Pattern of Dairying adopted by Dairy farmers in Kerala

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ABSTRACT: *Dairy is a vital part of the global food system providing economic, nutritional and social benefits to a large proportion of the world's population. Dairying as a profession has it's own significance in providing a secondary source of Income for millions of rural families. The present study enables to understand the pattern of Dairying adopted by the dairy farmers in Kerala to study in detail their feeding and breeding practices.*

Key Words: *Dairy farmer, Dairy Co-operative Society, Member, Non Member*

Introduction

Dairying has assumed the most important role in providing employment and income generating opportunities for rural population. The advent of dairying has been a boon for dairy farmers and of particular importance to those segments of the society that have been traditionally weak, the small landholders, landless labourers and women. The agriculture, being only seasonal, the dairy industry provides off-season work, steady income and keeps the rural population employed throughout the year. It provides an year-round source of income for people who previously could only depend on payments from small seasonal crops or from occasional labour. While considering the significance of dairying as a profession, it is pertinent to study the pattern of dairying adopted by the dairy farmers which includes both the feeding practices and the breeding practices.

Review of Literature

Review of literature is an integral part of all scientific investigations which would enable the researcher to understand the research gap and justify the study. Here the research begins with an enquiry into the studies already conducted in the field of dairying and it would throw light on the various aspects of dairying that has been studied from different angles by expert researchers and authors

Jaisridhar *et al.* (2013) explored the factors determining the adoption of scientific dairy farming with special reference to farmer's call centre of Tamilnadu". The study was taken to assess the socio-economic determinants of dairy farmers of Tamil Nadu who obtained information on scientific dairy farming practices from farmer's call centre (FCC). The research design formulated in this study consisted of 150 randomly selected respondents who were practicing dairy farming and who had consulted farmer's call centre (FCC) to seek information on scientific dairy farming. The data for the study was collected with a well-constructed interview schedule and the analysis was carried out using Statistical Package of Social Science (SPSS) software. From the results it was evident that, farmers who had contacted Farmer's Call Centre (FCC) and enquired about scientific dairy farming practices had utilized its recommendations greatly. The timely delivery of information and its trustworthiness among clients might have stimulated the information utilization pattern of the farmers and increased their extent of adoption on scientific dairy farming practices. On the other side, it is suggested that awareness should be stressed upon farmers to utilize video conferencing, voice mailing and SMS facilities that are available with FCC. Training programme can be organized for the farmers on how to operate such facilities.

Mishra and Bardhan (2009) analyzed the patterns of adoption and disadoption of vaccination and deworming by dairy farmers in TARAI area of Uttarakhand and identified the factors influencing patterns of adoption. The study was carried out on 80 farmers in five randomly selected villages of Rudrapur block of US Nagar district of Uttarakhand. Primary data were collected by personally interviewing the head of the household with the help of a well- structured and pre- tested schedule on socio-economic, communication behaviour, Psychological and institutional attributes. In this study, two three- item scales were developed to measure farmer's risk attitude and risk perception as per the method used by Bard and Berry (2005). The findings pointed out that the adoption rates have been high for vaccination over the years when compared to deworming. It could also be observed that providing farmers easy access to market in terms of better

infrastructure might work in favour of early adoption of technologies. The author also envisaged policy implications that to ensure farmer's adoption of technologies like vaccination and deworming, it is necessary to increase their awareness about the benefits of these technologies and making sure that these technologies are available frequently and timely.

Singh *et al*. (2010) assessed the level of adoption of dairy farmers in Haryana regarding scientific dairy farming practices. The study was conducted in Haryana on 200 dairy farmers who were regular members of Milk Producer's Co-operative Societies (MPCSs) for the last three years. A multistage stratified random sampling technique was employed to select ultimate units. i.e., chilling centres, milk collection routes, MPCSs and respondents. The respondents were personally interviewed to collect the relevant information. The study pointed out that the landless category of dairy farmers had lowest level of overall adaption of scientific dairy farming practices, whereas, all other categories viz., small, medium and large dairy farmers had fairly higher level of adoption. The maximum percent of adoption by the dairy farmers were found to be in case of the animal feeding practices followed by breeding practices, healthcare practices and management practices. However, the landless dairy farmers had lowest level of adoption in case of feeding practices. The main reason attributable for the low level of adoption of dairy feeding practices by the landless dairy farmers were the poor economic condition and mainly based on feeding of roadside grasses and leftover agricultural waste.

