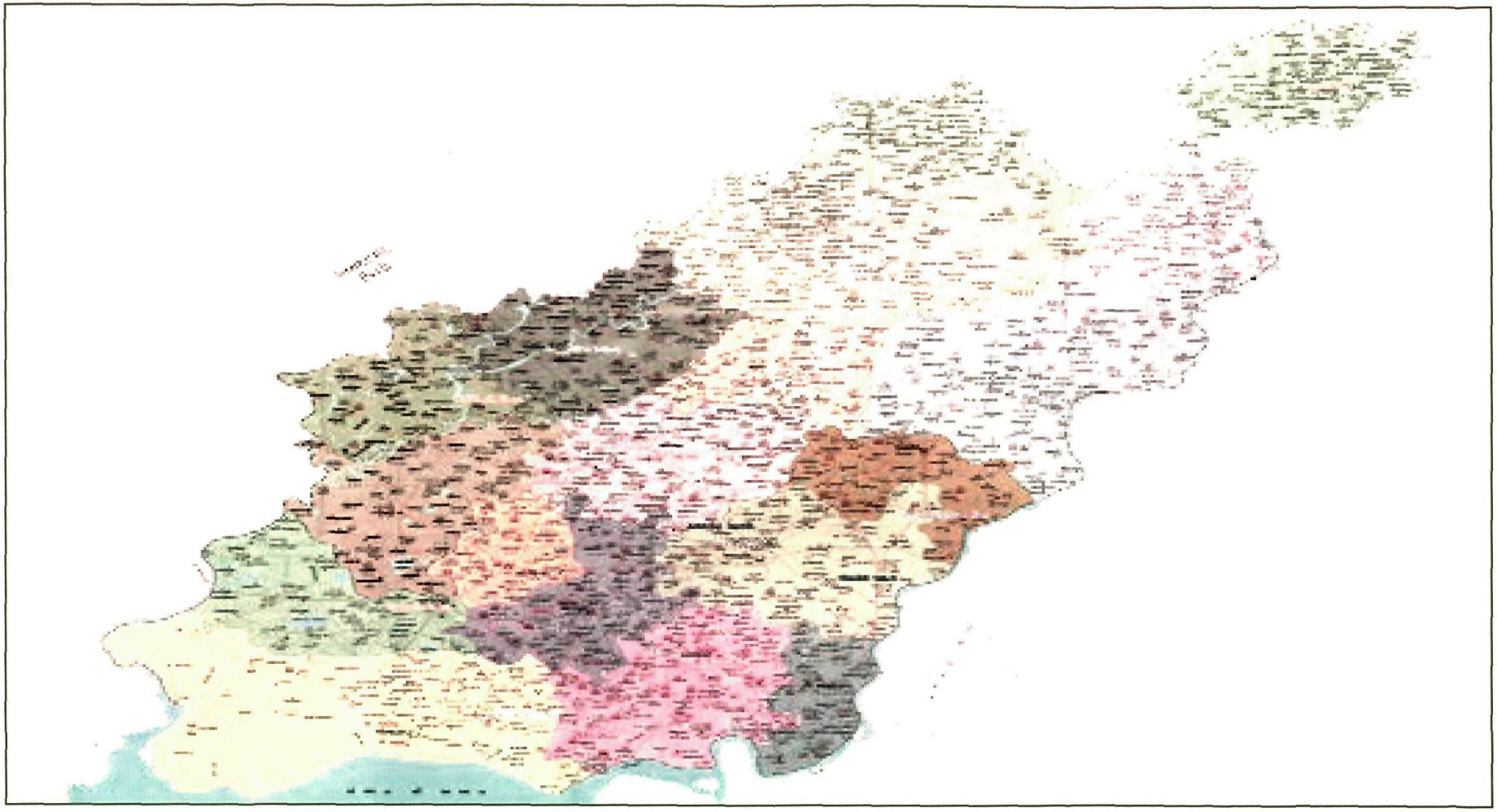


Fig 3.1: Map of Anand district of Gujarat where present study was conducted.

3.5 Collection of data

The interview schedule developed for the study was used for collecting the information through personal conversation/ interaction. Prior to the actual interview, the researcher was introduced himself to the respondents and narrate the significance of the study to them so that they should give proper response. The questions of interview schedule explained one by one and their responses was recorded. Every possible care was taken to get unbiased responses. After collection and recording all the data was compiled and tabulated in master sheet.

3.6 Recording and categorization of variables

A detailed description of many variables related with respondents selected for this study was recorded as mentioned below:

3.6.1 Socio-economic Status of Farmer Holding Dairy Demonstration Farms in Anand District.

3.6.1.1 Age

Age of the selected respondents was considered as number of completed years on the day of interview, with the help of direct questioning and classified into three groups

a) Young (≤30 years)

b) Middle (31–50 years)

c) Old (>50 years)

3.6.1.3 Education

Education level of respondents was studied and classified into below mentioned category

a) Illiterate

b) Up to 7^{th} Standard

c) Eight to 12^{th} Standard

d) Graduate and above

e) Animal husbandry training

3.6.1.4 Caste

Caste of the respondent was recorded during the interview and categorized as under

a) General

b) OBC

c) SC

d) ST

3.6.1.5 Family Size

Family size was considered as the total number of members in a family at the time of investigation. The information was collected and categorized as under

(a) Up to 4 members

(b) Above 4 members

3.6.1.6 Family Type

Family type was ascertained by knowing their way of living as joint or nuclear and grouped as below

(a) Joint type

(b) Nuclear type

3.6.1.7 Land Holding

It refers to the number of acres of irrigated land possessed by the dairy animal owners at the time of investigation and collected information grouped as under.

(a) Landless

(b) Up to 1.25 acres

(c) 1.25 to 2.5 acres

(d) Above 2.5

3.6.1.8 Vocational Diversification

Vocational diversification considered as the type of employment activity performed by the dairy animal owners as a source of their livelihood. The collected information was classified as under

(a) Dairy

(b) Agriculture + Dairy

(c) Agriculture +dairy + service

(d) Dairy+ service

(e) Dairy+ labour

(f) Dairy + other livestock species (specify)

3.6.2 Management of Animal and Housing on Dairy Demonstration Farms.

Information regarding management of animal and housing systems was collected by interview and visual appraisal on the following aspects

1. Type of Housing
    a. Close
    b. Open
2. Location of shed
    a. Attached to human dwelling
    b. At the field of farmer
    c. Nearby their dwelling
3. Direction of house
    a. East-West
    b. North-South
4. System of housing
    a. Tail to tail
    b. Head to head
    c. Single line

5. Floor Space / animal

Floor space required per animal as per ISI standards was 45.56 sq. ft.

a. Adequate (≥ 45.45 sq. ft)

b. Inadequate (< 45.45 sq. ft)

6. Provision artificial Light

a. Yes

b. No

7. Provision & practice to Protect animal from extreme weather

a. Yes (provision of fogers /curtains / fans etc.)

b. No

8. Type of floor

a. Pucca (cement concrete)

b. Stone paved

c. Brick paved

d. Muddy

e. Earthen floor

9. Slope in floor

a. Towards back

b. No slope

c. Towards front

11. Type of pillar/pole

a. Cemented/brick

b. Iron

c. Wooden

12. Materials used in wall

a. Brick and cement

b. Brick and lime

c. Brick in mud

d. Thatch

13. Wall of house

    a. Half

    b. Full

    c. No wall

14. Type of roof

    a. Asbestos sheets roof

    b. Galvanized iron sheets roof

    c. Thatched roof

    d. No roof

15. Height of roof at leaves

    a. Above 7.33 ft.

    b. Below 7.33 ft.

16. Slope of roof

    a. Double slope

    b. Single slope

    c. Flat

17. Linear Manger space/ animal

    a. Adequate (≤ 75 cm)

    b. Inadequate (> 75 cm)

18. Provision of drainage system

    a. Pucca drain

    b. Soaked at earthen floor

19. Bedding material used on the floor

    a. Yes

    b. No

3.6.3 Feeding Management on Dairy Demonstration Farms.

Information regarding feeding practices was collected by interview and visual appraisal on the following aspects:

1. Feeding system

    a. Stall feeding

    b. Grazing

    c. Both

2. Feeding of milch animal

    a. Individual

    b. Group feeding

3. Fodder availability

(i) Green

    a. Non - legume + Legume

    b. Legume

    c. Non-legume

(ii) Dry

    a. Paddy straw + Jowar straw +Wheat straw

    b. Paddy straw +Jowar straw

    c. Paddy straw

    d. Any other, Specify

4. Chaffing of fodder

    a. Yes

    b. No

5. Types of concentrate feeding

    a. Compounded cattle feed

    b. Homemade + compounded cattle feed

    c. Home produced ingredients

6. Method of feeding concentrate

    a. Mixed with fodder

    b. Separately

7. Criteria for concentrate feeding

    a. Body weight + Milk production

    b. Body weight

    c. Milk production

    d. Age

    e. No criteria

8. Time of feeding concentrate

    a. During milking

    b. Before milking

    c. After milking

10. Concentrate feeding to young calf

    a. Yes

    b. No

11. Concentrate feeding to heifer

    a. Yes

    b. No

12. Special feeding after calving

    a. Yes

    b. No

13. Feeding of mineral mixture

    a. Yes

    b. No

14. Feeding of salt

    a. Yes

    b. No

15. Frequency of Watering

    a. Free assess of water

    b. 3 times

    c. 2 times

16. Source of water

    a. Bore Well

    a. Hand Pump

    b. River

    c. Canal

    d. Pond

3.6.4 Milking Management on Dairy Farms and their Production.

3.6.4.*1* Milking management on dairy demonstration farm

Information related with milking management was collected by interview and visual appraisal on the following aspects:

1. Types of milking

    a. Machine

    b. Hand

2. Frequency of milking

    a. Thrice

    b. Twice

    c. Once

3. Washing of udder before milking

    a. Yes

    b. No

4. Stripping at the end of milking

    a. Yes

    b. No

5. Place of milking

    a. Milking at milking parlour

    b. Milking at the same place

6. Teat dipping followed

    a. Yes

    b. No

7. Cleaning of milking utensils

    a. Hot water

    b. Tap water

8. Disposal of Milk

    a. Co-operative society

    b. Vendors

    c. Middle man

    d. Home use

9. Test for mastitis diagnosis using Masti-strip

    a. Yes

    b. No

3.6.4.2 Production and Reproductive Performance of Crossbred Cow on Dairy Demonstration Farms

The productivity of herd was calculated by collecting information regarding lactation length, calving interval, lactation yield, Av. lactation yield per year, no. of AI require for insemination per animal etc. Average productivity of herd was calculated by taking Av. value of all observation.

3.6.5 Healthcare Management on Dairy Demonstration Farms.

Information regarding healthcare practices was collected by interview and visual appraisal on the following aspects:

1. Vaccination against disease
    a. Yes
    b. No
2. Deworming of milch animal
    a. Regular
    b. Occasional
    c. Not practiced.
3. Deworming of calves
    a. Regular
    b. Occasional
    c. Not practiced
4. Practices to control ecto – parasites
    a. Followed
    b. Not followed.

5. Treatment of Sick animals by

   a. Veterinary doctor

   b. Livestock inspector

   c. Calling a quack

   d. Use of local empirical knowledge

6. Diseased animals are tied

   a. Separately

   b. Together with others

3.6.6 Economics of Dairy Demonstration Farms.

3.6.6.1 Computation of cost: C (total expense/animal /day)

The total expense/animal/day was calculated by estimating total fixed depreciation cost/animal/day, cost of green fodder/animal/day, cost of dry fodder/ animal/day, cost of concentrate/animal/day, medication/animal/day, labour cost/ animal/day, miscellaneous/animal/day, instalment/animal/day, Av. interest/ year /animal/day, and total recurring expenses/animal/day.

3.6.6.2 Computation of returns cost (B)

The returns obtained from milk sold/animal/day, manure sold/animal/day and empty gunny bag sold/animal/day. The cumulative returns from all these outputs were taken as total returns. Total income/animal/day, net income /animal/day, net income/animal/month, net income/animal/year and cost of milk production were also calculated.

3.6.6.3 B: C ratio

It is the ratio of cash returns to input cost, which must be unity or more for an enterprise to be considered worthwhile. The minimum ratio required is 1:1, which indicates the coverage of costs without any surplus benefits. But usually the ratio should be more than unity in order to provide some additional returns over the costs for clear decision.

The benefit cost ratio can be stated both verbally and mathematically as

$$\text{B: C ratio} = \frac{\text{Total returns}}{\text{Total costs}}$$

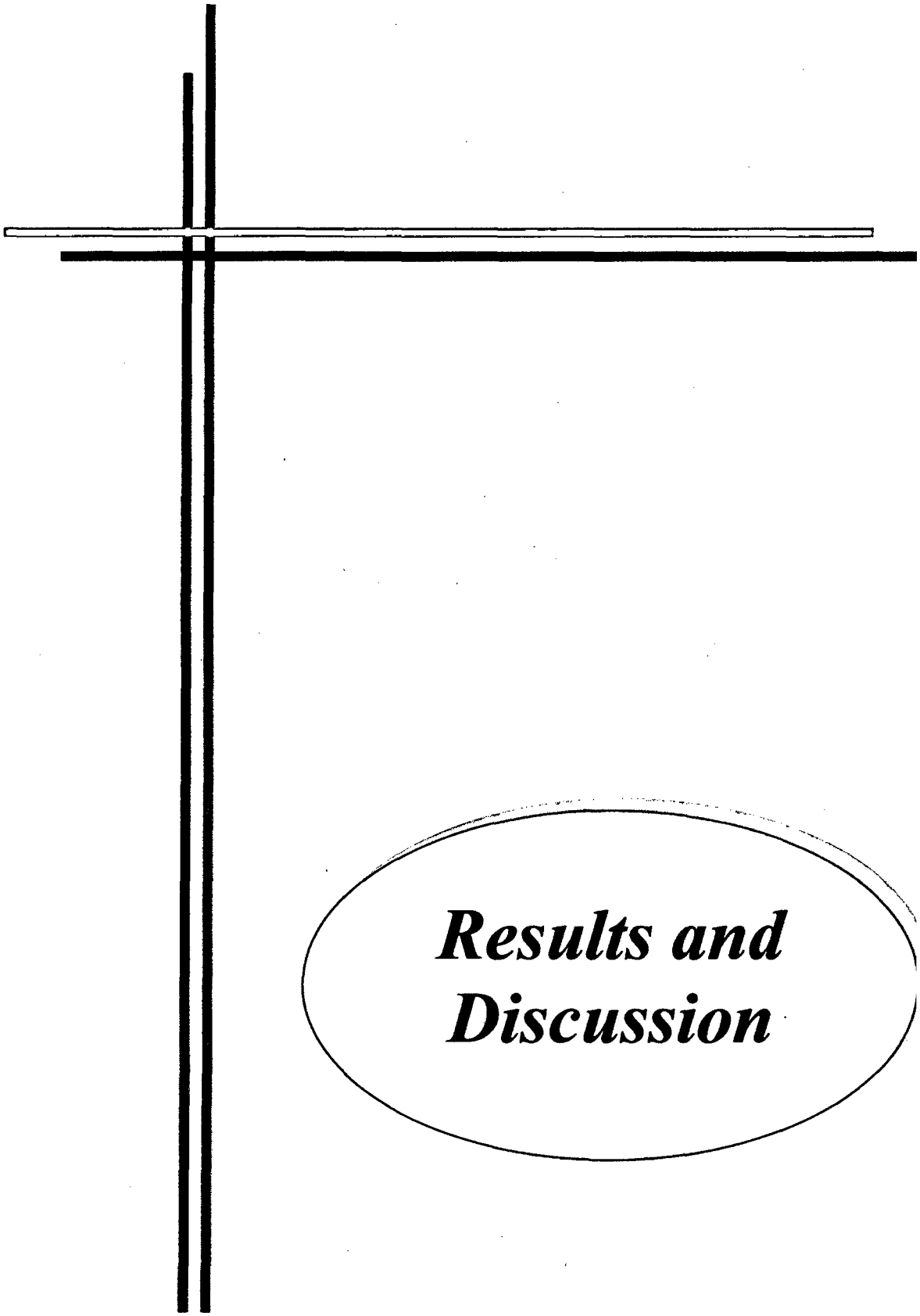
This B: C ratio will calculated for each of the DDF farm separately. Then the mean and S.D. was calculated for the values of the B: C ratio in order to categorise respondents as high, medium and low profitable farm.

3.7 Statistical analysis

All the responses recorded in the interview schedule were tabulated in the master sheet to describe personal, social and economic characteristics of the dairy animal owners, management practices adopted in dairy husbandry. The simple statistical tools were used for interpreting the data.

3.8 Frequency & percentage

Simple comparison was made for personal, socio-economic characteristics and various management practices adopted by respondents on the basis of frequency and percentage.



Results and Discussion

Chapter IV

Result and discussion

Amul had established about 176 dairy demonstration farms (DDF) spread over 8 taluka covering 62 villages. The present Study was carried out on twelve DDF in Anand district. The dairy farms included in study, their location and number of dairy animal is presented in Table No.1

Table.1. Details of dairy demonstration farms studied

Sr. No.	Farm No	Name of farm	Village	No. of milch cows	Herd strength
1	Farm 1	Kaushalkumar R. Patel	Rass	65	83
2	Farm 2	Ashwinbhai R. Patel	Navali	25	31
3	Farm 3	Chetanbhai Patel	Navali	30	38
4	Farm 4	Knatibhai M Patel	Navali	25	29
5	Farm 5	Sandipbhai Bhikabhai	Zharola	79	99
6	Farm 6	Ravaji M. Patel	Sarsa	46	57
7	Farm 7	Harishbhai J. Patel	Sinhol	30	38
8	Farm 8	Jayeshbhai Patel	Zharola	25	33
9	Farm 9	Ravaji M. Jadhav	Sinhol	31	37
10	Farm 10	Dilipbhai A. Jadhav	Sinhol	25	33
11	Farm 11	Pareshbhai B. Patel	Boriyavi	25	34
12	Farm 12	Nileshbhai Patel	Lambvel	25	31

The data and information generated was classified, tabulated, analyzed as per the research methodology laid down in the preceding chapter and have been presented, interpreted and discussed in the light of the objectives of the study in a methodical approach in this section under the following sub-sections.

4.1 Socio-economic status of farmer holding dairy demonstration farms in Anand district.

4.2 Management of animal and housing on dairy demonstration farms.

4.3 Feeding management on dairy demonstration farms.

4.4 Milking management on dairy demonstration farms and their production.

4.5 Healthcare management on dairy demonstration farms.

4.6 Economics of dairy demonstration farms.

4.1 Socio-economic Status of Farmer Holding Dairy Demonstration Farms

The information collected regarding personal, social and economic characteristics of dairy farmers were analyzed and results are presented in Table No. 2 and 3. All these characteristics affect the behavioural pattern, level of enterprise, adoption level of improved dairy husbandry practices and management capability of the dairy animal owners in some way or other.

4.1.1 Age and gender

All dairy demonstration farms were managed by male. The age of DDF owner was ranging from 28 years to 56 years. The average year of DDF owner was about 43.08 years. Perusal of the data revealed that majority (66.7 per cent) dairy farmers were from middle age group followed by old (25 per cent) and young (8.0 per cent) age group (Fig.4.1).

Similar findings were reported by Singh and Sastry (2002), Ray *et al.*, (2004), Gangil and Dabos (2005), Gill and Saini (2008), and Divekar and Saiyed (2009) that majority were belong to middle age group. There were variations in the findings. This might be due to the scale used to classify the respondents into different age groups and overall demographic structure of the regions.

4.1.2 Educational qualification

Most of DDF owner had education up to 12^{th} while only four farmers were graduated. The data revealed that about 66.7 per cent per cent of respondents had education from 8^{th} to 12^{th} standard while, 33.3 per cent of farmers were graduated (Fig. 4.1). None of them was educated below or equal to 7^{th} standard or illiterate.

