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Management practices and constraints in crossbred cattle rearing in Cauvery delta region of Tamil Nadu

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Abstract
The aim of the study was to look into the current management practices of crossbred dairy cattle among farmers in the Cauvery delta region of Tamil Nadu, mainly Tiruchirappalli, Thanjavur, and parts of Pudukkottai districts. For a total of 90 farmers, a pre-tested questionnaire was used to collect information on current management practices and constraints from the crossbred dairy farmers. Garett's ranking methodology was used to assess the farmers' constraints. The study revealed that the crossbred dairy farmers are using most of the basic components of management aspects related to dairy cattle rearing. Further, the farmers face a number of challenges, including shortage of feed resources, high concentrate costs, repeat breeding, a lack of knowledge about animal selection and breeding and involvement of middlemen in marketing. As a result, motivating farmers and providing them with expertise and cutting-edge technologies on dairy cattle rearing would pave the way for improved production and resource access in crossbred dairy farming.

Keywords: constraints, crossbred cattle, dairy farmers, management practices

1. Introduction
Dairy farming is seen by our country's farmers as a component of an integrated agricultural system in which dairy and agriculture work hand in hand. According to the Basic Animal Husbandry & Fisheries Statistics (2018) [1], India ranks first in the world in milk production, with an annual growth rate of 6.62 percent and the crossbred cow alone contributes 26 per cent of the total milk production in India.

India produced 187.7 million tonnes of milk in 2018-19, up from 176.3 million tonnes in the the previous year (2017-18). Milk supply per capita had risen as well, from 375 gm per day in 2017-18 to 394 gm per day in 2018-19. (Basic Animal Husbandry Statistics, 2019) [2].

The overall dairy cattle population in India is 193.46 million in 2019, up by 1.3 per cent from 190.90 million during previous census (2012). The female cattle population has increased by 18.6 per cent from the previous census, to 145.91 million. Moreover, our country's overall number of exotic and crossbred cattle was 142.11 million, up by 29.3 per cent from 2012. The number of dairy cattle in Tamil Nadu has increased by 8 per cent, from 88.14 lakh in 2012 to 95.19 lakh in 2019. Furthermore, from 63.54 lakhs in the previous census, the number of crossbred cattle in Tamil Nadu has increased by 21.58 per cent to 77.25 lakhs in 2019 (20th Livestock census – 2019) [3].

Tamil Nadu has the largest population of crossbred / exotic dairy cattle in India, with an average milk yield per In-Milk animal of 7.71 kg/day in the year 2017-18 (Amandeep Singh, 2018) [4]. The increase of crossbred cattle population and interest of the agricultural farmers to adopt animal husbandry activities in large scale will increase the pressure to boost production performance of an individual cow in order to have better profitability. Further, variations in water flow of the Cauvery river and meteorological parameters of the Cauvery delta region have a greater impact on dairy cattle management practices adopted by farmers. Hence, the study to analyze the management practices and constraints faced by farmers in rearing crossbred dairy cattle in Cauvery delta region is taken up to review the current scenario and manage mental practices adopted in dairy farming.

2. Materials and Methods
2.1 Study area
The study on existing management practices among farmers of crossbred dairy cattle was conducted in the Cauvery delta region of Tamil Nadu mainly Tiruchirappalli, Thanjavur, and

parts of Pudukkottai districts.

2.2 Collection of data
A standardized questionnaire was formulated and pre-tested in a non-sampling region for possible exclusions, changes, and modifications. The pre-tested questionnaire was used to gather information on current management activities. In the Cauvery delta area, 30 farmers were chosen at random from the three districts for a total of 90 farmers. During the months of February 2019 to July 2019, the study was conducted by personal interview mode with the respondents at their places. The information on dairy production system and management practices adopted for crossbred dairy cattle at farmer's field level were collected. The data thus collected were coded, tabulated and analyzed.