The above studies re-emphasize the need to increase the awareness level of the dairy farmers about the benefits of these technologies to ensure its adoption. One of the main reasons that has been found for the low level of adoption of dairy feeding practices by the landless dairy farmers were the poor economic condition and mainly based on feeding of roadside grasses and leftover agricultural waste. On the other hand, the timely delivery of information and its trustworthiness among clients have stimulated the information utilization pattern of the farmers and increased their extent of adoption on scientific dairy farming practices.

Objectives

- To study the feeding practices adopted by the dairy farmers
- To study the breeding practices adopted by the dairy farmers

Sources of data

Secondary data regarding the feeding schedule specifications have been collected from the Productivity Enhancement Department of National Dairy Development Board, Anand. Data regarding the societies have been collected from the procurement and inspection (P&I) wing of Thrissur dairy. Primary data comprised of the pattern of dairying adopted by the dairy farmers through the sample survey has also been included under this study.

Selection of the sample

Multi-stage random sampling was used to select 133 respondents from Thrissur district. Multi-stage sampling refers to sampling plans where the sampling is carried out in stages using smaller and smaller sampling units at each stage. In the first stage, from each Taluk, two Anand Pattern Co-operative Societies (APCOS) have been selected for which the societies in the Taluks have been ranked based on the quantity of milk supplied to MILMA during the last three years. From the rank list prepared, societies which ranked first and last have been selected. Thus the sample size of APCOS is ten, i.e., two societies each from five Taluks. In the second stage, from each of the societies, 10 farmers who are pouring members for the last three years have been selected randomly. As a control group for comparison, three farmers who are not the members of the society, but residing within the area of operation of the society have been selected. Thus the sample size is 130 dairy farmers, consisting of 100 member farmers of APCOS and 30 non member farmers. In addition to this, three commercial dairy units from the study area having a minimum cattle holding of 20, have also been included for the study. Pre-tested structured interview schedule have been used for collecting data from the respondents.

Statistical tools used for the study

One Sample t-test

One sample t-test is used to compare the mean of a single sample with the population mean, to know whether the sample comes from a particular population. The statistical hypothesis for one sample t test takes one of the following forms, depending on whether the research hypothesis is directional or non directional. All parametric statistics have a set of assumptions that must be met inorder to properly use the statistics to test the hypothesis. The assumptions are random sampling from a defined population, interval

or ratio scale of measurement and normal distribution of the population. In the equations below, μ_1 refers to the population from which the study sample was drawn. μ is replaced by the actual value of the population mean.

$H_0: \mu_1 = \mu$

$H_A: \mu_1 \neq \mu$

$H_0: \mu_1 \leq \mu$

$H_A: \mu_1 > \mu$

$H_0: \mu_1 \geq \mu$

$H_A: \mu_1 < \mu$

In this study, one sample t test has been used to find out whether there is significant difference between the actual feeding practices and the recommended feeding schedule. The feed items include concentrates, paddy straw and green grass and each feed item is analysed separately during milching and dry period by taking into account the actual feeding practices which is followed by the respondent farmers and the recommended feeding schedule prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand. The actual feeding practices have been compiled from the primary data which has obtained from the respondent farmers and the recommended feeding schedule has been obtained from the secondary data.

Data Analysis and Interpretation

The pattern of dairying adopted by the farmers is discussed under two heads- feeding practices and breeding practices. The study takes into account the feeding schedule specifications prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand and also the actual feeding practices adopted by the farmers. The study thus analyses whether there is any significant difference between the feeding schedule as per the recommended standards and the actual feeding practices followed by the respondent farmers both member wise and category wise

1.1 Feeding practices

The quantity and quality of the feed and water provided largely determines the dairy animal's health and productivity, and the quality and safety of its milk. Dairy animals should be provided with sufficient feed and water daily, according to their physiological needs. The quality and quantity of the feed, including appropriate fibre, should reflect the animal's age, body weight, stage of lactation, production level, growth, pregnancy and climate. Feeding practices vary during different stages in the growth of cattle.

Feeds are generally classified as concentrates and roughages.

1.1.1 Concentrates

Concentrates are generally called as hard feeds. Concentrates for dairy feeding come in a perplexing variety of different individual ingredients, descriptions and forms, each with their own advantages and limitations. Concentrate feeds include pellet feed, maize, soya bean, sorghum, Cholam, groundnut oil cake, coconut oil cake, gingely oil cake etc. Concentrates are good for providing highly concentrated sources of nutrients to supplement forages, supplying valuable starch, sugar and proteins for ruminant digestion and offering a broad choice from individual ingredients to complete balanced supplements.