From the above findings it could be concluded that all the dairy animal owners were literate. This will help farmer to adapt the new technology for increasing productivity of their farms. Similar findings were reported by Dixit *et al.*, (2006), Chowdhary *et al.*, (2006) and Divekar and Saiyed (2009) where most of respondents were literate.

Table No. 2: Farm wise socio- economic status of Dairy Demonstration Farm owners

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
1	**Age (years)**	42	48	40	52	38	45	56	44	51	28	38	35
2	**Education**	Graduate	10^{th}	8^{th}	8^{th}	12^{th}	Graduate	12^{th}	Graduate	10^{th}	10^{th}	12^{th}	Graduate
3	**Caste**	General	General	General	General	General	General	General	General	OBC	OBC	General	General
4	**Family Size (No.)**	7	4	5	8	7	5	7	4	8	6	8	7
5	**Family Type**	Joint type	Nuclear	Joint type	Joint type	Joint type	Joint type	Joint type	Nuclear	Joint type	Joint type	Joint type	Joint type
6	**Land Holding** (acres)	3.5	1	1.20	2.2	12	5.3	1.2	4.3	2.5	2.2	1.3	5.8
7	**Vocational Diversification**	Agriculture + Dairy+ service	Agriculture + Dairy	Dairy+ service	Agriculture + dairy	Agriculture + Dairy	Agriculture + Dairy+ service	Agriculture + Dairy	Agriculture + Dairy	Dairy+ agriculture	Dairy+ agriculture	Dairy+ service	Agriculture + Dairy+ service

Table No. 3: Overall socio- economic status of DDF owners (n =12)

Sr. No.	Particulars	Type	Percentage % (No.)*
1	Age	Middle (31–50 years)	66.7 (8)
		Young (≤30 years)	08.3 (1)
		Old (>50 years)	25.0 (3)
2	Education	Any animal husbandry training	0.00 (0)
		Graduate and above	33.3 (4)
		8th to 12th Standard	66.7 (8)
		Up to 7th class	0.00 (0)
		Illiterate (cannot read and write)	0.00 (0)
3	Caste	General	83.3 (10)
		OBC	16.7 (2)
		SC & ST	0.00 (0)
4	Family Size	Up to 4 members	16.7 (2)
		above 4 members	83.3 (10)
5	Family Type	Nuclear type	16.7 (2)
		Joint type	83.3 (10)
6	Land Holding	Above 2.5 acres	41.7(5)
		1.25 to 2.5 acres	25.0 (3)
		Up to 1.25 acres	33.3 (4)
		Landless	0.00 (0)
7	Vocational Diversification	Agriculture +dairy + service	25.0 (3)
		Dairy+ service	16.7 (2)
		Agriculture + Dairy	58.3 (7)
		Dairy + other livestock species (specify)	0.00 (0)
		Dairy	0.00 (0)
		Dairy+ labour	0.00 (0)

*Figures in parenthesis indicates No. of Farms

4.1.3 Caste

The owner of ten DDF farm were from general category, while only two were from other back word category. This indicates that the majority of the owners (83.3 per cent) found to be from general category followed by other backward class 16.7 per cent (Fig. 4.2).

Similar results were found by Kumar *et al.*, (1999) where majority of respondents belong to general category. However, there were variations in the findings related with the caste of the dairy animal owners in various parts of Gujarat and India due to the overall demographic structure of the regions.

4.1.4 Family size

The family size of DDF farm owners were ranging from 4 to 8 with an average family size of 6.33 members. In the present study, it was observed that 83.3 and 16.7 per cent of dairy demonstration farm owners have more than 4 members and equal or less than 4 members in a family, respectively (Fig. 4.2).

Similar findings were reported by Singh *et al.*, (2004), Singh *et al.*, (2008) and Divekar and Saiyed (2009) that maximum respondents were had large family size.

4.1.5 Family type

Ten joint families and two nuclear families were having dairy demonstration farm. Out of total DDF owner 83.33 and 16.7 per cent were having joint and nuclear type family, respectively (Fig.4.2)

Dhammu and Gill (2002), Shukla *et al.*, (2007), Halakatti *et al.*, (2007) and Divekar and Saiyed (2009) reported that, majority of respondents belongs to joint type family.

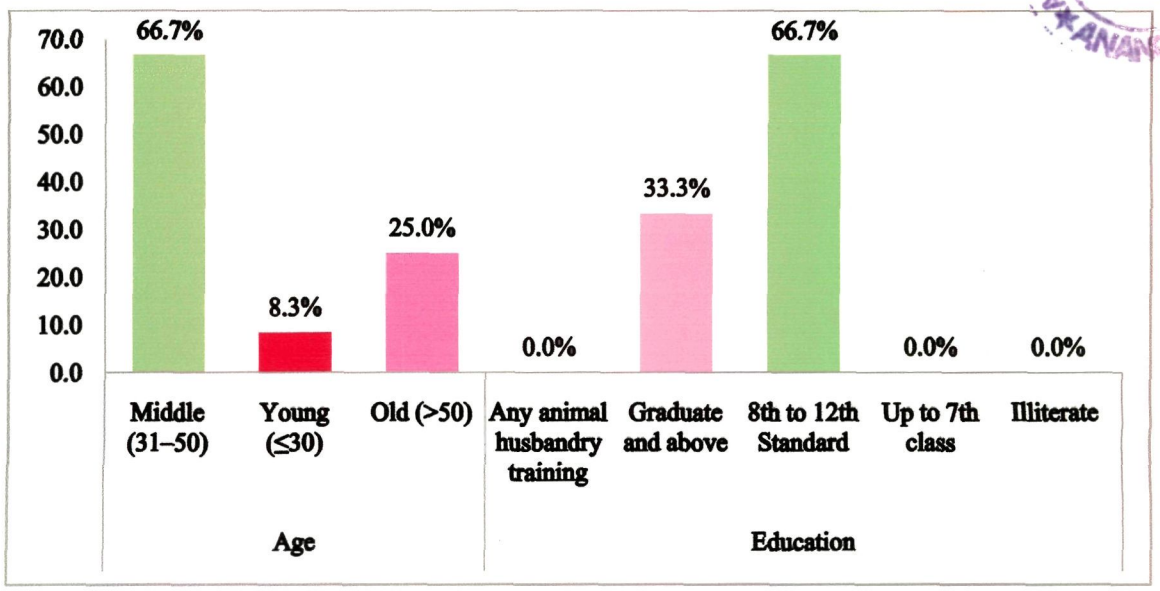


Fig.4.1 Age and level of education of dairy farm owner

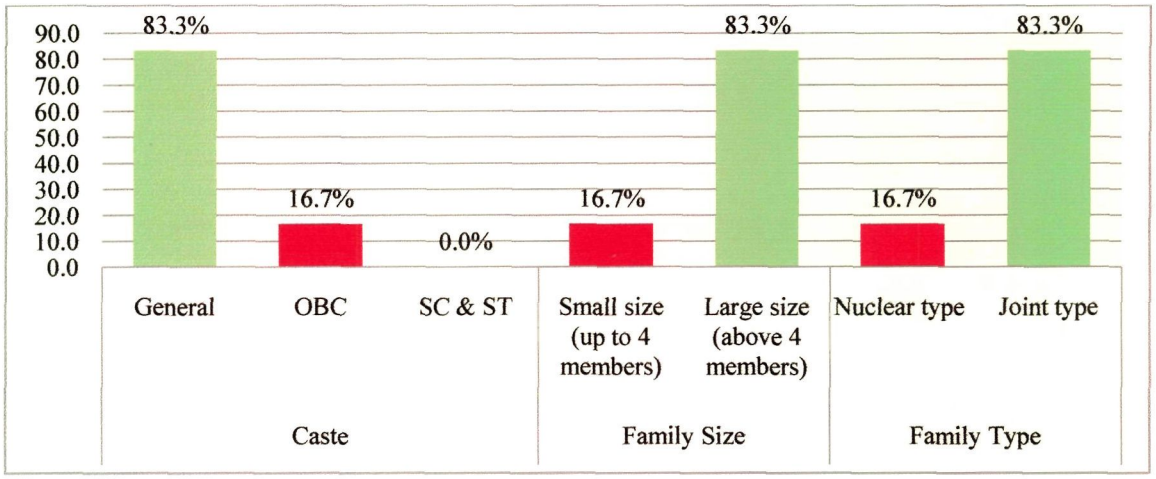


Fig.4.2. Cast, family size and family type of dairy farmer

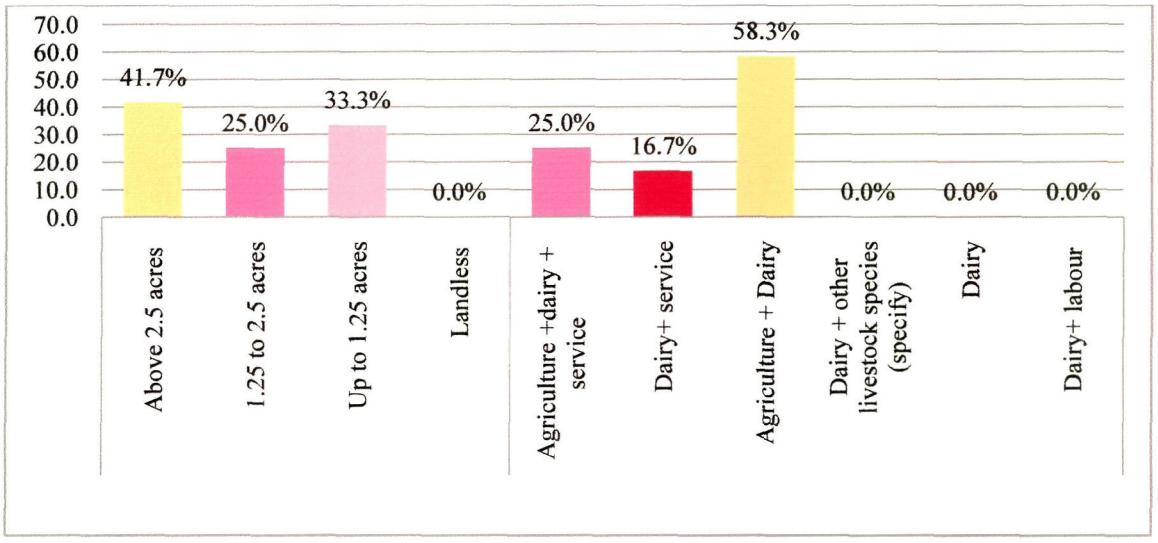


Fig.4.3 Land holding and vocational diversification of dairy owner

4.1.6 Land holding

The land holding of DDF owners were ranging from 1 to 12 acres with average land holding 3.54 acres. Further classification it was found that about 41.7 per cent farmers were having above 2.5 acres land holding while, 25 and 33.3 per cent of farmers were having 1.25 to 2.5 acres and up to 1.25 acres land holding area, respectively (Fig.4.3). The large land area holding is good for ensuring fodder supply round the year and availability of crop by-products which reduces cost of feeding.

Similar type of results was reported by Prasad *et al.*, (2001) and Singh and Sastry (2002) where most of respondents had large land holding area.

4.1.7 Vocational diversification

Dairy demonstration farm owner were practicing agriculture dairy and other service together. It was found that Majority of the respondents (58.3 per cent) in the area of the study, practiced agriculture and dairy as source of their livelihood, while 25 and 16.7 per cent DDF owner were having dairy, agriculture and services and dairy and services as source of their livelihood respectively (Fig. 4.3).

4.2 Management of Animal and Housing of Dairy Demonstration farms.

4.2.1 Management of animal

Productivity of animals and farms depending on managemental practices followed on a farm. Understanding of livestock management practices followed by the farmers is crucial to identify the strengths and weakness of the animal rearing system so that appropriate intervention policies can be devised in order to have optimum production from the animals and more benefits to the farmers. General management practices of dairy animal on dairy demonstration farm completing more than one year of operation were studied and presented in Table No. 4.

Table No. 4: Management of dairy demonstration farms

Sr. No.	Farm No.	No. of animal at start	Present strength	Percentage increase (%)	No. of milking cow	No. of dry cow	Herd Av. (lit)	Wet Av. (lit)	Wet and dry ratio	Av. lactation No.	Level of mechanisation			
											Chaff cutter	Milking machine	Autom-atic water	BMC
1	Farm No.1	50	83	66	50	15	8.58	11.15	77 : 23	4.53	Yes	Yes	Yes	Yes
2	Farm No.2	20	31	55	21	4	10.18	12.12	84 : 16	3.6	Yes	Yes	Yes	No
3	Farm No.3	25	38	52	23	7	8.66	11.3	77 : 23	3.6	Yes	Yes	Yes	No
4	Farm No.4	20	29	45	21	4	9.27	11.04	84 : 16	3.6	Yes	Yes	Yes	No
5	Farm No.5	50	99	98	54	25	7.21	10.55	68 : 32	4.54	Yes	Yes	Yes	No
6	Farm No.6	25	57	128	36	10	8.41	10.75	78 : 22	4.58	Yes	Yes	Yes	No
7	Farm No.7	25	38	52	24	6	8.69	10.86	80 : 20	3.23	Yes	Yes	No	No
8	Farm No.8	20	33	65	20	5	8.99	11.24	80 : 20	4.4	Yes	Yes	Yes	No
9	Farm No.9	20	37	85	24	7	7.91	10.22	77 : 23	4.5	Yes	Yes	No	No
10	Farm No.10	20	33	65	18	7	7.08	9.83	72 : 28	3.2	Yes	No	No	No
11	Farm No.11	20	34	70	20	5	8.03	10.04	80 : 20	3.2	Yes	No	No	No
12	Farm No.12	20	31	55	15	10	5.78	9.64	60 : 40	3.2	Yes	No	No	No
13	Average value	26.3	45.3	69.7	27.2	8.8	8.23	10.72	76:24	3.84	100 %	75 %	58.33%	8.33%

4.2.1.1 Herd strength

The farms were started with initial strength of 20 to 50 animals and at present strength it is reached up to 31 to 99 animals. There was average 69.66 per cent increase in strength of dairy animal. This increase in strength of dairy animals indicates better management and development of DDF, it indicates better profit and growth in dairy business.

4.2.1.2 Wet and dry ratio

Wet and dry ratio is indication of per cent of animal in milking and dry. More the animal in milk throughout the year better will be the profitability of enterprises. In present study the average No. animal in milk and dry were ranging from 15-50 to 4-25, respectively with wet dry ratio of farm ranging from 60:40 to 84:16. The study of all farms indicate that average wet dry ratio of 76:24 which is close to optimum wet dry ratio of 75:25 for better management and optimum profitability farm.

Similar wet dry ratio were reported in crossbred cow maintain at Livestock Research Station, Anand Agricultural University, Anand where it was 78.2: 21.8 (Anonymous 2013).

4.2.1.3 Herd average and wet average

Herd average of DDF was ranging from 5.76 to 10.12 lit with average 8.17 lit. Whereas wet average was ranging from 9.60 to 12.05 lit with average 10.68 lit.

Results are related with the result reported by Anonymous (2013) where the wet average and dry average reported at LRS farm Anand for crossbred cow was 10.77 and 8.39 lit.

4.2.1.4 Parity

In the present study all DDF owner were having dairy animal of different lactation (parity). The average parity of farm animal was ranging from 3.2 to 4.58 with an average parity of 3.84. It is well established that dairy cows produce maximum during 3 to 5 parity. It indicated that all DDF owner rear animal of the same parity for their optimum profit.

Sahu *et al.*, (2011) reported the similar finding that majority (78 percent) of commercial dairy farmer prefer their animals to be in between first to fifth lactation as this is most productive age of animal.

4.2.1.5 Level of Mechanisation

Effective management of farm depends on the level of mechanisation of dairy farm. It was found that DDF owner having some kind of mechanisation on their farm. All DDF owners were having Motor operated chaff cutter for chafing of fodder and 75 per cent of farms were having milking machine for milking of their animal. Automatic water supply system was installed by 58.33 per cent (7) of farms. Only one (8.33 per cent) of farm was with Bulk milk cooler (BMC) facility for storage of large quantity of milk. This all instrument help in reduce labour and time required for operation.

4.2.2 Housing management

Provision of proper housing facilities to the animals not only reduces the energy wastage in maintaining thermo neutral zone but also provides good hygienic condition, reduces the incidence of diseases, protects animals from predators and provides better working condition to the farmers. The various housing management practices followed by dairy demonstration farm owners in the study are presented in Table No. 5, 6 and Table No. 7, 8.

Table No. 5: Farm wise housing management(a): Type of housing, location of shed, direction of house, system of housing, Av. floor space/ animal, provision of light, protection against extreme weather, type of floor and slope in floor

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
1	Type of Housing	Close	Close	Close	Close	Close	Close	Close	Close	Close	Close	Close	Close
2	Location of shed	At the farmers field	Nearby their dwelling	Nearby their dwelling	At the farmer field	Attached to human dwelling	At the farmers field	Attached to human dwelling	At farmers field	Attached to human dwelling	Attached to human dwelling	Nearby their dwelling	Attached to human dwelling
3	Direction of house	East-West	East-West	East-West	East-West	East-West	East-West	North - South	East-West	East -west	North south	North – south	East-West
4	System of housing	Tail to tail	Tail to tail	Single line	Tail to tail	Head- head	Tail to tail	Head - head	Single line	Tail to tail	Single line	Head to head	Single line
5	Av. floor Space /animal (sq. ft)	48.75	46.87	50.62	48.75	71.25	48.75	52.75	50.62	48.75	46.87	48.75	52.5
6	Provision Light	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Protection against extreme weather	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Type of floor	Pucca	Pucca	Pucca	Pucca	Stone paved	Pucca	Pucca	Pucca	Pucca	Pucca	Pucca	Pucca
9	Slope in floor	Towards back	Towards back	Towards back	Towards back	No slope	Towards back	Towards back	Towards back	Towards back	Towards back	Towards back	Towards back

Table No. 6: Overall housing management (a) of Dairy Demonstration Farms

(n = 12)

Sr. No.	Particulars	Type	Percentage % (No.)*
1	Type of Housing	Close	100 (12)
		Open	0.00 (0)
2	Location of shed	Attached to human dwelling	41.7 (5)
		At the field of farmer	33.3 (4)
		Nearby their dwelling	25.0 (3)
3	Direction of house	East-West	75.0 (9)
		North-South	25.0 (3)
4	System of housing	Tail to tail	41.7 (5)
		Head to head	25 (3)
		Single line	33.3 (4)
5	Av. floor Space available / animal	Adequate (≥ 45.45 sq. ft.)	91.7 (11)
		In adequate (< 45.45 sq. ft.)	8.3 (1)
6	Provision of light	Yes	100 (12)
		No	0.00 (0)
7	Provision & practice to Protect animal from extreme weather	Yes	100 (12)
		No	0.00 (0)
8	Type of floor	Pucca (cement concrete)	91.7 (11)
		Stone paved	8.3 (1)
		Brick paved	0.00 (0)
		Muddy	0.00 (0)
		Earthen floor	0.00 (0)
9	Slope in floor	Towards back	91.7 (11)
		No slope	8.3 (1)
		Towards front	0.00 (0)

*Figures in parenthesis indicates No. of Farms

4.2.2.1 Type of housing

It was observed that all DDF owners (100 per cent) provided close type house. This was general practice followed by all DDF owners to provide closed type of hosing to animal for efficient management and maximum returns from dairy farming (Fig. 4.4).

Shrivastava and Promila (1983), Sharma (1996) and Sabapara *et al.,* (2010a) were also found that majority of respondents were provided close type of housing to their animal.

4.2.2.2 Location of shed

Management of farm is greatly influenced by location. For effective management of farm location should be close to human housing or on their agricultural field. The study of all DDF indicated that 41.7 per cent (5) shed were attached to human dwelling. While, 33 per cent (4) sheds were present at farmer field. Only 25 per cent (3) farms were present away from their dwellings (Fig. 4.4).