2.3 Constraints analysis
The list of constraints faced by the respondents was identified and compiled under five major headings such as management constraints, feeding constraints, breeding constraints, technical constraints and marketing constraints using the key informant techniques, secondary literature, and discussion with experts. The randomly selected 90 farmers from three districts were asked to rank the factor under major headings that were limiting the crossbred dairy cattle rearing. The constraints faced by the farmers of Cauvery delta region were analyzed by Garett's ranking technique. These order of merit under each major heading were transformed into units of scores by using the formula.

$$\text{Per cent position} = \frac{100\,(R_{ij} - 0.50)}{N_j}$$

Where, R_{ij} - Rank given for the ith factor by the jth individual
N_j - Number of factors ranked by the jth individual $100\,(R_{ij} - 0.5)$

By referring to table given by Garett and Woodworth's (1969) [5], the per cent position is transferred into scores. The individual respondents scores were then summed together for each factor under all major headings separately and divided by the total number of respondents for whom scores were added. The mean scores for all the factors were set in descending order, ranks were assigned, and the factors with the greatest influence were identified for all the major headings of constraints separately.

3. Results and Discussion
3.1 System of rearing
The data projected in Table 1 indicates that semi-intensive system of rearing was practiced by 66.67 per cent of dairy farmers, followed by intensive (30.0 per cent) and extensive (03.33 per cent) in Cauvery Delta region. Among the extensive and semi-intensive farmers (n = 63), 31.75 per cent of the farmers allowed their animals to graze on community land, followed by 28.57 per cent on their own land, 17.46 per cent on community land and road side, 12.70 per cent on their own land and community land and 09.52 per cent of farmers grazed their animals on road side alone. The grazing duration practiced by most of these farmers (n = 63) in Cauvery delta region were up to 6 hours (66.67 per cent) and the remaining 33.33 per cent of farmers grazed their animal more than 6 hours. The findings related to grazing time differed from the

findings of Akila and Senthilvel (2012) [6] and Singh *et al.* (2020) [7]. This variation may be due to the constraints of grazing lands and vast area of land in Cauvery delta region is utilized for agricultural purpose.

Table 1: System of rearing and grazing of crossbred cattle

S. No	Characteristics	No. of respondents (90)	Percentage (%)
1.	System of rearing		
	Extensive	03	03.33
	Semi intensive	60	66.67
	Intensive	27	30.00
2.	Grazing site (n = 63)		
	Own land	18	28.57
	Community land	20	31.75
	Own land and community land	08	12.70
	Road side	06	09.52
	Community land and Road side	11	17.46
3.	Grazing Time (hours/day) (n = 63)		
	Up to 6 hours	42	66.67
	Above 6 hours	21	33.33

3.2 Feeding management
Different aspects of feeding management of crossbred dairy cattle practiced in Cauvery delta region are shown in Table 2. In the present study, all the dairy farmers fed concentrate to their crossbred dairy cattle which is in contrast to the study of Sinha *et al.* (2009) [8], Singh *et al.* (2020) [7] and Akila and Senthilvel, (2012) [6]. Regarding the source of concentrate feeding, 73.33 per cent of farmers purchased concentrate feed while 12.22 per cent prepared their own concentrate feed and remaining 14.45 per cent of farmers purchased as well as prepared the concentrate feed. This finding is contrary to Akila and Senthilvel, (2012) [6] who reported that only 56 per cent of the farmers purchased the concentrate feed for their dairy cattle. Dairy farmers in the present study usually feed concentrate to their dairy cattle twice a day (92.22 per cent), three times a day (4.45 per cent), and once a day (03.33 per cent). The quantity of concentrate provided to animals based on milk production by majority of farmers were 300 to 400 g per litre of milk per cow (46.66 per cent) and 401 to 500 g per litre of milk per cow (45.56 percent).

In the Cauvery delta zone, 85.55 per cent of farmers regularly provided green fodder to their dairy cattle in addition to grazing, whereas 05.56 per cent of farmers provided green fodder only on availability basis and 08.89 per cent of farmers practice, only grazing. Among the regular green fodder feeding farmers (n= 77), 98.70 per cent of farmers cultivated the fodders in their own land and only 01.30 per cent farmers purchased the green fodder for their animals which is in accordance with the study by Rajeev *et al.* (2016) [9] in Shamli district of Indo-Gangetic Plain Zone. The frequency of green fodder feeding practiced by these farmers were once a day (49.35 per cent), twice a day (44.16 per cent), thrice a day (05.19 per cent) and more than three times a day (01.30 per cent) respectively. However, 64.94 per cent of farmers provided 11 to 20 kg of green fodders per cow per day either along with grazing or stall fed alone. This finding is similar to the study by Paramasivam *et al.* (2021) [10] in Tamil Nadu.