1.1.2 Roughages

Roughages include all green grass and paddy straw. It consists of 90 per cent moisture and the remaining 10 per cent is dry matter. Roughages are bulky feeds that are characterized by being high in fiber and low in energy. The digestive tracts of herbivores are structured so that they retain large quantities of forage where microbial fermentation breaks down the fibrous plant material. The nutrients in roughages are made available largely through microbial digestion. The types of roughages used by such animals as a feedstuff are pasture grasses and other grazed forages; hay and dehydrated forages; silage from grasses, legumes or cereal crops; and crop residues and crop by-products such as straw, stubble, and hulls. The roughage sources utilized in a feeding program depends on the nutrient content that each contains. Nutrient content of roughages is determined by their stage of harvest. Generally, the earlier the stage of harvest, the higher will be the energy and protein content. Digestibility and palatability will also be higher. Straw is a valuable low-cost feed that can be used effectively for feeding.

Table 1.1 Feeding schedules for dry cows (Quantity in kg.)

Items	Quantity in Kg		
	Example 1	Example 2	Example 3
Paddy straw	7	6	7
Green grass	4	10	4

Pellet feed	2	1	-
Coconut oil cake	-	-	1

Source: Productivity Enhancement Department, National Dairy Development Board, Anand

Table 1.1 indicates the feeding schedule for dry cows. Among the feed items provided, paddy straw and green grass constitutes the roughages and pellet feed together with coconut oil cake constitute the concentrate feed. The Table shows three combinations of feeding schedule for dry cows. The first combination prescribes 7 kg of paddy straw, 4 kg of green grass and 2 kg of pellet feed. The second combination prescribes 6 kg of paddy straw, 10 kg of green grass and 1 kg of pellet feed. The third combination substitute pellet feed by giving 1 kg of coconut oil cake, at the same time paddy straw and green grass have to be provided as 7 kg and 4 kg respectively.

Table 1.2 Feeding schedule for a cow that produces 5 litres of milk per day

Items	**Quantity in Kg**		
	Example 1	**Example 2**	**Example 3**
Paddy straw	7	5	7
Green grass	4	10	4
Pellet feed	4	3	-
Coconut oil cake	-	-	2
Thavidu	-	-	1

Source: Productivity Enhancement Department, National Dairy Development Board, Anand

Table 1.2 shows the feeding schedule for a cow that produces 5 litres of milk per day. The feed items include paddy straw, green grass, pellet feed, coconut oil cake and thavidu. Among these feed items, paddy straws together with green grass constitute roughages and pellet feed, coconut oil cake and thavidu constitute the concentrate feed. For a milching cow, more quantity of feed need to be provided when compared to a dry cow. As the milk production is directly related to the feeding schedule, prominence has to be given for feeding the cattle. The Table reflects three combinations of feeding schedule. The first combination prescribes 7 kg of paddy straw, 4 kg of green grass and 4 kg of pellet feed. The second combination prescribes only 3 kg of pellet feed and 5 kg of paddy straw, but it is compensated by providing a quantity of 10 kg for green grass. The third combination prescribes 7 kg of paddy straw, 4 kg of green grass and the pellet feed is substituted by providing 3 kg of other concentrate mixtures such as coconut oil cake and thavidu in quantities of 2 kg and 1 kg respectively.

1.1.3 Comparison of Recommended feeding schedule and actual feeding practices followed by respondent farmers – One sample t- test

After analyzing the feeding schedule recommended by the National Dairy Development Board, Anand, one sample t- test has been employed to find out whether there is significant difference between the actual feeding practices and the recommended feeding schedule. Both member wise and category wise analysis of data have been done. The feed items include concentrates, paddy straw and green grass and each feed item is analysed separately during milching and dry period by taking into account the actual feeding practices which is followed by the respondent farmers and the recommended feeding schedule prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand. The actual feeding practices have been compiled from the primary data which has obtained from the respondent farmers and the recommended feeding schedule has been obtained from the secondary data.

Table 1.3 describes the quantity of feeds given by the members and non- members during milching period. The quantity of feeds given by the respondent farmers is compared with the required quantity prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand.