Similarly, location of farm attached to human dwelling were reported by Rathore *et al.,* (2009), Sinha *et al.,* (2009), Rathore *et al.,* (2010) and Sabapara *et al.,* (2010a). The animal house nearby the human dwelling or attached to human dwelling provides good management, market availability and easy transport of milk.

4.2.2.3 Direction of animal house

Direction of house is important in hot humid climate to reduce heat stress on animal during summer season, to maintain good sanitation and increase production of dairy animal. 75 per cent (nine) of farmer construct animal houses such that length of shed is oriented in East-West direction while 25 per cent (3) of the animal shed were having length of shed in North-South orientation (Fig. 4.4).

Similar finding was reported by Sinha *et al.,* (2009) that majority (53 per cent) of respondents were constructed their animal houses in East-West direction.

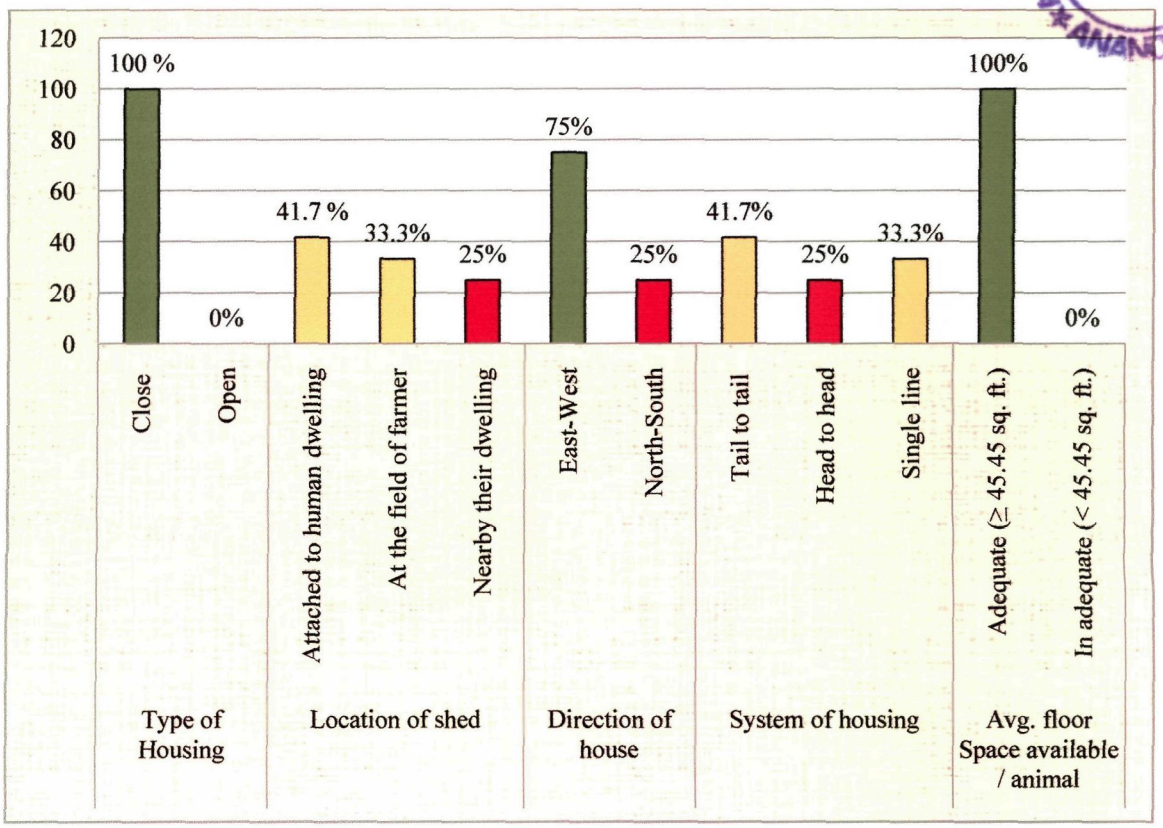


Fig4.4. Housing practices: Type, location, direction, system and Av. floor space available per animal

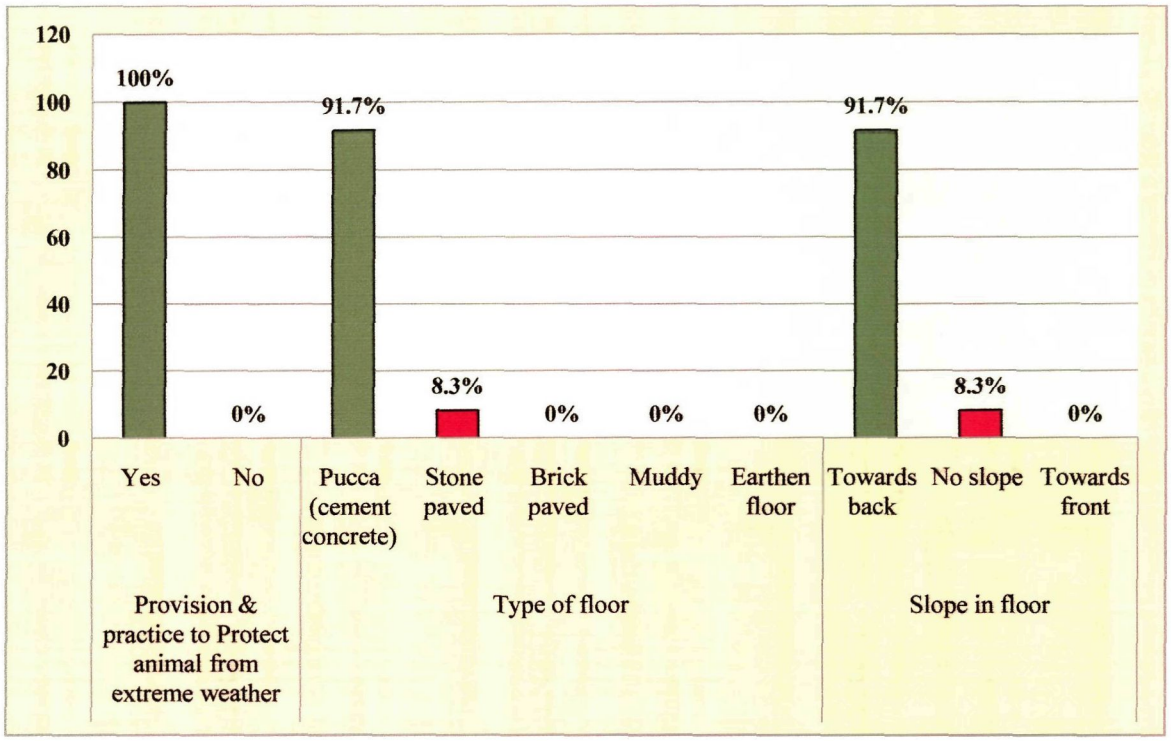


Fig 4.5 Housing practices: Protection against extreme weather, type of floor and slope of floor

4.2.2.4 System of housing

Majority of the dairy farmer 41.7 per cent (five farms) in the study followed tail to tail system of housing (Plate I). About 33.3 per cent (four farms) followed single line system of animal housing (Plate II), while head to head system (Plate III Plate IV) of housing was follow by 25.0 per cent (three farms) (Fig. 4.4). More number of double row system of housing might be due to the limited availability of land and larger herd size hence, farmers utilized the available land more efficiently by constructing double row houses.

Findings of this study were in conflict with the findings of Deoras *et al.,* (2004) and Ahirwar *et al.,* (2010) where majority of respondents followed the single row system of housing.

4.2.2.5 Floor space per animal

The floor space per animal on DDF farms ranging from 46.87 to 71.25 sq. ft. with average floor space per animal was 51.27 sq. ft. In study it was observed that Adequate ($\geq$ 45.45 sq ft/animal) floor space/animal was provided by all (100 per cent) DDF owners (Fig. 4.4).

Findings of this study were in agreement with the findings of Deoras *et al.,* (2004) who found that 93 per cent of respondents provide adequate standing floor space to animals. Sinha *et al.,* (2009) also found that 74.4 per cent of respondents in the rural and 86.7 per cent in urban area of Bareilly district of Uttar Pradesh had adequate floor space in their animal houses. Adequate standing floor space provides comfort to animal and reduces stress, which help in increase in production of milk.

4.2.2.6 Provision light

Provision of artificial light was observed in all (100 per cent) DDF farms (Plate V). Provision of sufficient light inside shed is useful for efficient working of labour in shed. Similar findings were reported by Deoras *et al.,* (2004) about 93 per cent respondents provides light. Ahirwar *et al.,* (2010) observed that in the animal houses of 75.50 and 86 per cent of the respondents had provision of light in the rural and urban areas, respectively.

Plate I: Tail to tail housing system at dairy farm of Ashwinbhai Patel

Plate II: Single row housing system at dairy farm of Chetanbhai Patel

Plate III: Head to head housing system at dairy farm of Sandipbhai bhikahai

Plate IV: Head to head housing system at dairy farm of Pareshbai Patel

4.2.2.7 Provision & Practice to protect animal from extreme weather conditions

All (100 per cent) of the respondents of DDF adopted some kind of measures to protect the animals from extreme weather conditions (Fig. 4.5). They were providing curtains (Plate VI) around shed during winter season and fans (Plate VII) fogger (PlateVIII) and in hot days of summer

They were having awareness regarding ill effects of the extreme weather conditions on health and production of animals. Bhardwaj (1999) also reported that most of farmer protects their animal against inclement weather condition.

4.2.2.8 Type of floor

Perusal of data revealed that majority of the respondents (91.7 per cent) had pucca type of floor to their animal house while, 8.3 per cent respondents had stone paved floor (Fig. 4.5). Pucca type of flooring in shed was helpful in maintaining cleanliness in shed.

Patel *et al.,* (2005), Chowdhary *et al.,* (2006), Sabapara *et al.,* (2010a) and Singh *et al.,* (2007) in their respective study area observed that majority of animal houses were having kuchcha type floor.

4.2.2.9 Slope in the floor

Eleven DDF owners were provides proper slope in floor towards backward. It was observed that 91.7 per cent farmers had slope in floor towards back in the animal shed while, 8.3 per cent of the respondents had no slope in floor of their animal shed (Fig. 4.5).

Sinha *et al.,* (2009) observed that 65.6 per cent of the respondents in the urban areas had floor slope towards back in their animal shed. Rathore *et al.,* (2010) reported that regarding slope in floor about half (51.50 per cent) of respondents had floor slope towards back in their cattle shed.

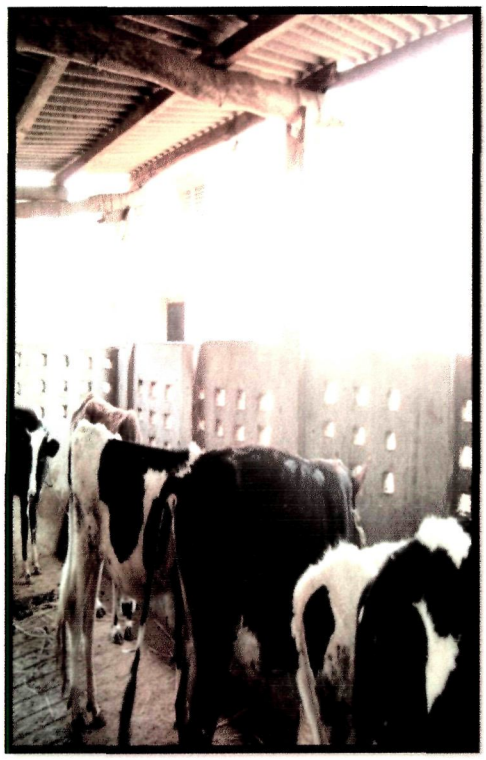


Plate V: Provision of Natural light and ventilation at dairy farm of Pareshbhai

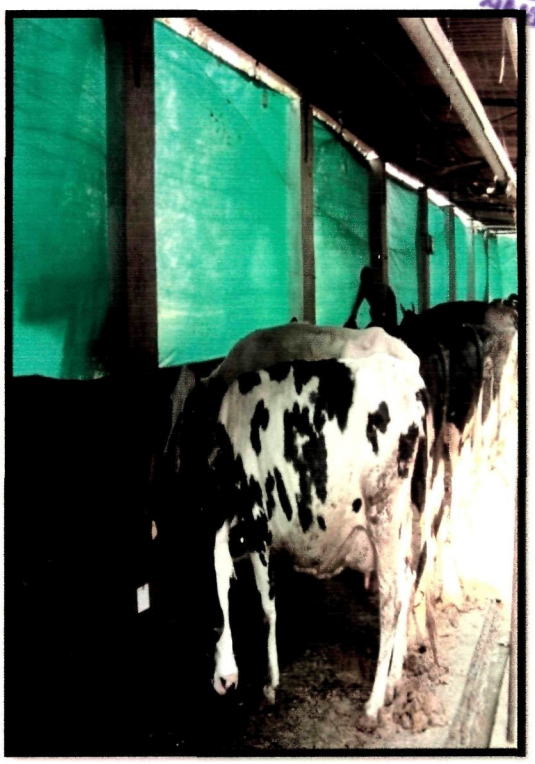


Plate VI: Provision of curtains to protect animal from cold at dairy farm of Chetan Patel

Plate VII: Fans for ventilation provided at dairy farm of Jayehbhai

Plate VIII: Fogger provided to reduce heat stress at dairy farm of Kaushal Patel

4.2.2.10 Type of pillar/pole

Sheds were constructed using cemented and brick type of pillar in seven DDF while, five DDF were having iron type of pillar. It was observed that the majority (58.3 per cent) of the respondents used cemented and brick type poles while, 41.7 per cent of the respondents used iron poles to support the roof (Fig. 4.6).

It might be due to the fact that cemented poles are more robust and durable than the wooden poles. Divekar and saiyed (2009) reported that 50.33 per cent of respondent used cemented type of pole.

4.2.2.11 Materials used in walls

It was found that all 100 per cent of the respondents used brick and cements to construction of wall in the animal house (Fig. 4.6). No respondents used thatch, brick in mud and brick & lime for the same purpose. They provide firm house to protect animal from any calamity.

4.2.2.12 Wall of house

It was revealed that 100 per cent of the respondents had constructed half wall in animal shed (Fig. 4.6). It might be due to the fact that it was providing better ventilation and also less expenditure was required to construct the animal houses.

4.2.2.13 Type of roof

Microclimate inside the shed is greatly influenced by type of roof material Galvanised iron sheet roof were provided by seven DDF owner in their animal shed. While five shed roof were of asbestos sheet roof. It revealed that around 58.3 per cent and 41.7 per cent of the respondents used galvanized iron sheets and asbestos sheets as roofing material for their animal shed respectively (Fig. 4.6).

A variety of results were found regarding roofing material. Rathore *et al.,* (2010) observed that 70.50 per cent of the respondents used thatch material for roof of cattle shed while; Sabapara *et al.,* (2010a) reported that 94 per cent respondents used earthen plates with thatched roof material for their animal shed.

Prevailing climatic conditions and economic status of the farmer might have played a significant role in the selection of roofing materials.

Table No 7: Farm wise housing management (b): Type of pillar/ pole, materials used in walls, wall of house, type of roof, height of roof at leaves, slope of roof, manger space allowed to animal, provision of drainage system and bedding material used.

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
10	Type of pillar/ pole	Iron	Cemented/ brick	Cemented / brick	Cemented/ brick	Iron	Cemented/ brick	Cemented / brick	Iron	Cemented/ brick	Iron	Cemented/ brick	Iron
11	Materials used in walls	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement	Brick and cement
12	Wall of house	Half	Half	Half	Half	Half	Half	Half	Half	Half	Half	Half	Half
13	Type of roof	Galvanised iron sheets	Asbestos sheets	Asbestos sheets	Asbestos sheets	Galvanised iron sheets	Galvanised iron sheets	Asbestos sheets	Galvanised iron sheet	Galvanised iron sheets	Asbestos sheets	Galvanised iron sheets	Galvanised iron sheets
14	Height of roof at leaves (ft.)	12	9	9	11	17	12	10	14	9	8	11	9
15	Slope of roof	Double slope	Double slope	Single slope	Double slope	Double slope	Double slope	Double slope	double slope	Double slope	Double slope	Double slope	Single slope
16	Linear Manger space / animal	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate	Adequate
17	Provision of drainage system	Pucca drain	Pucca drain	Pucca drain	Pucca drain	Soaked at earthen floor	Pucca drain	Pucca drain	Pucca drain	Pucca drain	Pucca drain	Pucca drain	Pucca drain
18	Bedding material used	No	No	No	No	No	No	No	No	No	No	No	No

Table No. 8: Overall housing management (b) of Dairy Demonstration Farms

(n = 12)

Sr. No.	Particulars	Type	Percentage % (No.)
10	Type of pillar/ pole	Cemented/brick	58.3 (7)
		Iron	41.7 (5)
		Wooden	0.00 (0)
11	Materials used in walls	Brick and cement	100 (12)
		Brick and lime	0.00 (0)
		Brick in mud	0.00 (0)
		Thatch	0.00 (0)
12	Wall of house	Half	100 (12)
		Full	0.00 (0)
		No wall	0.00 (0)
13	Type of roof	Asbestos sheets roof	41.7 (5)
		Galvanized iron sheets roof	58.3 (7)
		Thatched roof	0.00 (0)
		No roof	0.00 (0)
14	Height of roof at leaves	Adequate (Equal or above 7.33 ft.)	100 (12)
		Inadequate (Below 7.33 ft.)	0.00 (0)
15	Slope of roof	Double slope	83.3 (10)
		Single slope	16.7 (2)
		Flat	0.00 (0)
16	Linear manger space per animal	Adequate (more than 75 cm)	100 (12)
		Inadequate (less than 75 cm)	0.00 (0)
17	Provision of drainage system	Pucca drain	91.7 (11)
		Soaked at earthen floor	8.3 (1)
18	Bedding material used	Yes	0.00 (0)
		No	100 (12)

*Figures in parenthesis indicates No. of Farms

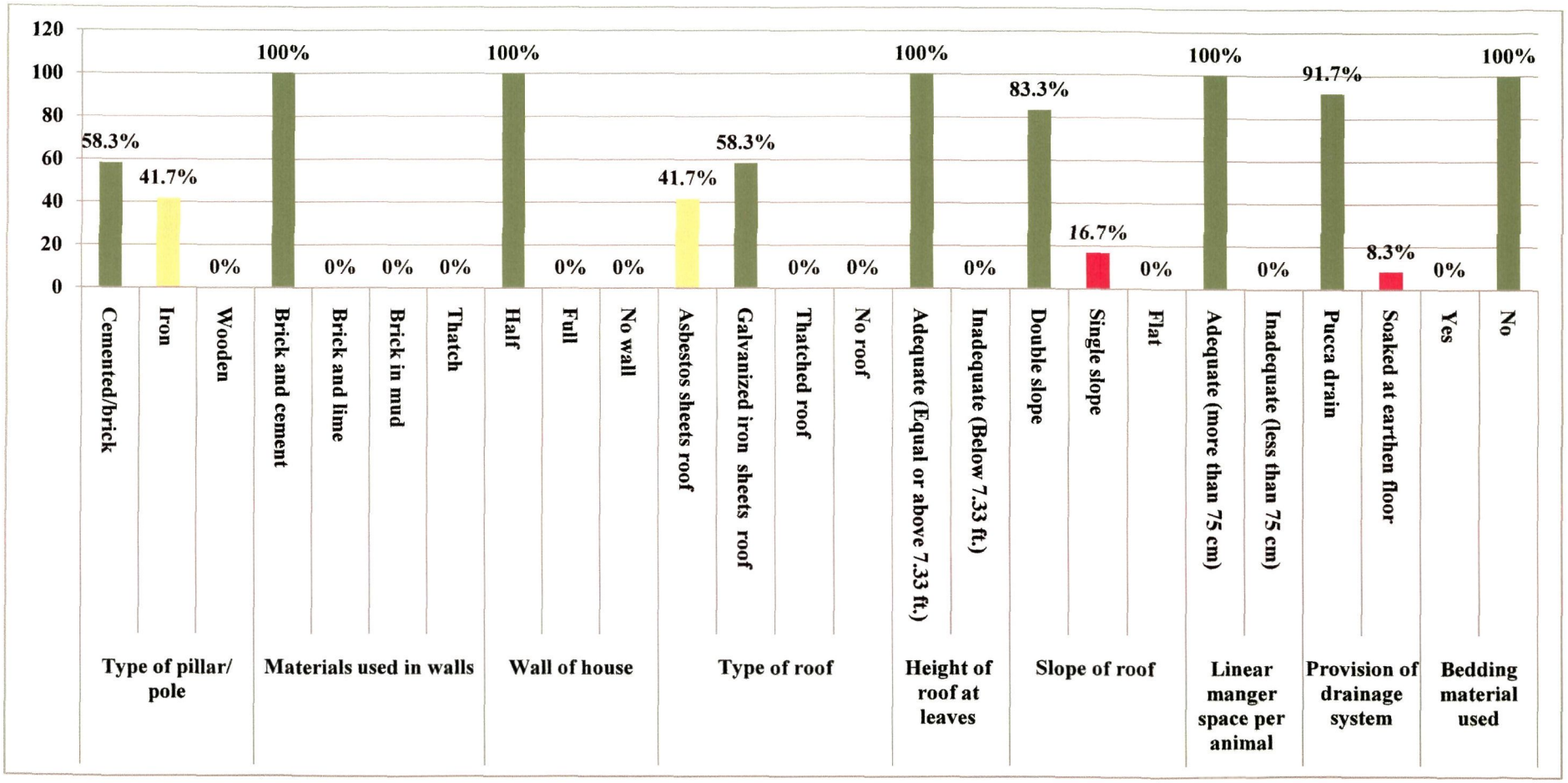


Fig.4.6 Housing practices: Type of pillar, material used in wall, wall of house, slope of roof, linear manger space, drainage system, and bedding material

4.2.2.14 Height of roof

The height of shed was also play an important role in proper ventilation (Plate IX). The height of shed at leave was ranging from 8 to 17 ft. with an average 10.91 ft. All DDF were providing roof height more than 7.33 ft. as per of ISI standards.