In the present study, all the farmers provided dry fodder to their crossbred dairy cattle either harvested in their own land (48.89 per cent) or purchase (40 per cent). In addition, a small portion of 1.11 per cent farmers harvested as well as purchased dry fodder for their dairy cattle. Mostly, farmers practiced feeding dry fodder twice a day (51.11 per cent),

followed by 24.44 per cent of farmers only once a day, 23.33 per cent three times a day and only 01.11 per cent farmers more than three times a day to their crossbred dairy cattle. The quantity of dry fodder provided by dairy farmers were 3 - 4 kg per day (24.44 per cent), 5 - 6 kg per day (60.0 per cent) and more than 6 kgs per day (15.56 per cent) respectively.

Most of the farmers (65.56 per cent) in the Cauvery delta region provided feed supplements either in form of mineral mixture (64.40 per cent), salt (13.56 per cent), calcium (03.39 per cent), mineral block (1.70) or combination of above supplements (16.95 per cent) to their dairy cattle. Similar finding was reported by Rajeev *et al.* (2016) [9] in Indo-Gangetic Plain Zone. Based on the above facts, the majority of farmers were feeding their dairy cattle according to a prescribed feeding schedule, which differed significantly depending on their resource availability especially green fodder and level of experience.

Table 2: Feeding practices of crossbred dairy cattle

S. No	Characteristics	No. of respondents (90)	Percentage (%)
1.	**Concentrate feeding**		
	Yes	90	100
	No	00	00
2.	**Source of concentrate feeding**		
	Prepared	11	12.22
	Purchased	66	73.33
	Both	13	14.45
3.	**Time of feeding**		
	1 time per day	03	03.33
	2 times per day	83	92.22
	3 times per day	04	04.45
4.	**Quantity of concentrate per litre of milk per animal**		
	Less than 300 g	03	03.33
	300 – 400 g	42	46.66
	401 – 500 g	41	45.56
	Above 500 g	04	04.45
5.	**Regular green fodder feeding**		
	Grazing alone	08	08.89
	Yes (Excluding grazing alone)	77	85.55
	No – (Only on availability basis)	05	05.56
6.	**If yes, source of green fodder feeding (n = 77)**		
	Cultivated in own land	76	98.70
	Purchased	01	01.30
7.	**Time of feeding (n = 77)**		
	1 time per day	38	49.35
	2 times per day	34	44.16
	3 times per day	04	05.19
	More the 3 times per day	01	01.30
8.	**Quantity of Green fodder given per animal (n = 77)**		
	Up to 10 kg	13	16.88
	11 - 20 kg	50	64.94
	21 - 30 kg	13	16.88
	Above 30 kg	01	01.30
9.	**Dry fodder feeding**		
	Yes	90	100
	No	00	00
10.	**If yes, source of dry fodder**		
	Harvested from your own land	44	48.89
	Purchased	36	40.00
	Both	10	11.11
11.	**Time of feeding**		
	1 time per day	22	24.44
	2 times per day	46	51.11
	3 times per day	21	23.33
	More the 3 times per day	01	01.11
12.	**Quantity of dry fodder fed**		
	3 – 4 kg per day	22	24.44
	5- 6 kg per day	54	60.00
	More than 6 kg per day	14	15.56
17.	**Feeding supplements**		
	Yes	59	65.56
	No	31	34.44
18.	**If yes, type of supplements provided (n = 59)**		
	Mineral mixture	38	64.40
	Mineral block	01	01.70

Salt	08	13.56
Calcium	02	03.39
Mineral mixture and Mineral block	01	01.70
Mineral mixture and Salt	05	08.47
Mineral mixture and Calcium	03	05.08
Mineral block and Calcium	01	01.70