Table 1.3 Quantity of feeds given by respondents during milching period: Member wise

Sl. No.	**Quantity of feeds (in Kg)**	**Members**	**Non members**
1	**Green grass**		
1.1	Less than 4	0(0)	0(0)
1.2	4	7(7)	5(17)
1.3	Above 4	96(93)	25(83)
1.4	Total	103	30
1.5	Average Quantity	7	6
1.6	Recommended Quantity	4	4

1.7	t value	9.211**{0.000}	7.681**{0.000}
2	**Paddy straw**		
2.1	Less than 8	88(85)	25(83)
2.2	8	14(14)	5(17)
2.3	Above 8	1(1)	0(0)
2.4	Total	103	30
2.5	Average Quantity	6	6
2.6	Recommended Quantity	8	8
2.7	t value	-14.999**{0.000}	-7.090**{0.000}

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

Table 1.3 makes it clear that more than 80 percent of the respondent farmers both in the member group and non- member group give more than four kilograms of green grass during milching period. The prescribed quantity of green grass that has to be given for a cow during milching period is four kilogram. And the average kilogram of feed that is found to be giving by the farmers both in the member and non-member group is seven and six kilograms respectively. The result of One sample t- test for both the member and non -member group revealed that there is significant difference in the quantity of green grass given by the respondent farmers and the recommended quantity of green grass that have to be given for the cattle. Since green grass is cheap and abundant in its availability, the average consumption is more than the required quantity.

It is evident that more than 80 percent of the respondent farmers both in the member group and non- member group give less than eight kilograms of paddy straw during milching period. The prescribed quantity of paddy straw that have to be given for a cow during milching period is eight kilogram. And the average kilogram of paddy straw that is found to be giving by the farmers both in the member and non-member group is six kilograms. The result of one sample t- test for both the member and non -member group revealed that there is significant difference in the quantity of paddy straw given by the respondent farmers and the recommended quantity of paddy straw that have to be given for the cattle. The average consumption of paddy straw per milching cow is less than the required prescribed quantity.

Table 1.4 describes the quantity of feeds given by the members and non- members during dry period. The quantity of feeds given by the respondent farmers is compared with the required quantity prescribed by the Productivity Enhancement Department of National Dairy Development Board, Anand.

Table 1.4 Quantity of feeds given by respondents during dry period: Member wise

Sl.No	Quantity of feeds (in Kg)	Members	Non members
1	**Concentrates**		
1.1	Less than 2	61(59)	16(53)
1.2	2	39(38)	14(47)
1.3	Above 2	3(3)	0(0)
1.4	Total	103	30
1.5	Average Quantity	1	1
1.6	Recommended Quantity	2	2
1.7	t value	-6.451**{0.000}	-5.277**{0.000}
2	**Green grass**		
2.1	Less than 4	5(5)	2(7)
2.2	4	28(27)	10(33)
2.3	Above 4	70(68)	18(60)
2.4	Total	103	30
2.5	Average Quantity	6	5
2.6	Recommended Quantity	4	4
2.7	t value	-4.875**{0.000}	4.252**{0.000}
3	**Paddy straw**		
3.1	Less than 7	88(85)	20(67)
3.2	7	15(15)	10(33)
3.3	Above 7	0(0)	0(0)

3.4	Total	103	30
3.5	Average Quantity	5	5
3.6	Recommended Quantity	7	7
3.7	t value	-16.922**{0.000}	-6.338**{0.000}

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

From the Table, it could be observed that more than 50 percent of the respondent farmers both in the member group and non- member group give less than two kilograms of concentrates during dry period. The prescribed quantity of concentrate that have to be given for a cow during dry period is two kilogram. And the average kilogram of feed that is found to be giving by the farmers both in the member and non-member group is one kilogram which is less than the prescribed quantity. The result of one sample t- test for both the member and non- member group revealed that there is significant difference in the quantity of concentrate given by the respondent farmers and the recommended quantity of concentrate that have to be given for the cattle.

More than 60 percent of the respondent farmers both in the member group and non- member group give more than four kilograms of green grass during dry period. The prescribed quantity of green grass that have to be given for a cow during dry period is four kilogram. And the average kilogram of feed that is found to be giving by the farmers both in the member and non- member group is six and five kilograms respectively. The result of one sample t- test for both the member and non- member group revealed that there is significant difference in the quantity of green grass given by the respondent farmers and the recommended quantity of green grass that have to be given for the cattle. Since green grass is abundantly available, easily accessible and cheapest in cost, the average consumption of green grass is more than the required prescribed quantity.