4.2.2.15 Slope of roof

Ten DDF owners were providing double slope (Plate X) roof in animal shed and two animals shed were with single slope type roof. It was observed that majority of the respondents 83.3 per cent possessed double slope type of roof while 16.7 per cent of the respondents possessed single slope type roof in their animal shed (Fig. 4.6). It might be due to that they follow double row housing system.

4.2.2.16 Manger space

Linear manger space provided per animal was adequate (than 75 cm as per of ISI standards) (Plate XI) in all (100 per cent) dairy farms, (Fig. 4.6). DDF owners provide adequate linear manger space required per animal to supply the sufficient quantity of feed to cow. Similar findings were reported by Rathore *et al.,* (2009) that 34.25 per cent of the respondents had pucca and optimum size of manger.

4.2.2.17 Provision of drainage system

Proper drainage system helps to maintain cleanness of shed. It was observed that pucca drainage (Plate XII) system was on eleven dairy farms while, only one farm was without any drainage system. This indicates 91.7 per cent respondents have pucca drainage facility while remaining 8.3 per cent of the respondents have no drainage facility in their animal houses (Fig. 4.6).

Most of DDF owner provide pucca drainage system to keep animal shed clean, hygienic and reduces chances of disease. Similar findings were reported by Modi (2003) and Deoras *et al.,* (2004), they found that about 82 per cent and 52.87 per cent of the respondents had pucca drainage facility in their animal houses, respectively.

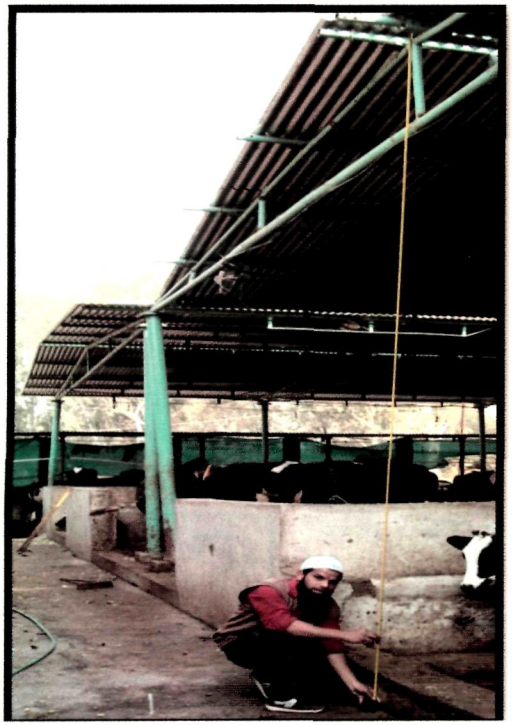


Plate IX. Measuring height of roof at centre on farm of Kaushalkumar

Plate X. Double slope type of roof at farm of Sandipbhai

Plate XI: Measuring of manger space

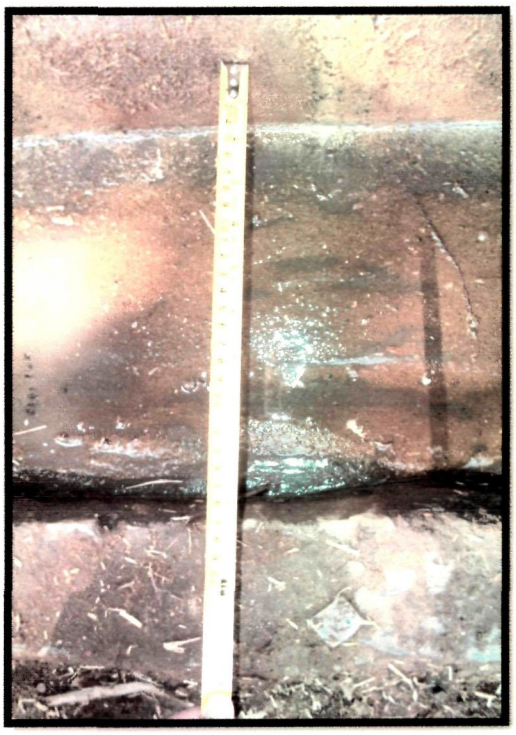


Plate XII. Measuring width of gutter at farm of Chetanbhai patel

4.2.2.18 Bedding materials used on the floor

It was observed that no DDF owners provide bedding material to their animals (Fig. 4.6) in Anand district of Gujarat, wheras Meena *et al.,* (2008) reported 91.66 per cent of the respondents at high altitude of kumaon Himalaya provided bedding material to their animals in the winter while, Rathore *et al.,* (2010) reported that in Churu district of Rajasthan 66 per cent of the respondents used bedding material during winter season.

Inconsistency in result might be due to the fact that during winter season mercury level of Anand district doesn't fall much as compared to the northern part of the country they only provide covering to animal shed from outside.

4.3 Feeding Management on Dairy Demonstration Farms.

To exploit the full genetic potential of the animal for higher production it is necessary that they must be fed properly. Underfeeding of young stock leads to under growth, delay in sexual maturity and lower productivity than optimum after attaining the breeding age.

The various feeding management practices followed by dairy demonstration farm owner in the study were presented in Table No. 9, 10 and 11, 12.

4.3.1 Feeding system

It was observed that all DDF owners (100 per cent) kept their animal as stall fed animals (Fig. 4.7). DDF owners kept their animal as stall fed because it reduces the energy loss at the time of grazing and provide efficient managemental practices.

Similar findings were reported by Gupta *et al.,* (2008) he observed that 84.5 per cent of respondent kept their animals as stall fed.

Table No. 9: Farm wise feeding management (a): Feeding system, feeding of milch animal, chaffing of fodder, types of concentrate feeding, method of feeding concentrate, criteria for concentrate feeding and time of feeding concentrate.

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
1	Feeding system	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding	Stall feeding
2	Feeding of milch animal	Individual	Individual	Individual	Individual	Group	Individual	Individual	Group	Individual	Individual	Individual	Individual
3	Fodder availability												
	(i) Green	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume	Non - legume + Legume
	(ii) Dry	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	Paddy straw + Jowar straw +Wheat straw	paddy straw + Jowar straw
4	Chaffing of fodder	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Types of concentrate feeding	Compoun ded cattle feed	Compoun ded cattle feed	Compoun ded cattle feed	Compound ed cattle feed	Compound ed cattle feed	Compound ed cattle feed	Compound ed cattle feed	Compoun ded cattle feed	Compound ed cattle feed	Compound ed cattle feed	Compoun ded cattle feed	Compoun ded cattle feed
6	Method of feeding concentrate	Separately	Separately	Separately	Separately	Separately	Separately	Separately	Separately	Separately	Separately	Separately	Separately
7	Criteria for concentrate feeding	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production	Milk production
8	Time of feeding conc.	During milking	During milking	During milking	During milking	Before milking	During milking	Before milking	Before milking	During milking	Before milking	During milking	Before milking

Table No. 10: Overall feeding management (a) on Dairy Demonstration Farms

(n=12)

Sr. No.	Particulars	Type	Percentage (No.)*
1	Feeding system	Stall feeding	100.0(12)
		Grazing	0.00 (0)
		Both	0.00 (0)
2	Feeding of milch animal	Individual	83.3 (10)
		Group feeding	16.7 (2)
3	Fodder availability		0.00 (0)
	(i) Green	Non - legume + Legume	100 (12)
		Legume	0.00 (0)
		Non-legume	0.00 (0)
	(ii) Dry	Paddy straw + Jowar straw +Wheat straw	91.7 (11)
		Paddy straw +Jowar straw	8.3 (1)
		Paddy straw	0.00 (0)
		Any other, Specify	0.00 (0)
4	Chaffing of fodder	Yes	100 (12)
		No	0.00 (0)
5	Types of concentrate feeding	Compounded cattle feed	100 (12)
		Homemade + compounded cattle feed	0.00 (0)
		Home produced ingredients	0.00 (0)
6	Method of feeding concentrate	Mixed with fodder	0.00 (0)
		Separately	100 (12)
7	Criteria for concentrate feeding	Body weight + Milk production	0.00 (0)
		Body weight	0.00 (0)
		Milk production (50 % of milk production)	100 (12)
		Age	0.00 (0)
		No criteria	0.00 (0)
8	Time of feeding concentrate	During milking	58.3 (7)
		Before milking	41.7 (5)
		After milking	0.00 (0)

*Figures in parenthesis indicates No. of Farms

4.3.2 Feeding of milch animal

It was observed that all 83.3 per cent (ten) DDF farmers adopted individual feeding system (Fig. 4.7) while, 16.7 per cent (two) farmers adopted group feeding. Individual feeding of animals provides an opportunity to feed milch animals according to their production level and also to save docile animals being harassed by vicious animals during feeding.

Similar findings were reported by Modi *et al.,* (2003) and Chowdhary *et al.,* (2008) who reported that all respondent in respective study area prefer individual feeding of their milch animal.

4.3.3 Fodder availability

4.3.3.1 Green fodder

All (100 per cent) farmers grew fodder crops and provide non-leguminous and leguminous green fodder throughout year (Fig. 4.7).

Sabapara *et al.,* (2010a) reported that about 75 per cent of the farmers were cultivating green fodder crops for their dairy animals. Cultivation of green fodder for animals depends upon various factors like availability of land, common grazing site (pasture), economic status of the farmer and productivity of the herd maintained by the farmers. Hence, fluctuating practices were reported in different parts of the country. It seems that in order to minimise the cost of milk production DDF owner preferred to cultivate certain amount of green fodder for their dairy animals.

4.3.3.2 Dry fodder

It was found that 91.7 per cent (nine) farmers fed their animal's paddy straw, jawar straw and wheat straw (Plate XVI) as dry fodder while remaining 8.3 per cent (one) farmer fed paddy as well as jawar straw only (Fig. 4.7). All these ingredients were available locally and also help in accomplish dry matter requirement of animal with low cost.

Table No. 11: Farm wise feeding management (a): Concentrate feeding to young calf, concentrate feeding to heifer, special feeding after calving, feeding of mineral mixture, feeding of salt, frequency of watering and source of water

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
9	Concentrate feeding to young calf	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	Concentrate feeding to heifer	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Special feeding after calving	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	Feeding of mineral mixture	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	Feeding of salt	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
14	Frequency of Watering	Free assess	Free assess	Free assess	Free assess	Free assess	Free assess	Two times	Free assess	Three times	Three times	Three times	Three times
15	Source of water	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well	Bore well

Table No. 12: Overall feeding management (b) on Dairy Demonstration Farms

(n=12)

Sr. No	Particulars	Type	Percentage (No.)*
9	Concentrate feeding to young calf	Yes	91.7 (11)
		No	8.3 (1)
10	Concentrate feeding to heifer	Yes	100 (12)
		No	0.00 (0)
11	Special feeding after calving	Yes	100 (12)
		No	0.00 (0)
12	Feeding of mineral mixture	Yes	100 (12)
		No	0.00 (0)
13	Feeding of salt	Yes	83.3 (10)
		No	16.7 (2)
14	Frequency of Watering	Free assess of water	58.3 (7)
		3 times	33.3 (4)
		2 times	8.3 (1)
15	Source of water	Bore Well	100 (12)
		Hand Pump	0.00 (0)
		River	0.00 (0)
		Canal	0.00 (0)
		Pond	0.00 (0)

*Figures in parenthesis indicates No. of Farms

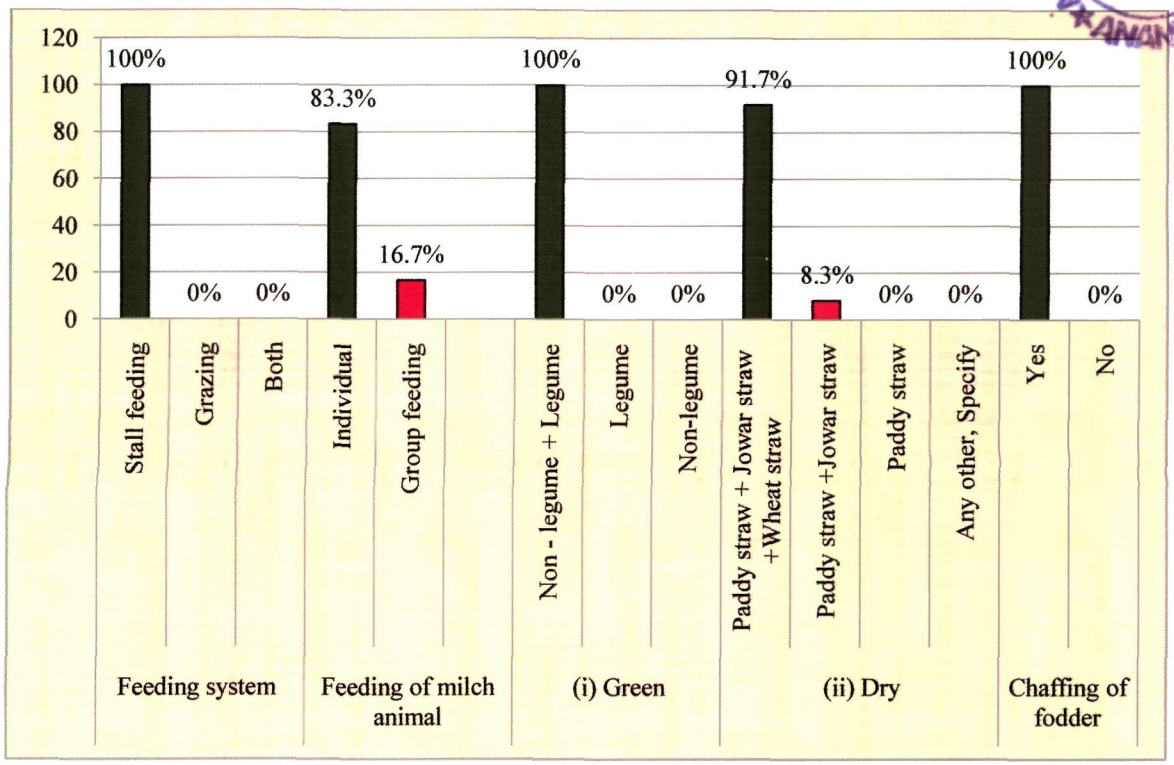


Fig.4.7 Feeding practices: System of feeding, feeding of animal (group or individual) types of green and dry fodder chaffing of fodder.

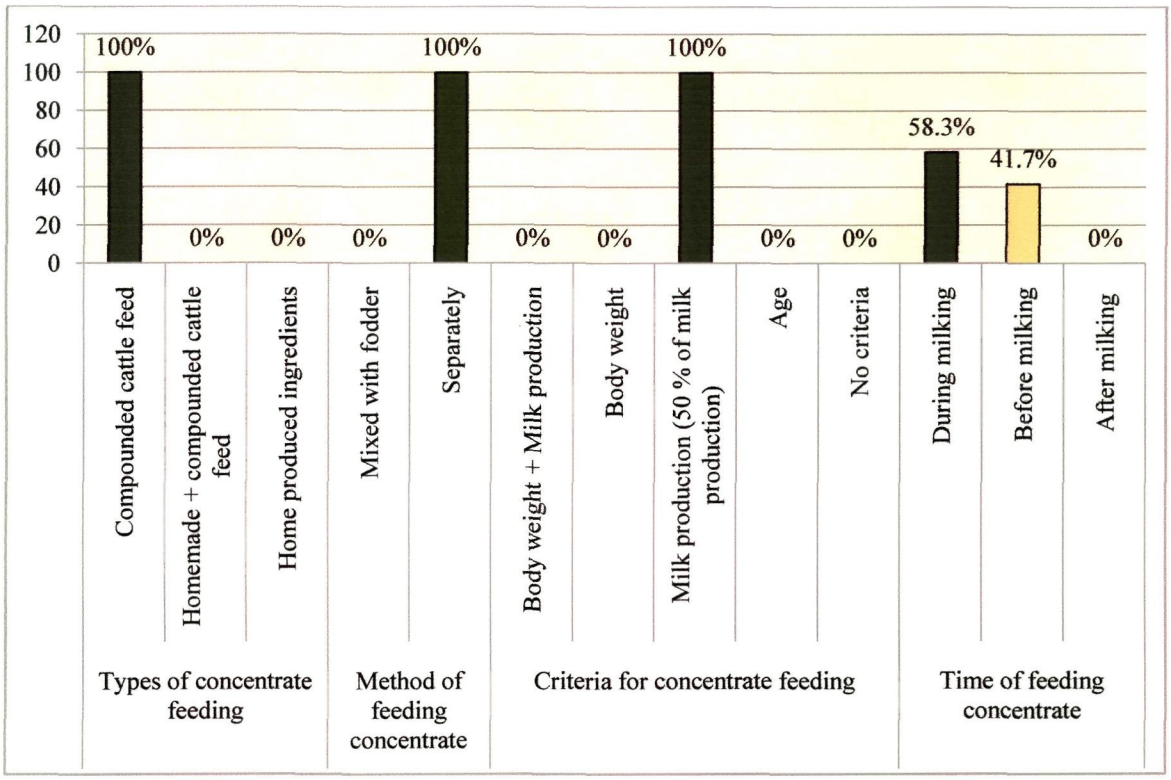


Fig.4.8 Feeding practices: Type, method, criteria and time of feeding concentrate on dairy demonstration farms.

4.3.4 Chaffing of fodder

It was observed that all DDF owners (100 per cent) offered green as well as dry fodders (Plate XIII and XIV) to their animal in chaffed form (Fig. 4.8). This improved practice of chaffing of green and dry fodder was done to reduce the wastage of feed and it also improves digestion of animal by reducing particulate size of fodder.

The findings of this study was in agreement with the findings of Gupta *et al.*, (2008) that majority (79.3 per cent) of the farmers fed dry and green fodders to the animals by chaffing.