3.3 Watering management

Watering management practice followed in crossbred dairy cattle of Cauvery Delta region has been given in Table 3. In the present study, more than 71.11 per cent of the dairy farmers use bore well, as a source of water for their animals which was slightly higher than the findings of Singh *et al.* (2020) [7] who reported that 62.96 per cent of farmers used bore well/ hand pumps as source of water for their Gangatiri cattle in Uttar Pradesh. These region farmers basically practiced either individual watering method (97.78 per cent) or community watering method (02.22 per cent) for the dairy cattle. As per the study in Cauvery delta region, 67.78 per cent of farmers provided water to the dairy cattle more than four times a day, followed by four times a day (25.56 per cent), thrice a day (04.44 per cent) and 02.22 per cent once a day respectively. More than half of the farmers (58.89 per cent) provided 40 to 60 litres of water per day to their dairy cattle. The farmers in Cauvery delta region made arrangements for the animals to have 24 hours access to water either inside the shed or nearby areas which is in divergence from the study by Sabapara *et al.* (2010) [11].

Table 3: Watering management practice in crossbred dairy cattle

S. No	Practices	No. of respondents (90)	Percentage (%)
1.	Source of water		
	Tank	02	02.22
	Open well	05	05.56
	Bore well	64	71.11
	Open well and Bore well	03	03.33
	Others	16	17.78
2.	Method of watering		
	Individual	88	97.78
	Community watering	02	02.22
3.	No. of times watered the animal per day		
	Twice	02	02.22
	Thrice	04	04.44
	Four	23	25.56
	More than four	61	67.78
4.	Quantity of water provided per cattle per day		
	Not sure	26	28.89
	Less than 40 litres	05	05.56
	40 – 60 litres	53	58.89
	Above 60 litres	06	06.67
5.	Availability of water throughout the day		
	Yes	90	100.00
	No	00	0.00

3.4 Breeding management

The breeding practices carried out by the farmers of crossbred dairy cattle is given in the Table 4. The dairy farmers in the Cauvery delta region practiced artificial insemination (AI) (81.11 per cent), natural service (NS) (03.33 per cent), and both AI and NS (15.56 per cent) as breeding methods to breed their crossbred dairy cattle. If natural service is practiced, the use of breeding bulls would be from their own farm (58.82 per cent), neighbouring farms (35.30 per cent), and temple bulls (05.88 per cent). In case, if AI is practiced, 57.47 per cent of farmers inseminated the animals either morning or evening and 42.53 percent inseminated both in the morning and evening. In the Cauvery delta region, 85.05 per cent of AI in dairy cattle is done by veterinarian, 03.45 per cent by livestock inspector, 01.15 per cent by inseminator, 09.20 per cent by either veterinarian or livestock inspector and another 01.15 per cent by either livestock inspector or inseminator. Among the 96.67 per cent of farmers (n = 87) in the study who carry out pregnancy diagnosis on their dairy cattle performed the procedure after 60 days of AI or NS (06.90 per cent), 75 days of AI or NS (08.05 per cent), 90 days of AI or NS (82.75 per cent) and 120 days of AI or NS (02.30 per cent) respectively. In the present study, the percentage of farmers practicing AI as breeding method was higher when compared to Akila and Senthilvel, (2012) [6] who reported AI (60 per cent), NS (22 per cent) and both (16 per cent) in Karur district of Tamil Nadu.

Periodic examination of unproductive animal in the herd is carried out on weekly basis by 01.11 per cent of farmers, on monthly basis by 4.44 per cent, on quarterly basis by 55.56 per cent, annually by 33.33 per cent, whereas the remaining 5.56 per cent of farmers never examined their animals. Most of the farmers of Cauvery delta region rearing crossbred dairy cattle are well aware of breeding practices to be followed in dairy cattle to improve their reproductive efficiency.