More than 65 percent of the respondent farmers both in the member group and non- member group give less than seven kilograms of paddy straw during dry period. The prescribed quantity of paddy straw that have to be given for a cow during dry period is seven kilograms. And the average kilograms of paddy straw that is found to be giving by the farmers both in the member and non- member group is four and five kilograms respectively. The result of one sample t- test for both the member and non- member group revealed that there is significant difference in the quantity of paddy straw given by the respondent farmers and the recommended quantity of paddy straw that have to be given for the cattle. The average consumption of paddy straw per dry cow is less than the required prescribed quantity for all the member and non- member respondents.

Table 1.5 shows the quantity of feeds given by the respondent farmers during milching period. The respondents are grouped into four categories based on their cattle population. Category one includes those farmers who own cattle from one to two, category two includes the respondents who have three to five cattle and the third category consist of respondents who have cattle population ranging from six to ten. The fourth category consists of farm units who own more than ten cows.

Table 1.5 Quantity of feeds given by respondents during milching period: Category wise

Sl. No	Quantity of feeds (in Kg)	Categories of Respondents			
		Category1	Category 2	Category 3	Category 4
1	**Green grass**				
1.1	Less than 4	0(0)	0(0)	0(0)	0(0)
1.2	4	5(9)	6(13)	1(4)	0(0)
1.3	Above 4	52(91)	39(87)	27(96)	3(100)
1.4	Total	57	45	28	3
1.5	Average Quantity	6.4	6.3	6.7	22.6
1.6	Recommended Quantity	4	4	4	4
1.7	t value	13.017**{.000}	11.415**{.000}	10.171**{.000}	
2	**Paddy straw**				
2.1	Less than 8	48(84)	41(91)	21(75)	3(100)
2.2	8	8(14)	4(9)	7(25)	0(0)
2.3	Above 8	1(2)	0(0)	0(0)	0(0)
2.4	Total	57	45	28	3

2.5	Average Quantity	5.7	5.7	5.8	2.3
2.6	Recommended Quantity	8	8	8	8
2.7	t value	-11.125**{.000}	-11.286*{.000}	-7.154**{.000}	

Source: Compiled from primary survey
Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

The Table points to the fact that a major percent of the respondents in all the first three categories provide more than four kilograms of grass for a milching cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give more than four kilograms of green grass for their cattle. The average quantity of green grass that have to be given for a cow during milching period is four and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the categories of respondents. The average consumption of green grass is found to be more when compared to the required quantity. Since the dairy farmers under study are household dairy farmers, they let the cattle out for freely graze the pasture lands where green grass is available in plenty.

The Table makes it clear that a major percent of the respondents in all the first three categories provide less than eight kilograms of paddy straw for a milching cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give less than eight kilograms of paddy straw for their cattle during milching period. The average quantities of paddy straw that have to be given for a cow during milching period is eight and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the four categories of respondents. The average consumption is found to be less when compared to the required quantity. The average consumption of paddy straw during milching period for the first three categories is six kilograms whereas for farm units, the average consumption of paddy straw is two kilogram, both less than the recommended quantity of eight kilograms.

Table 1.6 shows the quantity of feeds given by the respondent farmers during dry period. The respondents are grouped into four categories based on their cattle population. Category one includes those farmers who own cattle from one to two, category two includes the respondents who have three to five cattle and the third category consist of respondents who have cattle population ranging from six to ten. The fourth category consists of farm units who own more than ten cows.

Table 1.6 Quantity of feeds given by respondents during dry period: Category wise

Sl. No	Quantity of feeds (in Kg)	Categories of Respondents			
		Category1	Category 2	Category 3	Category 4
1	**Concentrates**				
1.1	Less than 2	48(84)	21(47)	8(29)	0(0)
1.2	2	9(16)	24(53)	20(71)	0(0)
1.3	Above 2	0(0)	0(0)	0(0)	3(100)
1.4	Total	57	45	28	3
1.5	Average Quantity	0.49	1.5	1.7	6
1.6	Recommended Quantity	2	2	2	2
1.7	t value	-15.011**{0.000}	-6.205**{0.000}	-3.286**{0.003}	
2	**Green grass**				
2.1	Less than 4	2(4)	4(9)	1(4)	0(0)
2.2	4	17(29)	15(33)	6(21)	0(0)
2.3	Above 4	38(67)	26(58)	21(75)	3(100)
2.4	Total	57	45	28	3
2.5	Average Quantity	5.0	4.8	5.3	20.6
2.6	Recommended Quantity	4	4	4	4
2.7	t value	8.030**{.000}	5.174**{.000}	5.730**{.000}	
3	**Paddy straw**				
3.1	Less than 7	44(77)	39(87)	22(79)	3(100)
3.2	7	13(23)	6(13)	6(21)	0(0)
3.3	Above 7	0(0)	0(0)	0(0)	0(0)
3.4	Total	57	45	28	3
3.5	Average Quantity	4.6	4.6	4.4	1.6
3.6	Recommended Quantity	7	7	7	7
3.7	t value	-10.953**{.000}	-11.608**{.000}	-8.276**{.000}	