4.3.5 Type of concentrate

It was revealed that the all DDF owner (100 per cent) fed compound cattle feed (Plate XV) concentrate to their animals which was prepared by Amul (Fig. 4.8). Cattle feed provided to DDF owner by Amul is economical and nutritious, in return DDF owner sale their milk to Amul.

Modi (2003), Sabapara *et al.*, (2010a) and Rathore *et al.*, (2010) reported that dairy farmers fed concentrate to their animals made from home produced ingredients along with compound cattle feed.

4.3.6 Methods of concentrate feeding

It was observed that all (100 per cent) of the dairy farmers provided concentrate feed to animals separately without mixing with fodder (Fig. 4.8). They followed this old system in feeding concentrate.

However, Sinha *et al.*, (2009) observed that the feeding of concentrate mixed with fodder was practiced by 74.4 and 85.6 per cent of the farmers in the rural and urban areas of Bareilly district of Uttar Pradesh, respectively.

Plate XIII: Chaffing of green fodder at dairy farm of Sandipbhai Bhikabhai

Plate XIV: Chaffed green fodder

Plate XV: Concentrate provided to animal

Plate XVI: Dry fodder provided to animal (wheat straw)

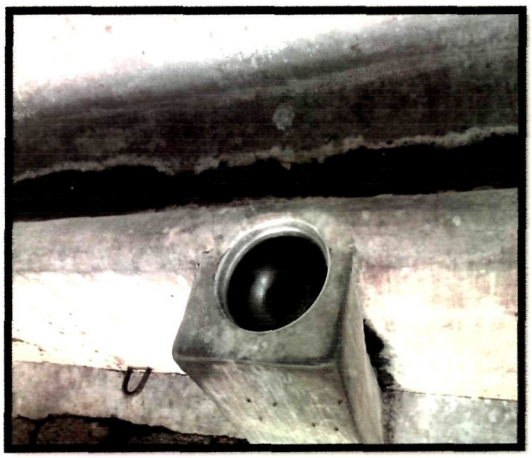


Plate XVII: Automatic water supplier

In order to increase the acceptability and palatability of fodder and efficient utilisation of concentrate, it is better farmers might have mixed the fodder with concentrate before feeding to the animals.

4.3.7.1 Criteria for concentrate feeding and quantity fed

It was observed that 100 per cent (twelve) farmers fed concentrate to their animals on the basis of their milk production (Fig. 4.8). All dairy owners were fed concentrate mixture 50 per cent of milk yield. The amount of concentrate fed per animal per day was ranging from 4.82 to 6.06 kg/ animal /day. The quantity of green fed varied from 10 to 25 kg with an average 19.58 kg and dry fodder 4 to 10 kg per head per day with an average 5.83 kg depending on fodder available.

Similar finding were reported by Malik *et al.*, (2005) and Sabapara *et al.*, (2010a) reported that majority of farmers 89 and 100 per cent fed concentrate to the dairy animals on the basis of milk production, respectively.

4.3.7.2 TDN and DCP intake by animal

The nutritional status of dairy cows was worked out as per Sen (1978) considering the average body weight of cow 450 kg is presented in table No. 13

The DCP supplied to dairy cows as percent of requirement varied between 113.34 to 128.55 and overall average worked out as 121.26 %. The figures for TDN intake were 108.18 to 125.52% and the average worked out as 119.56%. Thus in general the animals were overfed.

4.3.8 Time of feeding concentrate

All (100 per cent) farmers fed concentrate to their animals twice in a day, half of concentrate during morning and half in evening. Around 58.3 per cent (seven) farmer fed concentrate to their animals during milking and remaining 41.7 per cent (five) farmers provide concentrate before milking (Fig. 4.8).

Table No. 13: Nutritional status of dairy animals on DDF.

Farm No	Conc. (Kg)	Green fodder (Kg)	Dry fodder (Kg)	Av. daily Milk yield /animal (Kg)	Maintenance (450 kg Bwt.) (Kg)		Production (Kg)		Total requirement (maintenance + production) (Kg)		Intake (Kg)		% Availability	
					DCP	TDN	DCP	TDN	DCP	TDN	DCP	TDN	DCP	TDN
1	5.57	25	5	11.15	0.28	3.4	0.501	3.51	0.781	6.91	1.005	8.58	128.55	124.13
2	6.06	10	10	12.12	0.28	3.4	0.545	3.81	0.825	7.21	0.939	9.06	113.85	125.52
3	5.65	15	8	11.3	0.28	3.4	0.508	3.55	0.788	6.95	0.930	8.62	118.03	123.86
4	5.52	20	6	11.04	0.28	3.4	0.496	3.47	0.776	6.87	0.949	8.32	122.27	121.07
5	5.27	20	4	10.55	0.28	3.4	0.474	3.32	0.754	6.72	0.886	7.3	117.49	108.58
6	5.37	20	5	10.75	0.28	3.4	0.483	3.38	0.763	6.78	0.915	7.8	119.89	114.94
7	5.43	15	7	10.86	0.28	3.4	0.488	3.42	0.768	6.82	0.889	8.05	115.72	118.02
8	5.62	25	5	11.24	0.28	3.4	0.505	3.54	0.785	6.94	1.01	8.6	128.53	123.91
9	5.11	25	4	10.22	0.28	3.4	0.459	3.21	0.739	6.61	0.940	7.88	127.12	119.17
10	4.91	20	6	9.83	0.28	3.4	0.442	3.09	0.722	6.49	0.887	7.99	122.83	123.05
11	5.02	15	6	10.04	0.28	3.4	0.451	3.16	0.731	6.56	0.829	7.38	113.33	112.55
12	4.82	25	4	9.64	0.28	3.4	0.433	3.03	0.713	6.43	0.909	7.72	127.40	119.94
Av.													121.25	119.56

Shirsat *et al.,* (1994), Divekar and Saiyed (2008), Sabapara *et al.,* (2010a) and Rathore *et al.,* (2010) found that 90.83, 100, 91 and 84.50 per cent respondents were feeding concentrates at the time of milking respectively.

4.3.9 Concentrate feeding to young calf

'Young animals are future of the dairy farm' taking this in consideration 91.7 per cent (11) farmer fed concentrate feed to young calf while, remaining 8.3 per cent (one) did not follow this practice (Fig.4.9).

Similar findings were reported by Rathore *et al.,* (2010) that 60.25 per cent of respondent provide concentrate feed to young calf.

4.3.10 Concentrate feeding to the heifer

Like the concentrate feeding to young calf all respondent (100 per cent) were provide concentrate feed to the heifers (Fig.4.9). This helps in accomplish the nutrition requirement and there by improve growth and attend early sexual maturity.

Divekar and Saiyed (2008) and Rathore *et al.,* (2010) also reported practice where majority of the respondents 77.0 and 92.25 per cent in their respective area of study were feeding concentrate feed to their heifers.

4.3.11 Special feeding after calving

All respondents (100 per cent) of DDF followed special feeding after calving (Fig.4.9). They provide Rab (prepared by cooking crushed maize with Jaggery) to their animals for one week. This type of feeding helps animal to recover from negative energy balance and prevent or reduce chances of disease like milk fever.

Similar findings were reported by Patel *et al.,* (2005) and Sabapara *et al.,* (2010a) that most of respondent 100 and 96 per cent in their respective study area provide special feeding of concentrate after calving.

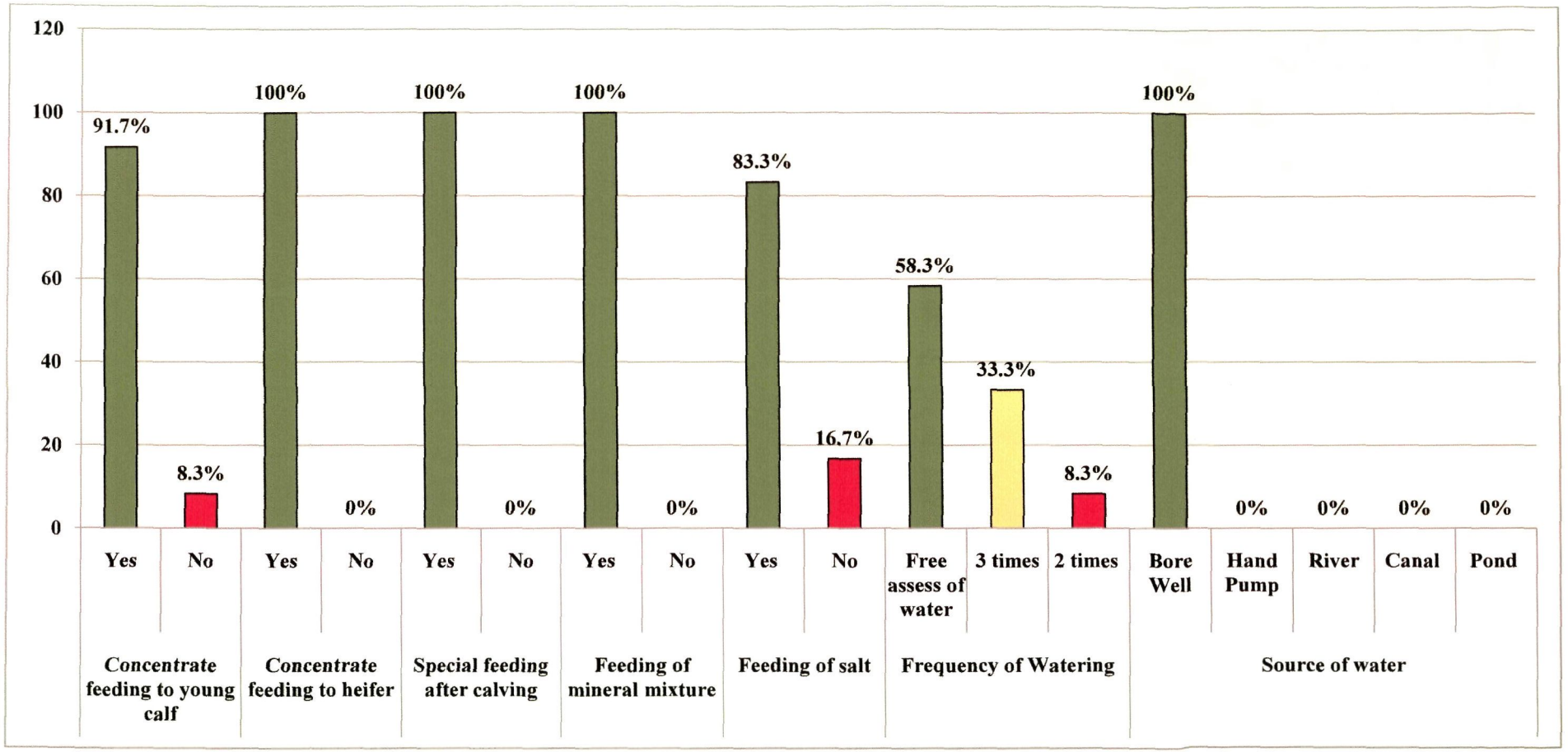


Fig.4.9 Feeding practices: Feeding of concentrate to young calf, heifer, special feeding after calving, feeding of mineral mixture, salt and frequency & source of watering.

4.3.12 Feeding of mineral mixture

Regarding practice of feeding of mineral mixture to milch animal, it was found that all 100 per cent (twelve) farmers fed mineral mixture to their animals (Fig.4.9). It shows greater awareness among DDF owner regarding beneficial effects of mineral mixture feeding.

Result found were in discrepancy with findings of Rathore *et al.,* (2009) Tiwari *et al.,* (2007) by Sabapara *et al.,* (2010a) and Aulakh *et al.,* (2011) they reported that 29.75, 14, 30.5 and 40.83 per cent respondents followed feeding of mineral mixture to their animals. It might be due to they were having low awareness about benefit of feeding mineral mixture.

4.3.13 Feeding of salt

Practice of feeding extra salt to the dairy animals was followed by the 83.3 per cent (10) farmers in the study area (Fig.4.9). Salt is essential to maintain the water balance in body and also maintain blood pressure. As the feeds and fodders of animal were lack in any source of salt, it is essential to provide it from other sources. DDF owners provide salt to their animal by adding it in water or by sprinkle salt solution on the fodder.

Findings were contrast with findings of Rathore *et al.,* (2009), Tiwari *et al.,* (2007) and Sabapara *et al.,* (2010a) who reported that 42.50, 48.89 and 18 per cent farmers provided extra salt in diet of animal.

4.3.14 Frequency of watering

Out of the total DDF studied 58.3 per cent (seven) farmers had provision to free access of water for 24 hour by automatic water supplier (Plate XVII) while, 33.3 (four) and 8.3 (one) per cent farmers provided water thrice and twice a day (ad lib), respectively (Fig.4.9). It shows that DDF owners adopt improved practice for watering of animal.

Table No. 14: Farm wise milking management (b): Types of milking, frequency of milking, washing of udder before milking, stripping at the end of milking, place of milking, teat dipping followed, cleaning of milking utensils, disposal of milk, test for mastitis diagnosis

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
1	Types of milking	Machine	Machine	Machine	Machine	Machine	Machine	Machine	Machine	Machine	Hand	Hand	Hand
2	Frequency of milking	Twice	Twice	Twice	Twice	Twice	Twice	Twice	Twice	Twice	Twice	Twice	Twice
3	Washing of udder before milking	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Stripping at the end of milking	Yes	No	No	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes
5	Place of milking	Milking at same place	Milking at same place	Milking at same place	Milking at same place	Separate place	Separate place	Milking at same place	Separate place	Milking at same place	Milking at same place	Milking at same place	Milking at same place
6	Teat dipping followed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Cleaning of milking utensils	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water	Hot water
8	Disposal of Milk	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society	Co-operative society
9	Test for mastitis diagnosis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table No. 15: Overall Milking management on Dairy Demonstration Farms

(n=12)

Sr. No	Particulars	Type	Percentage (No.)*
1	Types of milking	Machine	75.0 (9)
		Hand	25.0 (3)
2	Frequency of milking	Thrice	0.00 (0)
		Twice	100 (12)
		Once	0.00 (0)
3	Washing of udder before milking	Yes	100 (12)
		No	0.00 (0)
4	Stripping at the end of milking	Yes	58.3 (7)
		No	41.7 (5)
5	Place of milking	Milking at milking shed	25.0 (3)
		Milking at the same place	75.0 (9)
6	Teat dipping followed	Yes	100 (12)
		No	0.00 (0)
7	Cleaning of milking utensils	Hot water	100 (12)
		Tap water	0.00 (0)
8	Disposal of Milk	Co-operative society	100 (12)
		Vendors	0.00 (0)
		Middle man	0.00 (0)
		Home use	0.00 (0)
9	Test for mastitis diagnosis	Yes	100 (12)
		No	0.00 (0)

*Figures in parenthesis indicates No. of Farms

Conflict results were found by Chowdhry *et al.,* (2006) that majority of farmer (97.00 per cent) provided water to their milch animal ad lib but restricted in frequencies while, Sabapara *et al.,* (2010a) reported that almost all farmers (99 per cent) provided water to their milch animals ad lib but in restricted frequencies in which, 2 times (1 per cent respondents) to 3 times (98 per cent respondents) watering in a day were common in summer.

4.3.15 Sources of water

It was observed that all (100 per cent) farmers provide bore well water as a source of drinking water to their dairy animals (Fig.4.9). Similar findings have been reported by Malik *et al.,* (2005) that 98 per cent of respondent depend on bore well as source of water.

4.4 Milking Management on Dairy Demonstration Farms and their Production

4.4.1 Milking management

The results of various milking management practices followed by dairy animal owners were studied and presented Table No. 14 and 15

4.4.1.1 Type of milking

It was found that 75 per cent (nine) farmers were using machine milking, while 25 per cent (three) farmers prefer hand milking (Fig. 4.10). For production of clean milk production DDF owner use machine milking and it also help in reducing chances of mastitis.

4.4.1.2 Frequency of milking

All (100 per cent) farmers practised two times milking in day (Fig. 4.10). Similar findings of two times milking in a day were reported by Chowdhry *et al.,* (2008), Kalyankar *et al.,* (2008) and Rathore *et al.,* (2010).

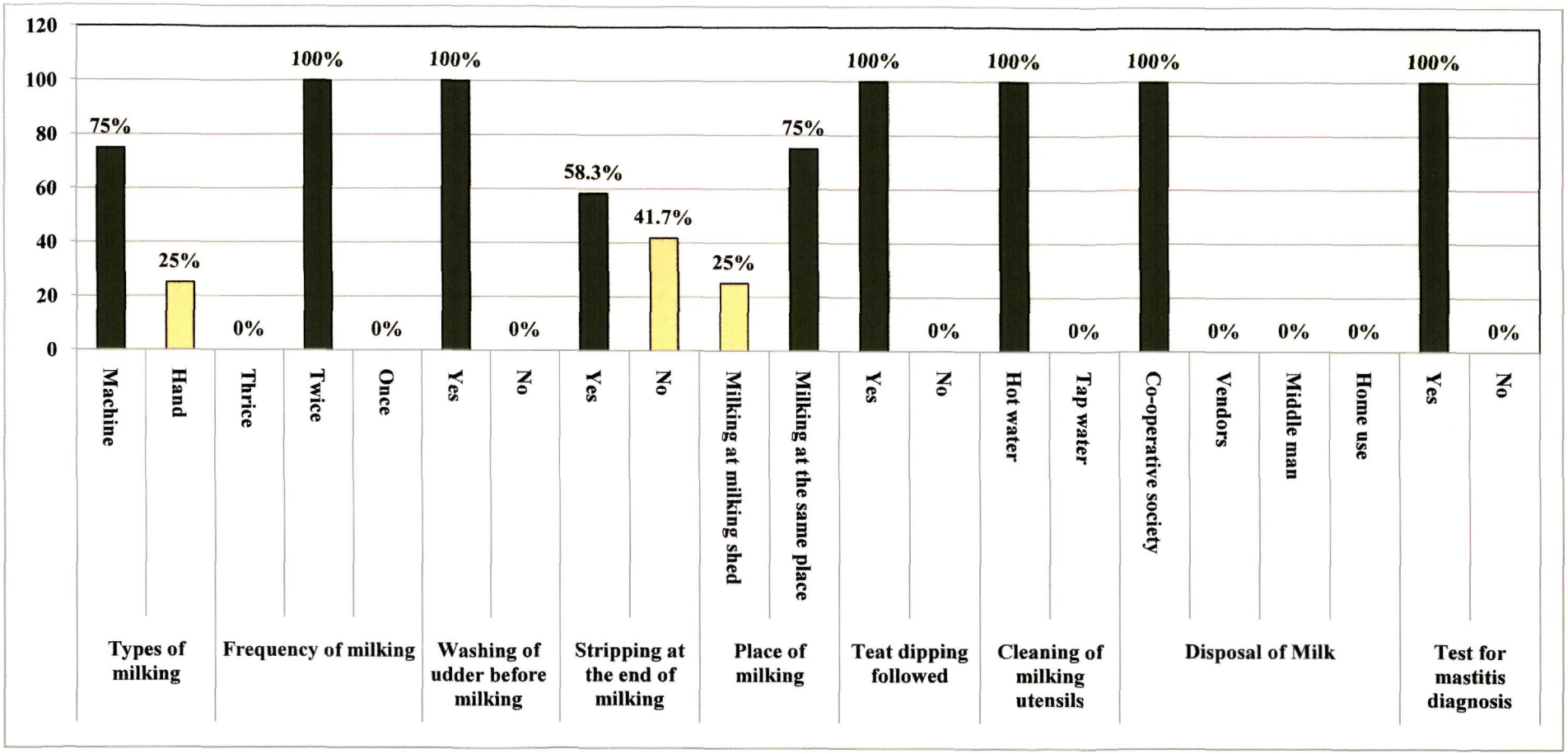


Fig.4.10 Milking management practices: Type, frequency, washing of udder before milking, stripping at end of milking, place of milking, teat dipping, cleaning of milking utensils, disposal of milk and test for mastitis diagnosis on dairy farm

4.4.1.3 Washing of udder before milking

It was observed that all (100 per cent) farmers wash teats and udder of a milking animal before milking (Plate XVIII, Fig. 4.10). They use antiseptic solution for washing udder. It helps in clean milk production and also, reducing chances of mastitis.