Table 4: Breeding management practice of crossbred dairy cattle

S. No	Practices	No. of respondents (90)	Percentage (%)
1.	**Breeding method**		
	Natural Service (NS) alone	03	03.33
	Artificial Insemination (AI) alone	73	81.11
	Both NS and AI	14	15.56
2.	**If NS, source of the bull (n = 17)**		
	Own farm	10	58.82
	Neighbour farm	06	35.30
	Temple's bull	01	05.88
3.	**If AI, time of Insemination (n = 87)**		
	Either morning or evening	50	57.47
	Both morning and evening	37	42.53
4	**AI done by (n = 87)**		
	Veterinarian	74	85.05
	Livestock Inspector	03	03.45
	Inseminator	01	01.15
	Veterinarian and Livestock Inspector	08	09.20
	Livestock Inspector and Inseminator	01	01.15
5.	**Pregnancy diagnosis carried out**		
	Yes	87	96.67
	No	3	3.33
6.	**If yes, period of pregnancy diagnosis done (n = 87)**		
	60 days after AI or NS	06	06.67
	75 days after AI or NS	07	07.78
	90 days after AI or NS	72	80.00
	Above 120 days after AI or NS	02	02.22
7.	**Periodic examination of unproductive animal in the herd**		
	Weekly	01	1.11
	Monthly	04	4.44
	Quarterly	50	55.56
	Annually	30	33.33
	Never	05	5.56

3.5 Calf management

The data provided in Table 5 shows the various management practice carried out by the farmers in new born calves. Common management practices followed by dairy farmers in calves are ligation of navel cord (53.33 per cent), deworming (81.11 per cent) and dehorning (3.33 per cent). Even though dehorning is a recommended practice, only a handful of farmers adopted the practice. In the present study related to colostrum feeding in calves, 2.22 per cent of farmers allowed their new born calf to be fed colostrum 1-2 times a day, 16.67 per cent 3-4 times a day, 71.11 per cent 5-6 times per day, and 10 per cent more than 6 times per day. The majority of farmers fed 1.5 litres (43.33%) and 2.0 litres (48.89%) of colostrum to the newborn calves. Large number of farmers (63.33 per cent) allowed their calves to fed milk 1-2 times per day from their dam. Only 10 per cent of the farmers in the Cauvery delta region weaned their calf before 90 days whereas 90 per cent weaned after 90 days. The findings related to deworming of calves is similar to Rajeev *et al.* (2016) [9].

Table 5: Calf management practice of crossbred dairy cattle

S. No	Practices	No. of respondents (90)	Percentage (%)
1.	**Ligating navel cord of new born calf**		
	Yes	48	53.33
	No	42	46.67
2.	**Deworming of calf**		
	Yes	73	81.11
	No	17	18.89
3.	**Dehorning of calf**		
	Yes	3	3.33
	No	87	96.67
4.	**Colostrum fed (times/ day)**		
	1-2 times	2	2.22
	3-4 times	15	16.67
	5-6 times	64	71.11
	Above 6 times	9	10.00
5.	**Quantity of colostrum fed**		
	1 litre	4	4.44
	1.5 litres	39	43.33
	2.0 litres	44	48.89
	2.5 litres and above	3	3.33

6.	Milk fed (times/ day)		
	1-2 times	57	63.33
	3-4 times	27	30.00
	5-6 times	6	6.67
7.	Weaning age (days)		
	Before 90 days	9	10.00
	After 90 days	81	90.00

3.6 Health management

The health management practices adopted by farmers of Cauvery delta region is given in Table 6. The common diseases and disorders affecting the crossbred dairy cattle reported by farmers in the Cauvery delta region are viral disease – foot and mouth disease (31.11 per cent), bacterial disease - mastitis (52.22 per cent), other bacterial diseases like diarrhea, Joint ill and *Hemorrhagic septicemia* (HS) (05.56 per cent), metabolic diseases like milk fever and bloat (06.67 per cent) and rickettsial diseases (21.11 per cent).

As a part of disease control programme the farmers are practicing deworming (94.44 per cent), vaccination (98.89 per cent) and isolation of sick animals (88.89 per cent). The dairy farmers in Cauvery delta region mostly prefers veterinarians (84.44 per cent) to treat their sick animals. Similarly, Singh *et al.* (2011) [12], Akila and Senthilvel (2012) [6], Singh *et al.* (2020) [7] and Paramasivam *et al.* (2021) [10] in their study in different part of India reported that most of dairy farmers are practicing vaccination and deworming for their animals.

