

Addressing Reproductive Issues in Semi-Intensive Dairy Cow Rearing

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Abstract

Small and marginal farmers engage in a semi-intensive type of dairy cattle production in the Manipur area of North-Eastern India. The study attempted to determine the prevalence of reproductive problems that are important for agricultural dairy cattle production. In crossbred dairy cattle, namely the Jersey crosses (JCB) and Holstein Friesian crosses (HFCB) breeds, the main objective was to ascertain the frequency of significant reproduction problems. An in-depth analysis of 620 crossbred dairy cattle from 10 districts of Manipur was over the course of 2 years (2021-2022). Among them were 230 HFCB and 390 JCB. The goal of the analysis was to determine the prevalence of significant clinical reproductive issues, with a focus on anestrus, abortion, repeat breeding and fetal membrane retention. Additionally, investigations were conducted into minor reproductive issues such as pyometra (PY), endometritis (EDM), prolapsed (PL) and dystocia (DS). To identify patterns and variances, the data were further segmented by breed, age and parity. Of all the animals evaluated, 34.96% (n=225) had at least one clinical reproductive issue. The primary reproductive issues found were Anestrus (AN) (31.98%), abortion (10.36%), retention of fetal membrane (RFM) (12.46%) and repeated breeding (24.92%). PL (2.64%), EDM (5.72%), PY (7.55%) and DS (4.23%) were among the minor reproductive issues. Notable variations in the prevalence of reproductive illnesses according to the same level, species and its age were found in the analysis. The results of the study demonstrate the occurrence of significant reproductive issues in dairy cattle produced in Manipur by small and marginal farmers in a semi-intensive system.

Keywords: Reproductive Issues, Semi-Intensive, Jersey crosses Breed (JCB), Holstein Friesian Cross Breed (HFCB), Indian Council of Agricultural Research (ICAR)

INTRODUCTION

Semi-intensive dairy cow rearing is an essential part of contemporary dairy farming processes. In this particular setting, the overall productivity and profitability of dairy operations are influenced by reproductive concerns. Dairy cow reproduction efficiency is a multifaceted phenomenon that is dependent on several factors, such as genetics, diet, management techniques and environmental circumstances (1). Maintaining a profitable dairy herd depends on effective reproduction since it immediately affects the frequency and success of calving, the amount of milk produced later and the general health of the herd. Achieving ideal reproductive performance can be difficult in semi-intensive systems, where cows are given access to pasture and extra nutrition, yet it is essential to maximize milk output and preserving economic viability (2).

Semi-intensive dairy cow rearing presents a number of significant reproductive challenges, from delayed adolescence and longer calving intervals to lower-than-ideal conception rates and a spike in culling as a result of reproductive

failure. A comprehensive strategy that incorporates both contemporary scientific discoveries and traditional husbandry methods is needed to comprehend and manage these issues (3).

The context for examining the intricacies of reproductive problems in semi-intensive dairy cow production is established. While acknowledging the variety of factors that affect cows' reproductive performance in semi-intensive systems, it highlights the significance of reproductive efficiency in establishing sustainable and successful dairy farming. The following analysis of particular reproductive issues will provide insight into possible approaches and methods for enhancing the general reproductive health of the herd in this particular agricultural environment (4).

The complex and multifaceted reproductive problems associated with semi-intensive dairy cow rising involve a careful balancing act between genetic, nutritional, management and environmental factors. A comprehensive and cohesive strategy is needed, taking into account the special qualities of semi-intensive systems. Dairy producers can improve the health and reproductive effectiveness of their herd and bolster the long-term survival and profitability of their enterprises. (5).

The study (6) indicated that none of the serum samples that were using indirect multi-species ELISA were taken from Wondo Genet and other towns tested positive for brucellosis in cattle. It was recommended that additional research be done, ideally in a lab setting, to determine the underlying reasons of those issues in various regions of the nation. In the meanwhile, farm attendants and owners should be made aware of the need to enhance their farm management system.