Similar practices were reported by Bainwad *et al.,* (2007), Kushwaha *et al.,* (2007), Chowdhry *et al.,* (2008), Gupta *et al.,* (2008), Kalyankar *et al.,* (2008) and Rathore *et al.,* (2010) in their respective study area that majority of farmers followed washing of udder before milking.

4.4.1.4 Stripping at the end of milking

Majority (58.3 per cent) of the farmers practice stripping at the end of milking and 41.7 per cent (five) farmers did not follow this practice (Fig. 4.10). Stripping at end of milking was followed because it contains high fat percentage.

Similar findings were reported by Malik and Nagpaul (1999), Swaroop and Prasad (2009) and Rathore *et al.,* (2010) that fairly high per cent of farmers practicing stripping at the end of milking.

4.4.1.5 Place of milking

Place of milking is important for clean milk production. Milking of animal at the same place of housing was followed by 75 per cent (nine) farmers while, only 25 per cent (three) farmers milked their animals at separate clean and dry place (Fig. 4.10). It might be due either less awareness of the farmers about clean milk production and or land unavailability and economic condition.

Similar findings were reported by Gupta *et al.,* (2008) Swaroop and Prasad (2009) and Sinha *et al.,* (2010). Where, they observed that majority of 77.5, 75.5 and 86.7 per cent of respondents milked their animals at the same place of housing, respectively.

Plate XVIII: Tying of animal for milking by Sandipbhai

Plate.XIX: Washing of udder before milking

Plate XX: Milking of animal with milking machine at dairy farm of Sandipbhai

Plate.XXI: Teat dip used after milking

4.4.1.6 Teat dipping

It was found that all (100 per cent) of the respondents follow teat dipping (Plate XXI) after milking (Fig. 4.10). This shows that the DDF owner were well aware about advantage of teat dipping in relation to maintenance of good udder health.

The contrast results were reported by Deshmukh *et al.,* (2009) that 97 per cent of the respondents were not following teat dipping after milking in their area of study. It might be due to they were not aware about advantage of teat dipping.

4.4.1.7 Cleaning of milking utensils

It was observed that all respondents have good knowledge about cleaning of milking utensils. All (100 per cent) respondents washed their milking utensil by hot water (Fig. 4.10). This practice is useful in maintain hygienic condition and avoid any contamination of milk with other microorganism. Similar findings were reported by Shirsat *et al.,* (1994), Bainwad *et al.,* (2007), and Rathore *et al.,* (2010).

4.4.1.8 Disposal of milk

All (100 per cent) farmers were disposed off their milk through village primary milk co–operative societies (Fig. 4.10). It might be due to the presence of well developed dairy co–operative network area. Similar result was reported by Chowdhry *et al.*, (2008) that 100 per cent of respondent were disposing milk to village cooperative society.

4.4.1.9 Test for mastitis diagnosis

It was found that all (100 per cent) farmers were used diagnostic test for the detection of mastitis by using masti-strip commonly available in medical store (Fig. 4.10). It shows that they are well aware about udder health management of animal. Result found was contradictory to results found by Gill and Saini (2008) were only 44 per cent of the respondents follow test to detect mastitis.

4.4.2 Production and reproductive performance of crossbred cow maintained on dairy demonstration farms

The information on production and reproductive performance of cows completing their lactation on DDF farms were collected and analysed to study the average production and reproductive performance of crossbred cow maintain at DDF farms. In all 431 lactation records were studied. The no of lactation records on each farm their average lactation No., No. of AI / conception lactation length, dry period, lactation yield, milk yield per day lactation length, milk yield per day of calving interval were presented in Table No. 16

4.4.2.1 Average No. of AI per conception

It was observed that average No. of AI per conception of crossbred cow was ranging from 1.36 to 1.86 with an average of 1.55. Similar results were reported by Anonymous (2013) that average no of service per conception for crossbred cow was 1.33.

4.4.2.2 Lactation length

Lactation length affects total milk production and as sequel it determines income from dairy animal. On analysis of data it was found that lactation length of a cow was ranging from 324 to 350 day with average 342 day.

These findings were in accordance to the findings reported by Roy and Saha (2003) who observed 335 days of lactation length in crossbred cows. While, Dubey and Singh (2005) estimated lactation length of 280-332 day in Sahiwal crossbred cattle. Kumar and Pathania (2011) reported that lactation length of crossbred cattle was 322 to 407 days in crossbred cattle.

Table No. 16: Production and reproductive performance of crossbred cow on Dairy Demonstration Farms

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12	Av. value
1	No. of milking animal	65	25	30	25	79	46	30	25	31	25	25	25	Total 431
2	Average lactation No.	4.53	3.6	3.6	3.6	4.54	4.58	3.23	4.4	4.5	3.2	3.2	3.2	3.84
3	Calving Interval (days)	404	402	384	388	410	404	406	405	407	404	404	401	402
4	No of AI require	1.43	1.44	1.86	1.76	1.7	1.47	1.53	1.52	1.58	1.56	1.48	1.36	1.55
5	Av. lactation length (days)	344	342	324	328	350	344	346	345	347	344	344	341	342
6	Av. lactation yield / animal (lit)	3835.6	4145.0	3661.2	3621.1	3692.5	3698.0	3757.5	3877.8	3546.3	3381.5	3453.7	3287.2	3663.1
7	Av. Yield/ day LL (lit)	11.15	12.12	11.3	11.04	10.55	10.75	10.86	11.24	10.22	9.83	10.04	9.64	10.72
8	Av. yield/ CI (lit)	9.49	10.31	9.53	9.33	9.01	9.15	9.26	9.57	8.71	8.37	8.55	8.20	9.12

4.4.2.3 Lactation yield

The milk yield is the main output which has economic significance in dairy enterprises. Lactation yield of animal maintained at DDF was ranging from 3287.24 lit to 4145.04 lit with average 3663.14 lit. Similar findings were reported by Joshi (1998) and Singh *et al.,* (2011) that Lactation yields of 3055 lit and 3393.3 lit in crossbred cow, respectively.

4.4.2.4 Calving interval

Calving interval is an indicator of reproductive performance of an animal and overall health of dairy business. Calving interval of animals was ranging from 384 to 410 day with an average 402 day. Similar findings were observed by Joshi (1998), Patel (2006) and Husain *et al.,* (2012) who reported that the calving interval of crossbred cows were 411, 409 and 393 to 422 days respectively.

4.4.2.5 Average milk yield per day of lactation length

It was observed that the average milk yield per day of lactation length of a crossbred cow on DDF was ranging from 9.64 to 12.12 lit with an average 9.83 lit.

The findings were higher value than finding of Singh *et al.*, (2005) and Patel (2006) who reported that average milk yield per day of lactation length of crossbred cow was 7.53 Kg and 7.34 kg, respectively.

4.4.2.6 Average milk yield per day of calving interval

Average milk yield per day of calving interval of cross bred cows on DDF was ranging from 8.2 to10.31 lit with an average 9.12 lit. Similar results were found that milk yield per day of calving interval was 10.32 lit in cross bred cows (Islam *et al.*, 2013)

4.5 Healthcare Management on Dairy Demonstration Farm.

Proper health management of dairy animals is very much essential as it affect the production, reproduction of animal and their by profit from dairy business. It is better to have prevention than cure of animal. The various health management practices followed on DDF farms were vaccination, deworming control of ecto and endo parasites and over all sanitation of farm and lastly treatment of sick animal. The results of various health care practices followed by DDF owners in the studied and presented in Table No. 17 and 18.

4.5.1 Vaccination

It was observed that all (100 per cent) farmers practiced regular vaccination of their animals against Foot and Mouth disease (FMD) and Haemorrhagic septicaemia (HS) (Fig. 4.11). Vaccination of animal is regularly done by veterinary doctors of Amul, who provides medical facility at low cost.

Findings of this study are in accordance with the findings of Pawar *et al.*, (2006), Kalyankar *et al.*, (2008), Gill and Saini (2008) and Sabapara *et al.*, (2010b) where they reported that majority of the farmers were practicing vaccination their animals.

4.5.2 Deworming of milch animal

It was also observed that all (100 per cent) farmers practiced deworming to their milch animals at regular intervals of 3 months (Fig. 4.11). Findings of study are in contrast with findings of Singh *et al.*, (2007b) and Meena *et al.*, (2008). The results indicated high level of awareness among DDF owners of Anand district.

4.5.3 Deworming of calves

It was observed that in order to control the endo-parasites in calves, all (100 per cent) farmers practice deworming of their calves at regular interval of six month (Fig. 4.11).

Table No.17: Health care practices followed on Dairy Demonstration Farms

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12
1	Vaccination against diseases	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Deworming of milch animal	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular
3	Deworming of calves	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular	Regular
4	Practices to control ecto – parasites	Followed	Followed	Followed	Followed	Followed	Followed	Followed	Followed	Followed	Followed	Followed	Followed
5	Treatment of sick animal by	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor	Veterinary doctor
6	Diseased animals are tied	Separately	Together with other	Together with other	Together with other	Separately	Together with other	Together with other	Separately	Together with other	Together with other	Together with other	Together with other

Table No. 18: Overall health care practice on Dairy Demonstration Farm

(n=12)

Sr. No	Particulars	Type	Percentage (No.)*
1	Vaccination against disease	Yes	100 (12)
		No	0.00 (0)
2	Deworming of milch animal	Regular	100 (12)
		Occasional	0.00 (0)
		Not practiced.	0.00 (0)
3	Deworming of calves	Regular	100 (12)
		Occasional	0.00 (0)
		Not practiced	0.00 (0)
4	Practices to control ecto – parasites	Followed	100 (12)
		Not followed.	0.00 (0)
5	Treatment of Sick animal by	Veterinary doctor	100 (12)
		Livestock inspector	0.00 (0)
		Calling a quack	0.00 (0)
		Use of local empirical knowledge	0.00 (0)
6	Diseased animals are tied	Separately	25.00 (3)
		Together with others	75.00 (9)

*Figures in parenthesis indicates No. of Farms

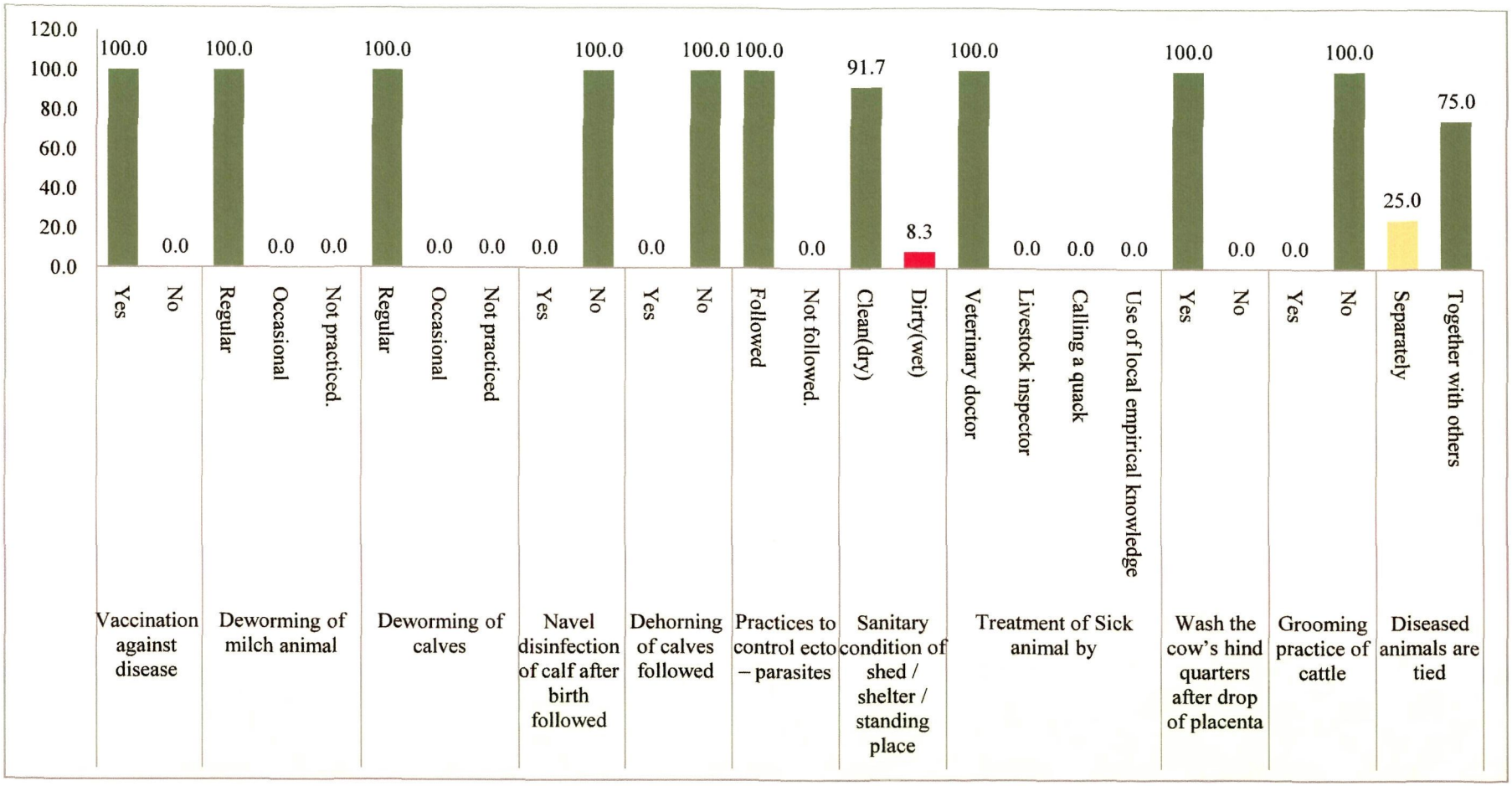


Fig.4.11 Health care practices: Vaccination, deworming of adult and calf, practices to control ecto-parasites, sanitary condition of farm, treatment of sick animal and disease animal tied separately or not.

Findings of this study are in conflict with the findings of Chowdhry *et al.,* (2008) and Sabapara *et al.,* (2010b). They reported that about 36 per cent and 25.5 per cent farmer fallow deworming of their calf, respectively.

4.5.4 Practices to control ecto-parasites

All (100 per cent) DDF farmer followed various practices (dusting, spraying, injectable drugs) for the control of ecto-parasites (Fig. 4.11). It shows that DDF owner are well aware about effect of ecto-parasite on animal health and productivity.

Similar findings were reported by Malik and Nagpaul (1999), Pawar *et al.,* (2006), Deshmukh *et al.,* (2009) and Sinha *et al.,* (2010) where 91.11, 86.70, 86 and 71.1 per cent of the respondents followed various practices for the control of ecto-parasites, respectively.

4.5.5 Treatment of Sick animal

It was observed that all (100 per cent) farmer treat their sick animals by Veterinary doctors (Fig. 4.11). It is because Amul provide the treatment facility to their member at low cost.

Similar findings were reported by Malik *et al.,* (2005), Gill and Saini (2008) and Sabapara (2010b) where majority of respondent treat their animal by veterinary doctor.

4.5.6 Placement of diseased animals

It was observed that only 25 per cent (three) farmers kept diseased animal separately, while majority 75 per cent (nine) farmers kept diseased animals together with healthy ones (Fig. 4.11). This might be due to either low level of knowledge of the dairy farmers about the isolation and segregation process to be adopted in order to control the spread the disease in the herd or may be due to non availability of space so that even if they are knowing this practice but couldn't do it due to paucity of the space. Similar findings were reported by Meena *et al.,* (2008) that 94 per cent of respondent were kept diseased animal together.

Plate XXII: Picking of manure from shed at dairy farm of Kantibhai Patel

Plate XXIII: Washing of shed with water at dairy farm of Ashwinbhai Patel

Plate XXIV: The provision made for washing animals at dairy farm of Jayeshbhai Patel

4.6 Economics of Dairy Demonstration Farms.

The economics of each dairy demonstration farm were calculated by studying the paid out cost as well as total cost of maintenance of animal per year. Returns from the farm were estimated on basis of cost of milk production per litre and profit per animal per year. The finding for all farm were calculated and presented in Table No. 19, 20, and 21, 22 Further these farms were classified into high, medium and low profitable farm as per research methodology.

4.6.1 Computation of total expense/animal/day (C)

4.6.1.1 Total fixed depreciation cost/animal/day of farm

The perusal of data revealed that total fixed depreciation cost/animal /day were ranging from ₹ 13.88 to 16.82 with an average of 15.18, while for high, medium and low profitable farm it was ₹ 15.96, 15.19 and 14.37 respectively. Total fixed depreciation cost includes depreciation cost shed, animal, equipment and miscellaneous cost.

Aitwade *et al.,* (2005), Sirohi *et al.,* (2007) and Singh *et al.,* (2011) were reported that total fixed depreciation cost of an animal was found to be ₹ 9.65, 12.88 and 16.83 per animal per day, respectively.

4.7.1.2 Cost of green, dry fodder and concentrate feeding/animal/day

The average cost of feeding of green fodder per animal per day was 30.89 ranging from ₹. 15.64 to 38.75 On further analysis cost of feeding green fodder in high, medium and low profitable farm was ₹. 23.32 30.44 and 34.49 per animal per day, respectively. Cost of feeding dry fodder of was ranging from ₹. 13.16 to 31.28 with average 19.00, while for high, medium and low profitable farm were ₹ 22.81 18.72 and 16.28 per animal per day. Cost of feeding concentrates was ranging from 62.23 to 74.41 with an average 67.37 while it was ₹ 70.08, 68.04 and 61.96 per animal per day for high, medium and low profitable dairy farm, respectively.

Table No. 19: Farm wise total expenses per animal per day (cost C)

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12	Average
1	No. of animal	65	25	30	25	79	46	30	25	31	25	25	25	35.92
2	Total Fixed depreciation cost/ animal /day (₹)	16.54	16.82	13.88	15.95	15.09	16.34	14.61	16.11	14.01	14.37	14.10	14.37	15.18
3	Cost of green fodder/ animal /day (₹)	38.75	15.64	23.09	30.13	31.00	31.08	22.89	37.44	36.35	31.15	23.79	37.04	29.86
4	Cost of dry fodder/ animal /day (₹)	16.68	31.28	26.50	18.99	14.33	16.22	23.12	16.00	13.16	18.90	19.09	13.67	19.00
5	Cost of conc./ animal /day (₹)	69.34	74.41	73.95	67.08	65.75	66.58	68.88	71.22	64.47	62.23	62.83	61.69	67.37
6	Total feed cost/ animal /day	124.77 (80.5%)	121.33 (75.5%)	123.54 (79.1%)	116.2 (75.3%)	111.08 (78.8%)	113.88 (78.4%)	114.89 (77.3%)	124.66 (76.5%)	113.98 (77.9%)	112.28 (75.5%)	105.71 (74.6%)	112.4 (75.6%)	116.23 (77.0%)
7	Medication/animal /day (₹)	0.11	0.28	0.19	0.28	0.15	0.13	0.26	0.15	0.22	0.28	0.23	0.23	0.21
8	Labour/animal /day (₹)	10.12	15.78	13.15	15.78	11.65	11.44	13.15	15.78	12.73	15.78	15.78	15.78	13.91
9	Miscellaneous/animal /day (₹)	0.84	1.10	0.91	1.10	0.69	1.19	0.91	1.10	0.88	1.10	1.10	1.10	1.00
10	Instalment /animal /day (₹)	12.08	15.10	12.46	14.28	11.02	11.79	13.14	14.43	12.59	13.05	12.79	13.05	12.98
11	Av. interest/ year/animal /day (₹)	6.98	7.14	5.89	6.75	6.36	6.81	6.21	6.82	5.95	6.17	6.04	6.17	6.44
12	Total recurring expenses/animal /day (₹)	154.89	160.72	156.13	154.38	140.95	145.23	148.56	162.94	146.35	148.64	141.66	148.73	150.77
13	Total expense/animal /day (₹)	171.43	177.55	170.02	170.33	156.05	161.57	163.17	179.05	160.36	163.01	155.75	163.10	165.95

Table No. 20: Total expense per animal per day (C) of high medium and low profitable dairy demonstration farms

Sr. No.	Particular	High profitable	Medium profitable	Low profitable
1	No of farms	2 (12)	8 (12)	2 (12)
2	Av. No. cows / farm	52	35	25
3	Average Wet dry ratio	76:24	79:21	66:34
4	Total Fixed depreciation cost/animal /day of farm (₹)	15.96	15.19	14.37
5	Cost of green fodder/animal /day (₹)	23.32	30.44	34.09
.6	Cost of dry fodder/animal /day (₹)	22.81	18.72	16.28
7	Cost of conc./animal /day (₹)	70.08	68.04	61.96
8	Medication/animal /day (₹)	0.21	0.20	0.25
9	Labour/animal /day (₹)	13.72	13.49	15.78
10	Miscellaneous/animal /day (₹)	0.89	1.00	1.10
11	Instalment /animal /day (₹)	13.06	12.95	13.05
12	Av. interest/ year/animal /day (₹)	6.75	6.43	6.17
13	Total recurring expenses/animal /day (₹)	150.84	151.27	148.68
14	Total expense/animal /day (₹)	166.80	166.46	163.06

Finding are in contrast Aitwade *et al.,* (2005) who found that cost of feeding dry fodder, green fodder and concentrate were ₹ 22.97, 16.33 and 23.44 per animal per day, respectively. It might be due to the cost of feed at that time were less as compared to nowadays.