Source: Compiled from primary survey

Note: Figures in single bracket represent percentage to total
Note: Figures in double bracket represent p value of t-statistic

From the Table, it could be revealed that majority of the respondents in category two and three give two kilograms of concentrates during dry period, whereas in the category one majority of the farmers give less than two kilograms of concentrates. It could also be observed that the respondents in the farm category give more than two kilograms of concentrates. The average quantity of concentrates that have to be given for a cow during dry period is two and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among the first three categories of respondents.

The Table makes it clear that a major percent of the respondents in all the first three categories provide more than four kilograms of grass for a dry cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give more than four kilograms of green grass for their cattle during dry period. The average quantity of green grass that have to be given for a cow during dry period is four and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the first three categories of respondents. The average consumption is found to be more when compared to the required quantity. Since the dairy farmers could get the green grass from the nearby places and also by freely allowing the cattle for grazing, it is the cheapest feed item when compared to the others. Collecting and cutting green grass is one of the major employment opportunities which is generated out of dairying.

The Table points to the fact that a major percent of the respondents in all the first three categories provide less than seven kilograms of paddy straw for a dry cow. It could also be observed that, in the farm category, 100 percent of the respondent farmers give less than seven kilograms of paddy straw for their cattle during dry period. The average quantities of paddy straw that have to be given for a cow during dry period is seven and the result of one sample t- test revealed that there is significant difference in the quantity recommended and given among all the four categories of respondents. The average consumption is found to be less when compared to the required quantity. The average consumption of paddy straw during dry period for the first three categories is five kilograms whereas for farm units, the average consumption of paddy straw is two kilograms, both less than the recommended quantity of seven kilograms.

1.2 Breeding Practices

Under the head breeding practices, the insemination method adopted by the farmers together with the various kinds of breeds of cattle of the respondent farmers have been discussed. Breeding practices involve both natural and artificial. The various kinds of breeds that have been found in the study areas are holstein friesians, jersey, crossbreed cattle, vechur cow, Sunandhini and kasargod dwarf cow.

1.2.1 Insemination method

From the study, it could be noted that majority of the dairy farmers are adopting artificial insemination method due to its peculiar advantages over natural breeding practices. Natural breeding practice involves natural mating by using indigenous breeding bull. Artificial insemination is the technique in which semen with living sperms is collected from the male and introduced into female reproductive tract at proper time with the help of instruments. This has been found to result in a normal offspring. In this process, the semen is inseminated into the female by placing a portion of it either in a collected or diluted forms into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions. The first scientific research in artificial insemination of domestic animals was performed on dogs in 1780 by the Italian scientist Lazanno Spal banzani. His experiments proved that the fertilizing power reside in the sperm atozpoa and not into liquid portion of semen. Few further studied under research station conditions helped this technique to be used commercially all over the world including India. Artificial insemination is not merely a novel method of bringing about impregnation in females. Instead, it is a powerful tool mostly employed for livestock improvement. In artificial insemination the germplasm of the bulls of superior quality can be effectively utilized with the least regard for their location in faraway places. By adoption of artificial insemination, there would be considerable reduction in both genital and non-genital diseases in the farm stock.

(i) Symptoms of Heat

For adopting artificial insemination, the cattle should show the following symptoms of heat. The various symptoms of heat are

- The animal will be in an excited condition. The animal will be in restlessness and nervousness.
- The animal will be below frequency.
- The animal will reduce the intake of feed

- Peculiar movement of limbo sacral region will be observed.
- The animals which are in heat will lick other animals and smelling other animals.
- The animals will standstill when other animals try to mount. This period is known as standing heat. This extends 14-15 hours.
- Frequent maturation (urination) will be observed.
- Clear mucous discharge will be seen from the valve, sometimes it will be string like the mucous will be seen stick to the near the pasts of valve.
- Swelling of the valve will be seen and the tail will be in raised position.
- Milk production will be slightly decreased.