The study (7) determined Brucellosis sero-incidence in milk cows raised in the Wondo Genet region on intense and semi-intensive farms for dairy products, as well as the detection and estimation of the prevalence of postpartum reproductive diseases with clinical manifestations accompanied by risk factors. The study was carried out from November (2019) to September (2020).

The article (8) evaluated dairy cows' well-being housed in two conventional rearing systems in southeast Sicily intensive agriculture and semi-intensive farming. A multi-criteria approach tailored for Sicilian conditions were used to evaluate eighteen dairy farms in all, nine of which were semi-intensive and the other nine of which were intense. The results simplified the European Food Safety Authority's (EFSA) model.

The paper (9) explained the mastitis, repeated breeding, RFM, uterine and vaginal PI and abortion were among the issues related to reproduction. In contrast, DS, AN, hypocalcaemia, uterine discharge and stillbirth accounted for 3.91%, 1.82%, 1.30%, 1.04% and 0.78% of issues related to reproduction with fewer occurrence rates, respectively. In relation to the wellness of the body, animal age, production system and mating system, the overall frequency of illnesses related to reproduction in the study demonstrated statistical significance.

The article (10) found that the main causes of the milking cattle' subpar reproduction abilities in Asella village were clinical reproductive issues, such as dystocia, repeat breeding, RFM and abortion. Enhancements to management protocols, appropriate identification of heat and appropriate bull selection for breeding might reduced issues related to reproductive health and thereby increase dairy cows' capacity for reproduction. From November (2017) to April (2018), a retrospective study were carried out in Asella town, central Ethiopia, to ascertain the predominance of significant reproduction issues and related risk factors in dairy cows.

The study (11) consisted heifers (279), dry cows (91), pregnant (262) and lactation cows (573). FMD (16.5%), RB (41.8%), LSD (42.6%), milk fever (22.4%), bloat (16.5%), respiratory issues (23.2%), mastitis (25.3%) and diarrhea (29.1%), were the main health issues that dairy cows in the research area faced. There was a modest prevalence of other conditions such dystocia (7.6%), uterine prolapsed vagina (13.5%), RFM (13.2%) and ecto-parasites (12.4%).

The study (12) involved those three distinct Puducherry regions Ramanathapuram, Thondamanattam and Kizhagraharam that produce significant amounts of fluid milk. Thirty pretested questions about various farm methods were used in interview with dairy farmers from each of those regions. Recorded were the responses about bio-security protocols, housing, breeding, feeding and management techniques. Using the Epicollect-program, questions about challenges with disease control, bio-security maintenance and milk marketing were posed to cattle raisers.

The study (13) indicated better access to top-notch veterinary care, enough knowledge, enhancing capabilities, implementing suitable handling of fertility issues techniques and appropriate farm record keeping were necessary. According to the information they obtained, 43.1% of dairy animals were in Bihar and 32.9% were in Assam. (Including heifers, milking and non-milking animals) had reproductive issues.

The paper (14) investigated few central Ethiopian farms between October (2018) and February (2019). The region had a somewhat cool climate, with average highs along with lows of 6 to 22 degrees Celsius and 59% relative humidity on average. There were 24°C and 18°C annual temperature range as well as 1225 to 1000 mm of rainfall, respectively. The region experienced two distinct rainy seasons, one lasting from June to September and the other from March to May.

The study (15) explained that understanding the AMU pattern and its indicators in the production conditions of dairy farms and individual farmers in southern India. Six-year treatment registrations (2012-2017) with 3,178 instances involving dairy farms and 12,057 instances of production by individual farmers' settings in (2017-2019) were gathered and subjected to log-linear model analysis. The objective of that research was to identify the predominance of reproduction issues that were significant for the production of dairy cattle in agriculture. The primary goal in crossbred dairy cattle, specifically the JCB and HFCB breeds, was to ascertain the predominance of significant reproduction issues.