4.7.1.3 Other costs

These costs include cost of medication, labour, miscellaneous, instalment, average interest, total recurring expenses and total expenses per animal per day. It was observed that cost of medication of high, medium and low profitable farm was ₹ 0.21, 0.20 and 0.25 per animal per day, respectively and ranging from ₹ 0.11 to 0.28 with average ₹ 0.21. It was observed that cost labour of DDF was ranging from ₹ 10.12 to 15.78 with an average ₹ 13.91 on further analysis for high, medium and low profitable farm it was ₹ 13.72, 13.49 and 15.78 per animal per day, respectively. The data was also revealed that miscellaneous cost per animal per day of high, medium and low profitable farm was ₹ 0.89, 1.00 and 1.10 per animal per day respectively and ranges from ₹ 0.69 to 1.10 with average ₹ 1 per animal per day. It was observed that instalment per animal per day was ranging from ₹ 11.02 to 15.10 with average ₹ 12.98 while, for high, medium and low profitable farm it was ₹ 13.06, 12.95 and 13.05 ₹ per animal per day respectively. Average interest per animal per day was found to be ₹ 6.75, 6.43 and 6.17, respectively and it was ranging from ₹ 5.89 to 7.14 with average ₹ 6.44. Total recurring expenses per animal per day of high, medium and low profitable farm was ₹ 150.84, 151.27 and 148.68 ranging from ₹ 140.95 to 162.94 with average ₹ 150.77 Total expenses computed was ranging from ₹ 155.75 to 179.05 with average ₹ 165.9 on further analysis for high, medium and low profitable farm it was ₹ 166.80, 166.46 and 163.06 per animal per day, respectively.

Similar study was carried out by Aitwade *et al.,* (2005), Singh and Agarwal (2007) Sirohi *et al.,* (2007) Singh *et al.,* (2011) and Singh *et al.,* (2011) they also reported finding which were low as compare to present findings. This might be due to increase in costs of each resource in the present day.

4.7.2 Computation of returns cost (B)

Return cost per animal per day include returns from sailing of milk, manure, and empty gunny bags. It was found that cost return from milk sold per animal per day ranging from 182.011 to 228.83 with an average ₹ 202.59 on further analysis it was found that for high, medium and low profitable farm it was ₹ 214.65, 204.27 and 183.80 per animal per day, respectively. It was also found that the cost return from manure sold per animal per day for high, medium and low profitable farm was same ₹ 16.20. Return from sailing empty gunny bag was ranges from ₹ 1.02 to 1.23 with an average ₹ 1.11 while, for high, medium profitable and low profitable farms ₹ 1.16, 1.12 and 1.02 respectively per animal per day.

Total income per animal per day was ranging from ₹ 199.22 to 246.26 with average ₹ 219.90 while, on further analysis it was ₹ 232.02, 221.59 and 201.02 for high, medium and low profitable farm, respectively. Net income per animal per day was ₹ 65.22, 55.13 and 37.97 for high, medium and low profitable farm, respectively and ranging from ₹ 36.13 to 68.71 with average ₹ 53.95. On observation it was revealed that an animal gave net profit ₹ 1098.81 to 2089.92 with an average ₹ 1641.08 while on further analysis for high, medium and low profitable farm it was ₹ 1983.84, 1676.96 and 1154.79 per month. Net profit per animal per year was ranging from ₹ 13185.74 to 25078.98 with average ₹ 19692.95 and for high, medium and low profitable farm it was ₹ 23806.12, 20123.52, and 13857.51 per year, respectively. Average cost of milk production was ₹. 18.24 ranges from 17.24 to 19.92 and Cost of milk production of high, medium and low profitable farm was found to be ₹ 17.27, 18.11 and 19.72 per litre of milk, respectively.

Table No. 21: Farm wise return per animal per day (cost B)

Sr. No.	Characteristics	Farm 1	Farm 2	Farm 3	Farm 4	Farm 5	Farm 6	Farm 7	Farm 8	Farm 9	Farm 10	Farm 11	Farm 12	Average
1	No. of animal	65	25	30	25	79	46	30	25	31	25	25	25	35.92
2	Milk sold /animal /day (₹)	211.19	228.83	210.59	206.42	200.47	203.62	205.7	212.90	193.58	185.59	190.17	182.01	202.59
3	Manure sold/ animal /day (₹)	16.20	16.20	16.20	16.20	16.22	16.20	16.20	16.20	16.20	16.20	16.20	16.20	16.20
4	Empty gunny bag sold/ animal /day (₹)	1.14	1.23	1.22	1.11	1.08	1.10	1.14	1.17	1.06	1.03	1.04	1.02	1.11
5	Total income/ animal /day (₹)	228.54	246.26	228.01	223.73	217.78	220.91	223.04	230.27	210.84	202.82	207.41	199.22	219.90
6	Net income/ animal /day (₹)	57.11	68.71	58.00	53.40	61.73	59.34	59.87	51.22	50.48	39.81	51.65	36.13	53.95
7	Net income /animal/month (₹)	1736.95	2089.92	1764.08	1624.20	1877.77	1805.00	1820.94	1557.98	1535.47	1210.77	1571.05	1098.81	1641.08
8	Net income /animal/year (₹)	20843.38	25078.98	21168.99	19490.35	22533.27	21659.98	21851.33	18695.78	18425.68	14529.28	18852.63	13185.74	19692.95
9	Cost of milk Production (₹)	18.04	17.24	17.94	18.34	17.30	17.63	17.63	18.69	18.41	19.52	18.20	19.92	18.24
10	B: A ratio	1.33	1.39	1.34	1.31	1.40	1.37	1.37	1.29	1.31	1.24	1.33	1.22	1.33

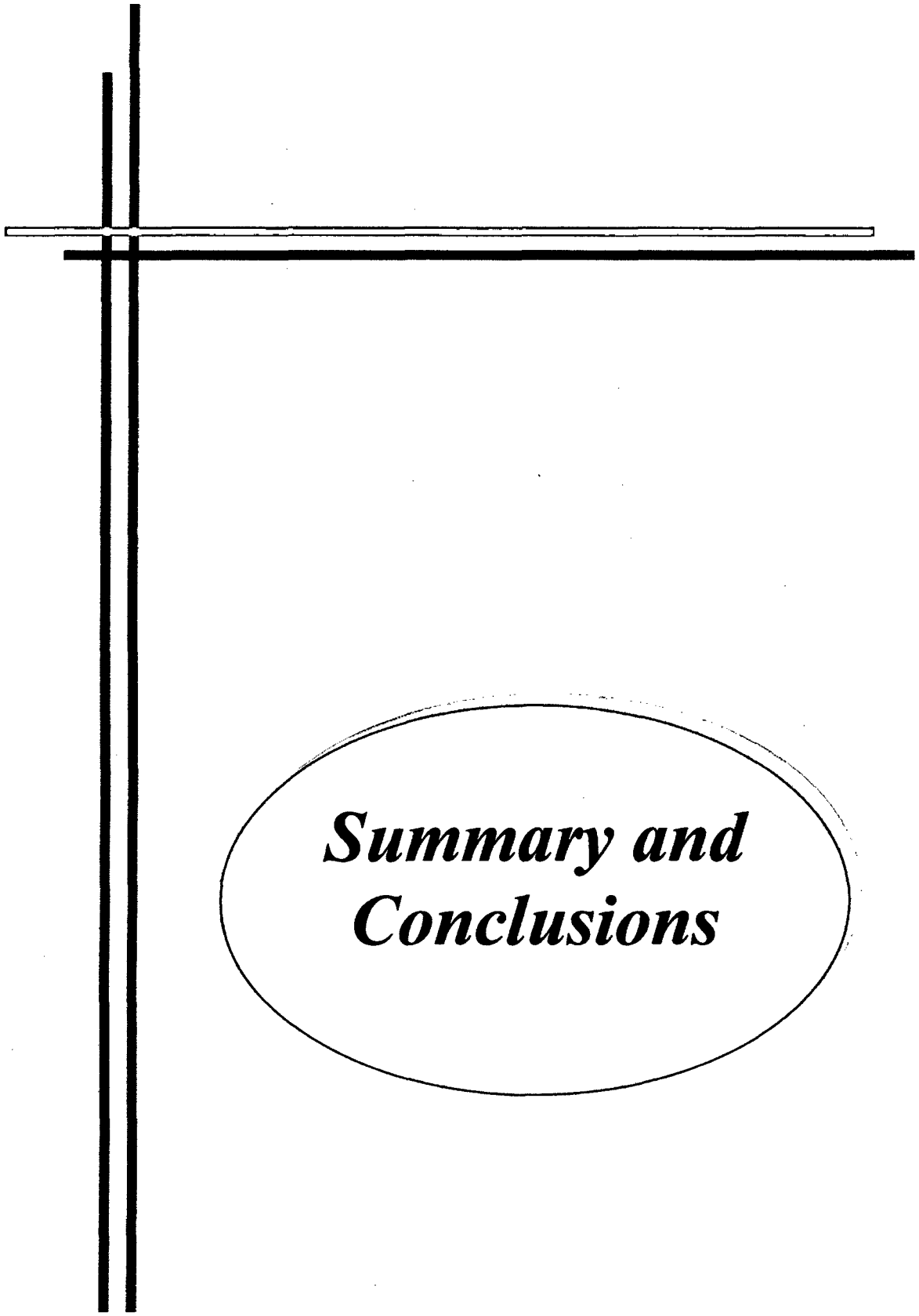
Table No. 22: Return cost per animal per day (B) for high, medium and low profitable dairy demonstration farms.

Sr. No.	Particular	High profitable	Medium profitable	Low profitable
1	No of farms	2 (12)	8 (12)	2 (12)
2	Av. No. cows / farm	52	35	25
3	Average Wet dry ratio	76:24	79:21	66:34
4	Milk sold /animal /day (₹)	214.65	204.27	183.80
5	Manure sold/animal /day (₹)	16.21	16.20	16.20
6	Empty gunny bag sold/animal /day (₹)	1.16	1.12	1.02
7	**Total income/animal /day (₹)**	232.02	221.59	201.02
8	Net income/animal /day (₹)	65.22	55.13	37.97
9	Net income /animal/month (₹)	1988.22	1676.96	1154.79
10	Net income /animal/year (₹)	23858.65	20123.52	13857.51
11	Cost of milk Production (₹)	17.27	18.11	19.72
13	B:C RATIO	1.39	1.33	1.23

Similar type of study was carried out by Aitwade *et al.,* (2005), Singh and Agarwal (2007), Sirohi *et al.,* (2007) and Singh *et al.,* (2011). Cost findings from this research were low as compared to present study. This might be due to the cost of farming and also price of milk at that time was low.

4.7.3 B: C ratio

It is the ratio of cash returns to cash input, which must be unity or more for an enterprise to be considered worthwhile. The minimum ratio required is 1:1, which indicates the coverage of costs without any surplus benefits. But usually the ratio should be more than unity in order to provide some additional returns over the costs for clear decision. It was observed that B:C ratio of farm were 1.39:1, 1.33:1 and 1.23:1 for high, medium and low profitable farm respectively and average B: C was ranging from 1.22:1 to 1.40:1 with average 1.33:1. This means that all farms were running in profitability. Similar study was carried out by Parthasarathy (1975) and Rao *et al.,* (2004) reported that return to input ratio of farm was 1.31:1.



Summary and Conclusions

Chapter V

Summary and Conclusions

In the face of economic liberalization the sustenance of rural livelihood is currently at stake than ever before. Livelihood options are shrinking in rural areas in general and more so in eco-fragile regions, such as drought, desert prone, hilly areas and other under developed / backward districts. Dairy farming plays significant role in sustaining the rural livelihood, although the phenomenon of farmer's suicides, migration, malnutrition / ill health are widely prevalent in rural India. However, some of the dairy farming based drought prone districts made rapid strides in ameliorating poverty by substantially contributing to the District / State agriculture economy.

In dairy development sector, Gujarat occupied pride place, due to impressive stride organizing chain of co-operative dairies in the state, with around 4.43 percent of cattle's and 9.09 percent of buffalo's (Anonymous, 2010). Gujarat Cooperative Milk Marketing Federation Ltd. (GCMMF) is India's largest food product marketing organisation with annual turnover (2011-12) of US$ 2.5 billion. Its daily milk procurement is approx 13 million lit (peak period) per day from 16,117 village milk cooperative societies, 17 member unions covering 24 districts, and 3.18 million milk producer members. Amul dairy has established Dairy Demonstration Farms (DDF) to increase milk procurement. These DDFs will serve as production hubs for Amul dairy.

Understanding of livestock management practices followed by farmers in a region is necessary to identify the strengths and weaknesses of the rearing systems and to formulate suitable intervention policy. The present study therefore has been designed to know about management of dairy demonstration farms, their productivity and economics.

The study was conducted in Anand district of Gujarat with the objectives to know personal, socio-economic status of dairy animal owners, existing dairy husbandry practices, and economics of dairy farming. Twelve dairy farms were included in study. Respondents (dairy farm owner) were interviewed and the desired information was collected in the questionnaire (schedule). The collected data were tabulated and subjected to various statistical methods to draw meaningful inferences.

5.1 Socio-economic Status of Farmer Holding Dairy Demonstration Farms

All these characteristics affect the behavioural pattern, level of enterprise, adoption level of improved dairy husbandry practices and management capability of the dairy animal owners in some way or other. All dairy demonstration farms were managed by male of which 66.7 per cent were from middle age group followed by 25 per cent old and 8.0 per cent young age. All farmers were literate where 66.7 per cent had education from 8^{th} to 12^{th} standard and 33.3 per cent were graduates. About 83.3 per cent farmer found to be from general category followed by other backward class 16.7 per cent. Farmer having average family size of 6.33 members with 83.3 per cent have more than 4 members and joint and 16.7 per cent have equal or less than 4 member and nuclear family, respectively. 41.7 per cent farmers were having more than 2.5 acres land holding area while, 25 and 33.3 per cent of farmers were having 1.25 to 2.5 and up to 1.25 acres land holding area, respectively with average land holding 3.54 acres. Agriculture and dairy as source of their livelihood, practiced by 58.3 per cent farmers

5.2 Management of Animal and Housing Management on Dairy Demonstration farm

Productivity of animals on farms depending on managemental practices followed on a farm. Herd strength of DDF was ranging from 31 to 99 animals with average increase in herd strength of 69.66 per cent over a period of establishing a farm. Average wet dry ratio of farms was 76:24 with wet dry ratio ranging from ranging from 60:40 to 84:16. Herd average of DDF was ranging from 5.76 to 10.12 lit with average 8.17 lit. Whereas wet average of DDF was ranging from 9.60 to 12.05 lit., with average 10.68 lit. The average parity of farm animal was ranging from 3.2 to 4.58 with an average parity of 3.84. All DDF owners were having some kind of mechanisation on their farm. 100, 75, 58.33 and 8.33 per cent farmers having Motor operated chaff cutter, milking machine, automatic water supplier and Bulk milk cooler (BMC) facility, respectively.

Provision of proper housing facilities to the animals not only reduces the energy wastage in maintaining thermo neutral zone but also provides good hygienic condition, reduces the incidence of diseases, protects animals from predators and provides better working condition to the farmers. All farmers having closed types of housing of which 41.7 per cent shed were attached to human dwelling. While, 33 per cent and 25 per cent shed at farmer field and away from their dwellings, respectively. East -West direction of houses were followed by 75 percent farmers. Tail to tail system of housing was followed by 41.7 per cent farmers. While, about 33.3 and 25.0 per cent farmers follow single line and head to head system of housing, respectively. The floor space per animal on DDF farms ranging 46.87 to 71.25 sq. ft. with average floor space per animal was 51.27 sq. ft. All 100 per cent farmer provide adequate spacing to their animal. Artificial light was provided on all

(100 per cent) farms. All farmers have fogger and curtains to protect the animals from extreme weather conditions. Pucca type of floor with slope back word side observed in 91.7 per cent animal house while, 8.3 per had stone paved with no slope in floor. Sheds were constructed using cemented and brick type of pillar by 58.3 per cent farmers while, 41.7 per cent farmers used iron poles to support the roof. All farmers constructed half wall using brick and cements in animal shed. Around 58.3 per cent and 41.7 per cent of the respondents used galvanized iron sheets and asbestos sheets as roofing material for their animal shed, respectively. Majority of farmers (83.3 per cent) possessed double slope type of roof while 16.7 per cent possessed single slope type roof in their animal shed. All farmers provide adequate linear manger space to animals. Pucca drainage facility was observed in 91.7 per cent sheds while, 8.3 per cent farmers do not have pucca drainage facility in their animal houses. It was observed that no DDF owners provide bedding material to their animals.

5.3 Feeding Management on Dairy Demonstration Farms.

To exploit the genetic potential of the animal for higher production it is necessary that they must be fed properly. It was observed that all (100 per cent) famer kept their animal as stall fed with individual feeding. All the farmers grew fodder crops and provide non-leguminous and leguminous green fodder throughout year. Around 91.7 per cent farmers fed their animal's paddy straw, jawar straw and wheat straw as dry fodder while remaining 8.3 per cent farmer fed paddy and jawar straw. All farmers (100 per cent) offered green as well as dry fodders to their animal in chaffed form. Feeding of compound cattle feed (Amul dan) separately without mixing with other fodder observed in all farms. All DDF farmers provide concentrate to animal on the basis of their milk production. Around 58.3 per cent

farmers fed concentrate to their animals during milking and remaining 41.7 per cent farmers provide concentrate before milking. Concentrate feeding to young calf and heifer was followed by 91.7 and 100 per cent farmer, respectively. All DDF follows special feeding after calving. It was found that 100 per cent farmers fed mineral mixture to their animals. Practice of feeding extra salt to the dairy animals was followed by the 83.3 per cent farmers in the study area. Out of the total respondent in the study area 58.3 per cent farmers have provision to free access of water for 24 hour while, 33.3 and 8.3 per cent farmers provided water thrice and twice a day (ad lib quantity), respectively during summer season. It was observed that all DDF farmers provide bore well water as a source of drinking water to their dairy animals.