(ii) Advantages of Artificial insemination

Artificial insemination is the disposition of semen into the female genital tract by means of instruments. There are several advantages by the artificial insemination over natural mating or servicing.

- There is no need for maintenance of breeding bull for a herd. Hence the cost of maintenance of breeding bull is saved.
- It prevents the spread of certain diseases and sterility due to genital diseases
  Eg: -contagious abortion, vibriosis.
- By regular examination of semen after collection and frequent checking on fertility makes early detection of inferior males and better breeding efficiency is ensured.
- The progeny testing can be done at an early age.
- The semen collected can be taken to the urban areas or rural areas for insemination.
- It makes possible the mating of animals with great differences in size without injury to either of the animal
- It is helpful to inseminate the animals that refuse to stands or accepts the male at the time of oestrum.
- It helps in maintaining the accurate breeding and calving records.
- It increases the rate of conception.
- It helps in better record keeping.
- Old, heavy and injured sires can be used.

(iii) Disadvantages of Artificial Insemination

- Requires well-trained operations and special equipment.
- Requires more time than natural services.
- Necessitates the knowledge of the structure and function of reproduction on the part of operator.
- Improper cleaning of instruments and in sanitary conditions may lead to lower fertility.
- If the bull is not properly tested, the spreading of genital diseases will be increased.
- Market for bulls will be reduced, while that for superior bull is increased.

1.2.2 Breeds

The various kinds of breeds that have been found in the study areas are holstein friesians, jersey, crossbreed cattle, vechur cow, sunandhini, kasargod dwarf cow.

(i) Holstein Friesians

Holstein Friesians are a breed of cattle known today as the world's highest production dairy animals. Originating in Europe, Friesians were bred in what is now the Netherlands and more specifically in the two northern provinces of North Holland and Friesland, and northern Germany. The animals were the regional cattle of Friesians and the Saxons. The Dutch breeders bred and oversaw the development of the breed with the goal of obtaining animals that could best use grass, the area's most abundant resource. Over the centuries, the result was a high producing, black and white dairy cow. It is black and white due to artificial selection by the breeders. Holsteins have distinctive markings and outstanding milk production. They are large, black and white marked animals that vary from mostly black to mostly white or they can also be red and white. A healthy calf weighs 40 to 45 kg or more at birth. A mature holstein cow typically weighs 580 kg (1280 pounds) and stands 147 cm (58 inches) tall at the shoulder. Holstein heifers should be bred by 13 to 15 months of age, when they weigh over 360 kg (794 pounds). Generally breeders plan for holstein heifers to calve for the first time between 23 and 26 months of age. The gestation period is about nine and a half months.

(ii) Jersey cattle

Jersey cattle are a small breed of dairy cattle originally bred in the channel island of jersey. The breed is popular for the high butter fat content of its milk and lower maintenance costs attending its lower body weight as well as its genial disposition. The jersey cow is quite small, ranging from only 400 to 500 kilograms. The main factors contributing to the popularity of the breed has been their greater economy of production due to the ability to carry a large number of effective milking cows per unit area due to lower body weight, hence lower maintenance requirements and superior grazing ability, calving ease and a relatively lower rate of dystocia leading to their popularity in crossbreeding with other dairy, High fertility, High butterfat conditions and the ability to thrive on locally produced food. Jerseys come in all shades of brown, from light tan to almost black. They are frequently fawning in color. All purebred jerseys have a lighter band around their muzzle, a dark switch (long hair on the end of the tail) and black hooves; although recent years color regulations have been relaxed to allow a broadening of the gene pool. They are calm and docile animals, but tend to be a little more nervous than other dairy cow breeds. They are also highly recommended cows for first time owners and marginal pasture.

(iii) Cross-bred

A cross breed or cross-bred usually refers to an organism with purebred parents of two different breeds, varieties or populations. Cross breeding is used to maintain health and viability of organisms. Irresponsible cross breeding can also produce organisms of inferior quality.