METHODS AND MATERIALS

Research area and animal

The investigation was carried out at the ICAR for North-Eastern Hill Zone in Bishnupur, Manipur, India. Ascertain the frequency of illnesses related to reproduction in 620 crossbred dairy cows those were randomly selected and came from every district in Manipur, India. The study was carried out over the course of two years, from (2021) to (2022). Every animal chosen for the study was raised under semi-intensive management, which involved stall feeding the animals and providing them with little open space for grazing. All over the research area, there was essentially the same method of cow rearing in terms of housing, feeding, as well as managing health care. Feed was made up of boiling and mixed vegetables, fragmented rice, grain such as maize and wheat/rice fiber. There were two meals a day. In addition, some green feed grass and paddy straw were provided.

Data collection and reproductive disorders

Gynecological exams were performed on 620 crossbred dairy cows to ascertain the frequency of reproduction issues. Using an organized questionnaire, the cow's complete medical history considering the time of any earlier "artificial insemination (AI)" or organic reproduction was acquired from the livestock farmer. Reproductive disease diagnosis was based on clinical indicators, outcome of therapy and medical information. Repeated breeders were cows with seemingly normal genetics that were unable to conceive either naturally by mating with a fertile bull or artificially infertile by utilizing high-quality semen three times in a row.

Examination of blood serum's biochemistry

A specimen of blood was taken from 300 milking calves out of 620 cows estimate the concentration of serum levels of albumin, saturated fat and entire protein. There were three groups of cattle, each consisting of 100 animals: normal breeding, RB and anestrus. Blood samples weighing 10 ml were taken from the jugular vein without the use of an anticoagulant. Centrifugation was used to extract the serum, which was placed sterilely into a clear bottle and marked. The blood specimens were utilized right away to estimate glucose using a standard kit. The specimens were kept at -19°C until analysis, since they could not be done on the day of collection. Using the standard kit and the manufacturer's instructions, Albumin, cholesterol and overall protein concentrations were estimated.

Data processing and analysis

Prior to processing, the details gathered were organized differently and the responses to the questions were recorded. Ensure that there were no errors and for consistency, the data were carefully examined. Two genotypes were distinguished among the animals. JCB (n=390) and HFCB (n = 230). The information was further divided into age groups and parities. Ages <4 (n = 170), 4-6 (n = 155), 6-8 (n = 160) and >8 (n = 135) were the four age groups. Four groups were grouped according to parity: heifers (n = 140), first–5th parity (n = 200), 5-7th parity (n = 170) and >7th parity (n=110). The percentage of animals impacted among all animals investigated and the total quantity of animals affected by a certain condition, respectively, were used to calculate the prevalent and frequency ratios of problems with reproduction. The SPSS 19.0 application was used to enter and analyze the baseline survey data. The prevalence of reproductive disorders was investigated using descriptive statistics and the degree of importance among cattle medical instances was ascertained using the Duncan t-test. Data from the blood biochemical profile were analyzed using a one-way analysis of variance.

RESULTS

Incidence of reproductive disorder

Every animal chosen for the investigation was cared for using a semi-intensive control technique. The owner gave the animals' water, food and shelter, but they were free to graze in the open in search of green grass. The findings indicated that 34.96% (n=225) of the 620 dairy cows that were inspected had one or more reproductive health issues. Regardless of the species, life span, or equitable treatment of the cow, the reproduction issues identified in this study included "anestrus (31.98%), RB (24.92%), retention of fetal membrane (12.46%), abortions (10.36%), dystocia (4.23%), PL (2.64%), EDM (5.72%) and pyometra (7.55%)" (Table 1). Cow infertility was most caused by anestrus syndrome. AN, RB, RFM and abortions were the main reproductive issues, accounting for more than 79% of the affected animals. Nevertheless, it was discovered that DS, vaginal PL, EDM and PY had an impact on dairy cattle fertility.

Breed's impact on reproductive issues

Compared to JCB, HFCB animals had a greater incidence of reproductive problems of the 620 animals used in the investigation overall (Table (2)). Breed impacted endometritis, dystocia, anestrus and abortion. There was no discernible change in prolapse, pyometra, RFM and RB instances. HFCB cattle had a considerably greater incidence of anestrus, abortions, dystocia and endometritis than JCB cattle. The incidences were 12.06% versus 7.60%, 6.71% versus 3.10%, 7.12% versus 2.32% and 3.92% versus 1, 82%, respectively (Table (3)).