5.4 Milking Management on Dairy Demonstration Farm and their Production

It was observed that 75 per cent farmers were using machine milking, while 25 per cent farmers prefer hand milking. All farmers practised two times milking in day. It was found that all farmers wash teats and udder of a milking animal before milking using antiseptic solution. Majority of the 58.3 per cent farmers practice stripping at the end of milking while, 41.7 per cent farmers were not following this practice. Milking their animal at the same place was followed by 75 per cent farmers while, only 25 per cent farmers milked their animals at milking parlour. It was practice of all farmers to follow teat dipping after milking and washed their milking utensil by hot water. All DDF farmers were disposed off their milk through village primary milk co–operative societies. All farmers were used diagnostic test for the detection of mastitis by using masti-strip commonly available in medical store. It shows that they were well aware about udder health management of animal.

Calving interval of animals was ranging from 384 to 410 day with an average 402 day. On observation of data it was found that lactation length of a cow

was ranging from 324 to 350 day with average 342 day. Lactation yield of animal maintain at DDF was ranging from 3287.24 to 4145.04 lit with average 3663.14 lit. It was observed that the average milk yield per day lactation length of a crossbred cow on DDF was ranging from 9.64 to 12.12 lit with an average 9.83 lit. While, average milk yield per day of calving interval was ranging from 8.2 to10.31 lit with an average 9.12 lit.

5.5 Healthcare Management on Dairy Demonstration Farms.

All DDF farmers practiced regular vaccination, deworming to their milch animals at regular intervals of 3 months and deworming their calves at regular (6 month) interval. All DDF follow various practices (dusting, spraying, injectable drugs) for the control of ecto-parasites. Treatment sick animal by Veterinary officer of Amul was following on all DDF. Only 25 per cent farmers kept diseased animal separately while, 75 per cent farmers kept diseased animals together with healthy.

5.6 Economics of Dairy Demonstration Farms.

The economics of dairy demonstration farm were calculated by using cost of medication, labour, miscellaneous, instalment, average interest, total recurring expenses and total expenses per animal per day. Returns from the farm were estimated on basis returns from selling of milk, manure, and empty gunny bags. It revealed that total fixed depreciation cost/animal /day were ₹ 15.96, 15.19 and 14.37 for high, medium and low profitable farm. Total fixed depreciation cost includes depreciation cost shed, animal, equipment and miscellaneous cost. The cost of feeding green fodder in high, medium and low profitable farm was ₹ 23.32 30.44 and 34.49 per animal per day, respectively. Cost of feeding dry fodder at high, medium and low profitable farm were ₹ 22.81 18.72 and 16.28 per animal per day while, cost of feeding concentrates was ₹ 70.08, 68.04 and 61.96 per animal per day. It was observed that cost on medication of high, medium and low profitable farm

was ₹ 0.21, 0.20 and 0.25 per animal per day, while cost labour was ₹ 13.72, 13.49 and 15.78 per animal per day, respectively. The miscellaneous cost per animal per day for high, medium and low farm was 0.89, 1.00 and 1.10 ₹ per animal per day, respectively. On further analysis it was observed that instalment of high, medium and low profitable farm ₹ 13.06, 12.95 and 13.05 per animal per day respectively, with average interest per animal per day was found to be ₹ 6.75, 6.43 and 6.17 respectively. Total recurring expenses per animal per day of high, medium and low profitable farm was ₹ 150.84, 151.27 and 148.68 with total expenses computed was about ₹ 166.80, 166.46 and 163.06 per animal per day, respectively.

It was found that cost of return from milk sold per animal per day was ₹ 214.65, 204.27 and 183.80 for high, medium and low profitable farm, respectively. It was also found that the cost return from manure sold per animal per day for high, medium and low profitable farm was same ₹ 16.20. While, return from selling empty gunny bag was ₹ 1.06 for high and medium profitable and ₹ 1.07 for low profitable farms per animal per day. Total income per animal per day of high, medium and low profitable farm was found to be ₹ 232.02, 221.59 and 201.02 respectively, where as net income per animal per day was ₹ 65.22, 55.13 and 37.97 for high, medium and low profitable farm respectively. The net profit per animal per month and per year was ₹ 1983.84, 1676.96 and 1154.79 per month and 23806.12, 20123.52, and 13857.51 per year for high, medium and low profitable farm, respectively. Cost of milk production of high, medium and low profitable farm was found to be ₹ 17.27, 18.11 and 19.72 per litre of milk, respectively. The minimum ratio required is 1:1, which indicates the coverage of costs without any surplus benefits. Perusal of data revealed that B:A ratio of farm were 1.39:1, 1.33:1 and 1.23:1 for high, medium and low profitable farm respectively.

Conclusions

The following conclusion can be drawn from study of management of dairy demonstration farm in Anand district.

1 All DDF were managed by male majority of them form middle age group (66.7 percent), belonging to general category (83.3 percent) having joint family of large size with average family size of 6.33 (4 - 8) members.

2. All farmers having some land holding, average land holding was 3.54 (1-12) acres.

3. Dairy Demonstration farm were started with 25 to 50 dairy animals the present herd strength of DDF was ranging 31 to 99 animals with an average 69.66 per cent increase in herd strength.

4. Average wet dry ratio of DDF was 76:24, herd average and wet average at DDF farm was 8.17 and 10.68 litre, respectively. Parity of animal was recorded in between 3.2 to 4.58 with an average of 3.84.

5. The sheds of DDF farmers varies from tail to tail (41.7 per cent), head to head (33.3) and single line (25). Most of DDF has East-West orientation.

6. DDF owners provided improved housing facility as per BSI standards to animals like floor space, pucca floor with back word slope of floor, pucca drainage system, provision of artificial light, constructing wall of house half, concrete sheds using brick and cement material and adequate linear manger space for feeding.

7. Adopted improved feeding practices were followed at majority of DDF like growing leguminous and non leguminous fodder, chaffing of both green and dry fodder, feeding of compound concentrate cattle feed at 50 per cent of milk production, feeding of concentrate to calf and heifer, special feeding after calving, feeding of salt and free access to drinking water with automatic water supplier.

8. Most (75 per cent) of the DDF farmers follow machine milking, milking twice a daily at 12 hour interval, washing of udder before milking using antiseptic solution, washing of utensils with hot water, stripping at end of milking, using Masti-strip for detection of mastitis and dipping of teat after milking.

9. The production and reproduction performance of crossbreed cows at DDFs were observed. The average value of calving interval, lactation length, lactation yield, were 402(day), 342 (day), and 3663 (lit.), respectively.

10. All DDF owners follow healthcare managemental practices on farm like regular vaccination, deworming of milch cow and calf respectively at regular interval of three month and six month, control of ecto- parasites and treatment of sick animal.

11. It was observed that a total expense per animal per day was ₹ 166.80, 166.46 and 163.06 respectively for high, medium and low profitable farm. While income per animal per day was ₹ 232.02, 221.59 and 201.02 for high, medium and low profitable farm, respectively.

12. Average cost of milk production for high, medium and low profitable farm was ₹ 17.27, 18.11 and 19.72 per litre of milk with average benefit cost ratio of 1.39:1, 1.33:1 and 1.23:1, respectively.

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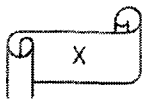

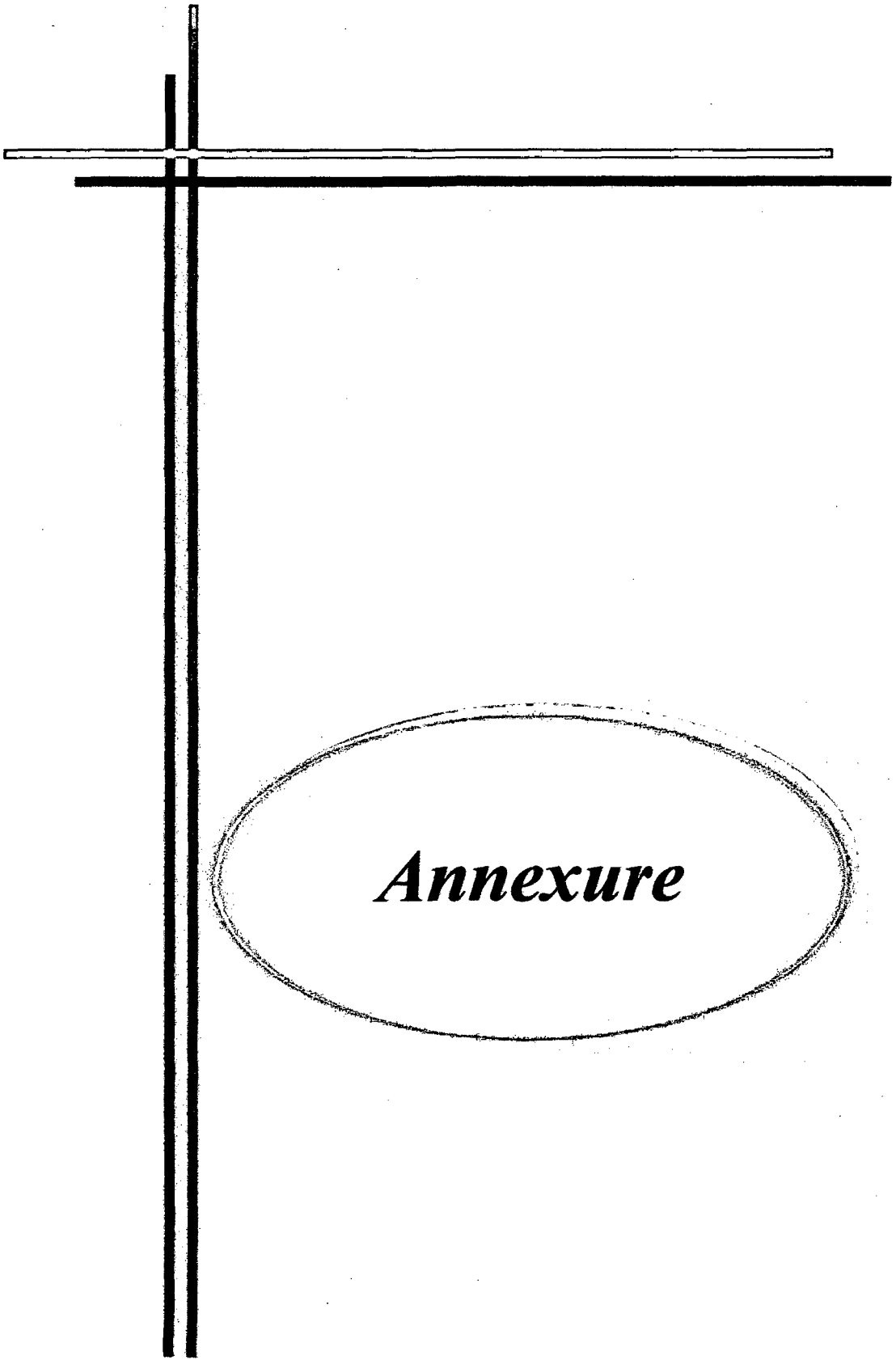
Annexure

Annexure I

Questionnaire

Name of owner:

Taluka: **Village:**

1. Socio Economic Status of DDF Owner

Sr. No.	Particulars	Type	
1	Age	Middle (31–50)	
		Young (≤30)	
		Old (>50)	
2	Education	Any animal husbandry training	
		Graduate and above	
		8th to 12th Standard	
		Up to 7th class	
		Illiterate	
3	Caste	General	
		OBC	
		SC & ST	
4	Family Size	Up to 4 members	
		Above 4 members	
5	Family Type	Nuclear type	
		Joint type	
6	Land Holding	Above 2.5 acres	
		1.25 to 2.5 acres	
		Up to 1.25 acres	
		Landless	
7	Vocational Diversification	Agriculture +dairy + service	
		Dairy+ service	
		Agriculture + Dairy	
		Dairy + other livestock species (specify)	
		Dairy	
		Dairy+ labour	

Housing management of Dairy Demonstration Farms

Sr. No.	Particulars	Type	
1	Type of Housing	Close	
		Open	
2	Location of shed	Attached to human dwelling	
		At the field of farmer	
		Nearby their dwelling	
3	Direction of house	East-West	
		North-South	
4	System of housing	Tail to tail	
		Head to head	
		Single line	
5	Av. floor Space available / animal	Adequate (≥ 45.45 sq. ft.)	
		In adequate (< 45.45 sq. ft.)	
6	Provision of light	Yes	
		No	
7	Provision & practice to Protect animal from extreme weather	Yes	
		No	
8	Type of floor	Pucca (cement concrete)	
		Stone paved	
		Brick paved	
		Muddy	
		Earthen floor	
9	Slope in floor	Towards back	
		No slope	
		Towards front	

Continue....

Continue.....

Sr. No.	Particulars	Type	
10	Type of pillar/ pole	Cemented/brick	
		Iron	
		Wooden	
11	Materials used in walls	Brick and cement	
		Brick and lime	
		Brick in mud	
		Thatch	
12	Wall of house	Half	
		Full	
		No wall	
13	Type of roof	Asbestos sheets roof	
		Galvanized iron sheets roof	
		Thatched roof	
		No roof	
14	Height of roof at leaves	Adequate (Equal or above 7.33 ft.)	
		Inadequate (Below 7.33 ft.)	
15	Slope of roof	Double slope	
		Single slope	
		Flat	
16	Linear manger space per animal	Adequate (more than 75 cm)	
		Inadequate (less than 75 cm)	
17	Provision of drainage system	Pucca drain	
		Soaked at earthen floor	
18	Bedding material used	Yes	
		No	

Feeding practices on DDF

Sr. No.	Particulars	Type	
1	Feeding system	Stall feeding	
		Grazing	
		Both	
2	Feeding of milch animal	Individual	
		Group feeding	
3	Fodder availability		
	(i) Green	Non - legume + Legume	
		Legume	
		Non-legume	
	(ii) Dry	Paddy straw + Jowar straw +Wheat straw	
		Paddy straw +Jowar straw	
		Paddy straw	
		Any other, Specify	
4	Chaffing of fodder	Yes	
		No	
5	Types of concentrate feeding	Compounded cattle feed	
		Homemade + compounded cattle feed	
		Home produced ingredients	
6	Method of feeding concentrate	Mixed with fodder	
		Separately	
7	Criteria for concentrate feeding	Body weight + Milk production	
		Body weight	
		Milk production (50 % of milk production)	
		Age	
		No criteria	
8	Time of feeding concentrate	During milking	
		Before milking	
		After milking	

Continue.....

Continue....

Sr. No	Particulars	Type	
9	Concentrate feeding to young calf	Yes	
		No	
10	Concentrate feeding to heifer	Yes	
		No	
11	Special feeding after calving	Yes	
		No	
12	Feeding of mineral mixture	Yes	
		No	
13	Feeding of salt	Yes	
		No	
14	Frequency of Watering	Free assess of water	
		3 times	
		2 times	
15	Source of water	Bore Well	
		Hand Pump	
		River	
		Canal	
		Pond	

Milking management on DDF

Sr. No	Particulars	Type	
1	Types of milking	Machine	
		Hand	
2	Frequency of milking	Thrice	
		Twice	
		Once	
3	Washing of udder before milking	Yes	
		No	
4	Stripping at the end of milking	Yes	
		No	
5	Place of milking	Milking at milking shed	
		Milking at the same place	
6	Teat dipping followed	Yes	
		No	
7	Cleaning of milking utensils	Hot water	
		Tap water	
8	Disposal of Milk	Co-operative society	
		Vendors	
		Middle man	
		Home use	
9	Test for mastitis diagnosis	Yes	
		No	

Health care practice on Dairy Demonstration Farm

Sr. No	Particulars	Type	
1	Vaccination against disease	Yes	
		No	
2	Deworming of milch animal	Regular	
		Occasional	
		Not practiced.	
3	Deworming of calves	Regular	
		Occasional	
		Not practiced	
4	Practices to control ecto – parasites	Followed	
		Not followed.	
5	Treatment of Sick animal by	Veterinary doctor	
		Livestock inspector	
		Calling a quack	
		Use of local empirical knowledge	
6	Diseased animals are tied	Separately	
		Together with others	

Production detail of DDF

Animal No	Date of purchase	Lactation no.	Milking / dry	Av. daily milk yield (litre)	Lactation length (month)	Dry period (month)	No. AI require	Calving interval (month)

Annexure II

Economics of dairy farm

The economics of DDF was calculated with following assumptions

1. Annual depreciation cost for shed/ animal etc was calculated @ 10% per year

2. The amount of manure produced / animal/ day is 18 kg.

3. Cost of concentrate, green and dry fodder was as per prevailing rate.

4 Receipt from sale of milk to society

1. Fixed expenses per year

1.1 Annual depreciation cost for shed

= Cost of construction of shed / Total No. of year

1.2 Annual depreciation cost per animal

= Cost of animal at purchase – Cost of animal at culling / No. of year.

1.3 Annual depreciation cost for herd

= Annual depreciation cost per year per animal × No. of animal

1.4 Annual depreciation cost of milking machine

= Cost of milking machine /7 year

1.5 Annual depreciation cost of chaff cutter

= Cost of chaff cutter/ 7year

1.6 Annual depreciation cost of fogger

= Cost of fogger /7 year

1.7 Annual depreciation cost of Equipment =

= Cost of equipment /5year

1.8 Annual Total fixed depreciation cost of farm =

= Annual depreciation cost for (shed + herd + milking machine + chaff cutter + fogger + equipment)

2. Recurring expenses

2.1 Feeding expenses

2.1.1 Cost Green fodder

a. Adult animal

1 During Lactation

= Cost of fodder × Amount of fodder × Av. lactation day/year × No. of animal

2 During dry period

= Cost of fodder × Amount of fodder × Av. dry period /year × No. of animal

b. Calf/ heifer

= Cost of fodder × Amount of fodder × No. of days × No. of animal

Total cost of green fodder = (a + b)

2.1.2 Cost of dry fodder

a. Adult animal

1. During Lactation

= Cost of fodder × Amount of fodder × Av. lactation day/year × No. of animal

2. During dry period

= Cost of fodder × Amount of fodder × Av. dry period /year × No. of animal

b. Calf/ heifer

= Cost of fodder × Amount of fodder × No. of days × No. of animal

Total cost of dry fodder = (a + b)

2.1.3 Cost of concentrate feeding

a. Adult animal

1. During Lactation

= Cost of conc. × Amount of conc. × Av. lactation day/year × No. of animal

2. During dry period

= Cost of conc. × Amount of conc. × Av. dry period /year × No. of animal

b. Calf/ heifer

= Cost of conc. × Amount of conc. × No. of days × No. of animal

Total Cost of conc. Feeding = (a + b)

2.2 Medication

= No. of visit x 70

2.3 Labour

= No. of labour × 4000 × 12 month

2.4 Miscellaneous = (10,000)

2.5 Instalment

Loan sanctioned

= 75% of total fixed cost (cost of shed + herd + milking machine + chaff cutter + fogger + equipment)

Instalment per year

= Total amount of loan / no. of year

2.6 Av. Interest per year

= Total interest of up 8 year /8

= {interest on each year (Amount of loan × @ 10.5%)} / 8

2.7 Total recurring expenses per year

= Cost of feed ing (green + dry + conc.) + Medication + Labour + Miscellaneous + Instalment per year + Av. Interest per year.

3 Income

3.1Receipts of Milk sold per year

= Av. milk yield of animal × Av. lactation day/year × No. of animal × Cost of milk per lit.

3.2 Receipts of manure sold per year

= Av. dung produced/cow/day × No of animal ×365 day × price of dung/ kg

3.3 Empty gunny bag sold

= Total amount of conc. /70 × Price of empty gunny bag

3.4 Total income

= Receipt from (Milk + Manure + Gunny bag)

3.5 Net income per year

= Total income per year – (Annual total fixed cost of farm +Recurring expenses per year)

3.6 Net income per month

=Net income per year/ 12

3.7 Net income per animal per year

= Net income per year / no of animal

3.8 Net income per animal per month

= Net income per animal per year / 12

3.9 Cost of milk production per lit

= Total expenses / Total milk yield

3.10 B: C Ratio = Total income / Total receipts