Table 6: Health management practices in crossbred dairy cattle

S. No	Characteristics / Practices	No. of respondents (90)	Percentage (%)
1.	Common diseases and disorders affecting dairy cattle		
	Viral Disease - FMD	28	31.11
	Bacterial disease - Mastitis	47	52.22
	Bacterial disease – others (Diarrhea, Joint ill and HS)	05	05.56
	Metabolic diseases - (Milk fever, Bloat)	06	06.67
	Rickettsial diseases	19	21.11
2.	Deworming of dairy cattle		
	Yes	85	94.44
	No	05	05.56
3.	Vaccination of dairy cattle		
	Yes	89	98.89
	No	01	01.11
4.	Isolation of sick animal		
	Yes	80	88.89
	No	10	11.11
5.	Treatment of the sick animals by		
	Veterinarian	76	84.44
	Livestock Inspector	05	05.56
	Veterinarian and Livestock Inspector	08	08.89
	Quack	01	01.11

3.7 Milking management

The details of milking management practiced by farmers in Cauvery delta region is provided in Table 7. All the farmers in the Cauvery delta region milked their dairy cows twice a day both in the morning and the evening which in contrast to the study of Singh *et al.* (2020) [7], who observed that 82.41 per cent of farmers milked their animals twice a day and 17.59 per cent milked just once a day in Gangatiri cattle in Uttar

Pradesh. The milking management practiced by farmers in Cauvery delta region of Tamil Nadu are field level mastitis detection tests (06.67 per cent), washing of hands before milking (100 per cent), washing and grooming of animals before milking (100 per cent), cleaning udder with antiseptic solution (28.89 per cent) and regular cleaning of milking utensils (100 per cent) respectively.

Table 7: Milking management practices in crossbred dairy cattle

S. No	Practices	No. of respondents (90)	Percentage (%)
1.	Time of milking		
	Morning and Evening	90	100
2.	Frequency of milking		
	Twice daily	90	100
3.	Conducting field level mastitis detection test (strip cup test)		
	Yes	06	06.67
	No	84	93.33
4.	Washing the hands before & after milking		
	Yes	90	100.00
	No	0	0.00
5.	Washing and grooming of animals before milking		
	Yes	90	100.00
	No	0	0.00

6.	Washing the udder with antiseptic solution		
	Yes	26	28.89
	No	64	71.11
7.	Cleaning of milking utensils		
	Yes	90	100.00
	No	0	0.00

3.8 Constraints

The constraints in crossbred dairy cattle rearing in Cauvery delta region are presented in Table 8. Among the cattle management constraints encountered by farmers in crossbred dairy cattle rearing on the Cauvery delta region, the most prominent one is the inadequate feed resources (score of 67.31 – Ist rank), followed by lack of well-defined breeding policy (score of 57.38 - IInd rank), lack of training on crossbred cattle rearing (score of 54.64 – IIIrd rank), inadequate support from Government for breed conservation and dairy farming (score of 53.90 - IVth rank), dearth of willingness among younger generation to undertake crossbred cattle rearing as an occupation (score of 46.49 - Vth rank), high labour costs (score of 43.71 - VIth rank) and difficulty in handling animals (score of 23.83 - VIIth rank).

Regarding feeding management practices in the study area, the paramount hindrance faced by the dairy farmers is the high costs of concentrate feeds with the score of 66.81, closely followed by the non-availability of green fodder as well as dry fodder (score of 64.99 – IInd rank), lack of knowledge about balanced feeding (score of 58.33 – IIIrd rank), lack of knowledge about fodder preservation methods (score of 51.57 - IVth rank), lack of knowledge about mineral mixture (score of 47.29 - Vth rank), high cost of dry fodder (score of 46.40 - VIth rank), restrictions for grazing in forest zone and road sides (score of 30.69 - VIIth rank) and lack of sufficient water for drinking (score of 29.54 - VIIIth rank).The findings were in contrary to Meganathan et al. (2010) [13], who found lack of adequate pasture land for grazing cattle as the major constraints while compared to high cost of concentrates in hilly area of Tamil Nadu.

It could be observed from the table that the dairy farmers with regard to breeding management had opined higher repeat breeding incidence with artificial insemination as the main hurdle in crossbred cattle with the mean score of 60.04 which is in accordance with the study of Rathod et al. (2014) [14] on determination of the knowledge level of dairy farmers about artificial insemination in Bidar district of Karnataka. Lack of knowledge about effective breeding practices was ranked second with the mean score of 56.50, followed by poor reproduction performance (score of 54.52 – IIIrd rank), lack of AI facilities (score of 50.28 - IVth rank), and the lack of improved breeding bulls (score of 40.14 – Vth rank) and spread of reproductive disease through NS (score of 32.82 – VIth rank).