Age's impact

Age category affected RB and anestrus significantly ($p < 0.05$). In the age group under 4 years old, there was a lower prevalence of reproductive abnormalities reported and no occurrences of PL, EDM, or PY were noted during the study period. Heifers in the 4–7 and >7 year age groups had notably more AN cases than the 4–7 year age group. RB was lowest in the age group under 4 years old and maximum in the age group over 8. Between the age groups, there was no discernible difference in RFM, abortion and DS, PI, EDM and PY (Table (4)).

Table (1). The data in percentage of total affected animal (Source: Author)

Reproductive disorder	Frequency	% of total affected
AN	73	31.98
RFM	30	12.46
RB	57	24.92
Abortion	23	10.36
Dystocia	9	4.23
Prolapse	6	2.64
Endometritis	12	5.72
Pyometra	15	7.55
Total	225	100

Effect of parity

The predominance of several reproduction issues was impacted by parity in Manipur's smallholder dairy cattle production system. The first to third parity was found to have the highest frequency of reproductive problems, followed by the fourth to fifth parity. The group with the largest number of cases of RB, anestrus, RFM and abortion was the one with the lowest number of cases, followed by the one with the highest parity in heifers. Only PL cases in the first through third parties were documented. Likewise, EDM cases in heifers and animals with more than seven parities were not documented. The incidence of abortion peaked in the second calving and decreased in the heifer, first calving, sixth calving and subsequent calving. First calving had the highest prevalence of stillbirths (1.8%), while heifers, sixth, seventh and more calving had no stillbirths at all. Likewise, third parity was associated with greater rates of retained placenta (5.6%), metritis (2.2%), PY (2.2%), uterine PL (1.6%) and RB (6.3%). Third parity had the highest rates of mastitis (3.9%) and vaginal prolapsed (2.5%) (Table 5).

Table (2). The affected count of JCB and HFCB (Source: Author)

Breed	No of animal examined	No of cows affected	No of non-affected	(%)affected
HFCB	230	100	130	44.01
JCB	390	125	265	29.31
Total	620	225	395	34.96

Table (3). Breed-specific differences in the frequency of Reproductive Disorders (RD) in dairy cows (Source: Author)

RD	Breed	N (%)	Total (n=620) N (%)	Amount of Significance
Anestrus	HFCB	35 (12.06)	73 (10.84)	*

	JCB	38(7.60)		
RB	HFCB	25 (12.88)	57 (8.20)	NS
	JCB	32(11.15)		
RFM	HFCB	13 (7.01)	30 (4.68)	NS
	JCB	17(4.28)		
Abortion	HFCB	9 (6.71)	23 (3.78)	*
	JCB	14(3.10)		
Dystocia	HFCB	3 (7.12)	9 (1.48)	*
	JCB	6(2.32)		
Prolapse	HFCB	2 (0.10)	6 (0.98)	NS
	JCB	4(1.01)		
Endometritis	HFCB	6 (3.92)	12 (1.96)	*
	JCB	6(1.82)		
Pyometra	HFCB	7 (4.12)	15 (2.41)	NS
	JCB	8(2.01)		
Total	HFCB	100 (44.01)	225 (34.96)	
	JCB	125 (29.31)		

Table (4). Age group's impact on the frequency of disorders of reproduction (Source: Author)

R D	Age range	N (%)	Overall (n=620)	Amount of Significance
Anestrus	A	17 (10.00)	73 (10.84)	*
	B	17 (10.97)		
	C	20 (12.50)		
	D	19 (14.07)		
RB	A	16 (9.41)	57 (8.20)	*
	B	12 (7.74)		
	C	11 (6.88)		
	D	18 (13.33)		
RFM	A	6 (3.53)	30 (4.48)	NS
	B	5 (3.23)		
	C	11 (6.88)		
	D	8 (1.32)		
Abortion	A	5 (0.78)	23(3.78)	NS
	B	4 (0.59)		
	C	6 (0.98)		
	D	8 (1.32)		
Dystocia	A	1 (0.01)	9(1.48)	NS
	B	3 (0.06)		
	C	3 (0.06)		
	D	2 (0.04)		
Prolapse	A	3 (0.16)	6(0.98)	NS