(iv) Vechur cow

Vechur cow, an indigenous cattle variety of Kerala, a rare breed of Bosindicus, is the smallest cattle breed in the world. It yields the maximum milk in the world for a cow of this size. It's not the quantity of the milk but its quality that gave it an international fame. Vechur cow was earlier believed to have gone extinct from its birthplace due to high crossbreeding. But to the surprise of many, they survived this doomed future. Named after the village where it is believed to have evolved, this dwarf cattle breed is well adapted to the hot, humid tropical climate of Kerala. They require minimum food and are highly resistant to diseases. Farmers are of the opinion that these cute cattle of Kerala are more intelligent and lovable compared to other crossbreeds common in Kerala. Vechur bulls despite their small size are very strong and were used in the earlier times to plough the marshy paddy fields. The medicinal property of vechur cow's milk has been accepted by ayurveda too. Its milk is easily digestible due to smaller fat globule size and hence ideal food for children and convalescents. Recent studies proved the medicinal property of the lactoferrin protein in the milk of vechur cow. It is said that the milk contains arginine, an amino acid with specific therapeutic functions like wound healing, cell proliferation, cell signalling and management of cardio- vascular diseases.

(v) Sunandhini

Sunandhini is the formal name given to the composite breed of cattle evolved by crossing the non-descript cattle with exotic donor breeds (Brown Swiss, Jersey and HF) limiting the exotic inheritance to 50 per cent. The origin of sunandhini breed can be traced back to the import of 22 brown swiss bulls and 46 cows during the period from 1965 to 1967 from Switzerland. The bulls were mated to a stock of 143 nondescript cows to produce the crossbred stock. The crossbred female born from such matings were inseminated with frozen semen of 75 per cent brown swiss bulls to produce the 62.5 per cent crossbreds. Originally conceived as a multipurpose breed for milk and meat, the sunandhini with 62.5 per cent exotic inheritance from brown swiss did change in its genetic content as well as quality to become a dairy breed in conformity with the needs and wishes of the farmers of Kerala. It has acquired genes from the jersey breed in large proportions; HF and American brown swiss genes too were incorporated. Germplasm in the form of proven bull semen of jersey, HF and American brown swiss, high pedigreed embryos of these breeds and genetically evaluated jersey and HF bulls from many parts of the world were used in the programme. On the zebu side, genes from breeds like Sahiwal, Gir, Rati and Kankrej were also introduced in proportions. Thus sunandhini has a wide genetic base ideal for a new breed. However it brings heterogeneity in the external appearance of the animals. Sunandhini is thus a synthetic breed having genes from the above mentioned breeds with around 50 per cent level of exotic inheritance. Over generations, the inheritance from the brown swiss is gradually decreasing with the proportionate increase from jersey and of rate from HF.

The breed characteristics fixed for Sunandhini cows

- Mature body weight – 350 kg
- Age at first calving – 30 months
- First lactation milk yield – 2500 kg
- Overall lactation milk yield – 3400 kg

- Milk fat percentage – 4.0

vi) Kasargod cow

Kasargod cow is a dwarf variety of cattle breed found in Kasargod, the northern most districts in the state of Kerala, India. One of the smallest breeds of native cows available in Kerala, Kasargod dwarfs are well to hot and humid climate. Kasargod cows are excellent milkers because their feed to milk ratio is high as compared to other hybrid cows.

Conclusion

Pattern of dairying has been analysed in detail with the feeding practices and breeding practices adopted by the dairy farmers. Comparisons have been made both member wise and category wise with the recommended standards and it could be found out that there is significant difference in the feeding practices adopted by dairy farmers and prescribed standards. Based on the cattle population, while comparing the actual quantity given and the recommended quantity, it could be observed that concentrates and paddy straw are not given upto the recommended quantity whereas green grass is provided more than the prescribed quantity. Among these, the quantity of concentrates and green grass given by the farm respondents are more than the required quantity whereas the quantity of paddy straw given is found to be less when compared to the other three categories. With respect to the breeding practices, artificial insemination method is being adopted by all the respondent farmers and the various kinds of breeds that have been found in the study areas are Holstein-Friesian, Jersey, Crossbreed cattle, Vechur cow, Sunandhini and Kasargod dwarf cow.

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Abbreviation

MILMA	:	Kerala Co-operative Milk Marketing Federation
DDD	:	Dairy Development Department
AHD	:	Animal Husbandry Department
NDDB	:	National Dairy Development Board
PED	:	Productivity Enhancement Department
GOK	:	Government of Kerala
GOI	:	Government of India
FAO	:	Food and Agricultural Organisation
AI	:	Artificial Insemination
APCOS	:	Anand Pattern Co-operative Societies