Concerning the technical limitations the farmers expressed, the lack of awareness about selection and breeding of animals for breed improvement as the major constraint with the mean score of 72.86, followed by the lack of knowledge about improved rearing practices for cattle (score of 61.46 - IInd rank), lack of knowledge of crossbred cattle (score of 53.54 - IIIrd rank), inadequate knowledge about diseases, their prevention and control (score of 51.66 - IVth rank), absence of good knowledge about vaccination (score of 36.48 - Vth rank), lack of understanding about de-worming (score of 34.58 - VIth rank) and poor herd management practices followed during grazing (score of 32.29 - VIIth rank).

According to this study report, the most crucial obstacle faced by the farmers in the marketing arena, are the involvement of middlemen with the mean score of 62.82, subsequently by no proper price fixation and value for dairy products and manure (score of 54.41 - IInd rank), distance location of milk procurement center (score of 49.29 - IIIrd rank), absence of adequate understanding about insurance schemes (score of 47.70 - IVth rank), lack of regularized sale of milk due to uneven demand (score of 47.72 - Vth rank) and difficulty in obtaining finance (score of 33.90 - VIth rank).

Table 8: Constraints in crossbred cattle rearing (Mean score and Rank)

Sl. No.	Constraints	Score	Rank
	Management constraints		
1	Lack of support from Government for breed conservation and dairy farming	53.90	IV
2	Lack of defined breeding policy	57.38	II
3	Inadequate feed resources	67.31	I
4	Lack of training on crossbred cattle rearing	54.64	III
5	High labour cost	43.71	VI
6	Lack of willingness among young generation towards crossbred cattle rearing	46.49	V
7	Difficult in handling of animals	23.83	VII
	Feeding constraints		
1	Restriction for grazing in forest zone and road side	30.69	VII
2	High cost of dry fodder	46.40	VI
3	Non-availability of green and dry fodder	64.99	II
4	Lack of knowledge about balanced feeding	58.33	III
5	Lack of knowledge about importance of mineral mixture	47.29	V
6	Lack of water for drinking	29.54	VIII
7	High cost of concentrate feeds	66.81	I
8	Lack of knowledge about fodder preservation methods	51.57	IV
	Breeding constraints		
1	Non-availability of improved breeding bulls	40.14	V
2	Lack of knowledge about breeding practices	56.50	II
3	Spread of reproductive disease through NS	32.82	VI

4	Lack of AI facilities	50.28	IV
5	Higher repeat breeding incidence with AI	60.04	I
6	Poor reproduction performance	54.52	III
Technical constraints			
1	Lack of knowledge about crossbred cattle	53.54	III
2	Lack of awareness about selection and breeding of animals for breed improvement	72.86	I
3	Lack of knowledge about vaccination	36.48	V
4	Lack of knowledge about deworming	34.58	VI
5	Lack of knowledge about improved rearing practices for cattle	61.46	II
6	Poor herd management during grazing of animals	32.29	VII
7	Inadequate knowledge of diseases, their prevention and control	51.66	IV
Marketing constraints			
1	Lack of regularized sale of milk	47.62	V
2	No proper price fixation for dairy products and manure	54.41	II
3	Involvement of middle man	62.82	I
4	Lack of adequate understanding about insurance	47.70	IV
5	Distance location of milk procurement center	49.29	III
6	Difficulty in obtaining finance	33.90	VI

4. Conclusions
The study among crossbred dairy farmers at Cauvery delta region of Tamil Nadu reveals that the farmers are adopting most of the basic management practices related to dairy cattle rearing. The major constraints faced by the farmers are inadequate feed resources, high cost of concentrates, repeat breeding, lack of awareness about selection and breeding of animals for breed improvement and involvement of middleman in sale of the farm produce. Hence, motivation and enrichment of farmers with scientific knowledge and recent technology on dairy cattle production will pave way for better results in terms of production and availability of resources to improve the crossbred dairy cattle rearing to next level.

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