	B	1 (0.01)		
	C	1 (0.11)		
	D	1 (0.11)		
Endometritis	A	4(0.20)	12(1.96)	NS
	B	3(0.16)		
	C	2(0.14)		
	D	3(0.16)		
Pyometra	A	5(0.78)	15(2.41)	NS
	B	3(0.16)		
	C	4(0.20)		
	D	3(0.16)		
Total	A	57(33.45)	225(34.96)	*
	B	48(31.52)		
	C	58(35.81)		
	D	62(50.01)		
Note : <4 years (A), 4-6 years (B), 6-7 years (C) , > 7years (D)				

Table (5). Parity's impact on dairy cows' occurrence of reproductive illnesses (Source: Author)

RD	Parity	N (%)	Total (n=620)	Amount of Significance
Anestrus	Heifer	9 (6.43%)	73 (10.84)	*
	1st to 4th	10 (5.00%)		
	5-6th	7 (4.12%)		
	>7th	4 (3.64%)		
RB	Heifer	5 (3.57%)	57 (8.20)	*
	1st to 4th	8 (4.00%)		
	5-6th	13 (7.65%)		
	>7th	2 (1.82%)		
RFM	Heifer	8 (5.71%)	30 (4.48)	*
	1st to 4th	12 (6.00%)		
	5-6th	2 (1.18%)		
	>7th	1 (0.91%)		
Abortion	Heifer	7 (5.00%)	23(3.78)	NS
	1st to 4th	5 (2.50%)		
	5-6th	8 (4.71%)		
	>7th	6 (5.45%)		
Dystocia	Heifer	10 (7.14%)	9(1.48)	NS
	1st to 4th	6 (3.14%)		
	5-6th	11 (6.47%)		
	>7th	3 (3.14%)		
Prolapse	Heifer	9(5.92%)	6(0.98)	NS
	1st to 4th	8(4.31%)		

	5-6th	4(2.72%)		
	>7th	5(5.01%)		
Endometritis	Heifer	7 (5.31%)	12(1.96)	NS
	1st to 4th	7 (3.50%)		
	5-6th	12 (7.12%)		
	>7th	8 (8.12%)		
Pyometra	Heifer	2 (1.43%)	15(2.41)	NS
	1st to 4th	9 (4.50%)		
	5-6th	11 (6.47%)		
	>7th	6 (5.45%)		
Total	Heifer	57 (40.71%)	225(34.96)	*
	1st to 4th	65 (32.50%)		
	5-6th	68 (40.00%)		
	>7th	35 (31.82%)		

CONCLUSION

This research area has a significant prevalence of reproductive health issues. The primary goal with crossbred dairy cattle, specifically the JCB and HFCB, was to ascertain the frequency of significant reproductive problems. Over the course of two years (2021–2022), 620 crossbred dairy cattle from ten districts of Manipur were analyzed. There were 390 JCB and 230 HFCB among them. Finding the frequency of major clinical reproductive problems was the aim of the analysis, with particular attention paid to anestrus, abortion, recurrent breeding and fetal membrane retention. The study's findings demonstrate the predominance of serious issues with dairy farms reproduction rose in Manipur in a semi-intensive method used by marginal and small farmers. More thorough investigation of particular elements of breeding, housing, health care and feeding practices would aid in the identification of targeted strategies that could be used to increase the production of dairy animals. Low productivity and fertility were further exacerbated by an absence of scientific understanding, limited availability of breeding and inadequate health services. In-depth studies on particular facets of breeding systems, housing, health care and nutrition would be helpful in identifying targeted changes that can be applied to raise dairy cow productivity.

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