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Assessment of reproductive failure due to repeat breeding and anoestrous in dairy animals of Uttara Kannada district of Karnataka

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Abstract

Reproductive inefficiency of cattle is due to repeat breeding and anoestrous syndrome which is expensive hitch in profitable dairy production as the age at first calving in heifers is delayed and the inter-calving interval is extended, thus results in lowering of calf production, milk production and leading to huge economic losses to the dairy farmers. Animals having problems of reproductive failure, presented during clinical examination or during infertility camps from different taluks like Sirsi, Siddapura, Yellapura, Mundagod, Haliyal, Kumta, Honnavara and Ankola of Uttara Kannada districts were included in the study. The present research work has been carried out in order to assess the causes for reproductive failure associate with dairy animals of different breed, age, lactation also the representative serum samples of the affected animals were analysed for different biochemical parameters in the Uttara Kannada district of coastal Karnataka. The outcome of the present study revealed that the cows comprised of 78.7% (77 animals) and buffaloes 21.2% (21 animals) of the cases. The incidence of the reproductive failure was higher in HF crossbred cows (41.4%), followed by Jersey cross bred cows (32.3%), buffalo (21.2%) and lowest in Native cows (5.0%). In the current study the percentage of repeat breeding in heifers are 30.61% and in First to third lactation animals it is 31.63%, fourth to sixth lactation it is 34.69% and in more than sixth lactation it 3.07%. However the prevalence of rate of repeat breeding, anoestrous and Abortions are 52.04%, 44.89%, and 3.06% respectively. The major causes for repeat breeding are delayed ovulation (53.8%), followed by anovulation (28.8%), endometritis (11.5%) and cystic ovarian diseases (9.6%). The major causes for anoestrous are functional hormonal deficit (43.1%), followed by nutritional deficiency (36.3%), underdeveloped gonads (15.9%) and persistent CL or luteal cysts (4.5%). It is also suggested from the current study that it is advisable provide balanced ration to animals as per recommendations of bureau of Indian standards additional supplementation of Mineral and vitamin mixture for better reproductive efficiency.

Keywords: Repeat breeding, anoestrous, cattle, heifers, nutritional deficiency, reproductive failure

Introduction

Indian subcontinent is having very rich diversity of the livestock population in the world, among which the cattle and buffaloes plays major role in contributing the India's milk production. From several decades there are certain persisting problems associated with the Indian dairy sector which are the major hurdles to achieve the optimum production. Among which the reproductive health of the dairy cow is the one of the threat to the growing Indian dairy sector. Several research and mitigation strategies are developed in order to combat the existing reproductive problems in the dairy cattles, However, reproductive inefficiency of cattle is due to repeat breeding and anoestrous syndrome which are expensive hitch in profitable dairy production as the age at first calving in heifers is delayed and the inter-calving interval is extended, thus results in lowering of calf production, milk production and leading to huge economic losses to the dairy farmers (M. Singh *et al.*, 2017) [1]. The reasons associated with reproductive failure are multi-factorial, they are mainly divided into Functional, Nutritional, Infectious and Managemental problems. Functional causes may include endocrine dysfunctions like faulty LH secretion, improper steroidogenesis, hormonal imbalance etc. (M. Singh *et al.*, 2017) [1]. Infections of reproductive tract like clinical and subclinical endometritis associated with bacteria, yeast, fungi, and abrasions of reproductive tract results either in fertilization failure or early embryonic death (M. Singh, *et al.*, 2017) [1]. Uttara Kannada district comprises about 3, 36, 312 cattle and 73, 993 buffalo population (Govt of Karnataka animal censuses 2019) of which 35-40% of the population are having problem of reproductive

failure at some stages of their production life. Considering its huge economic impact on the rural farmers the present research work has been carried out in order to assess the causes for reproductive failure associated with dairy cattle and buffalo of different breed, age, and lactation in the Uttara Kannada district of coastal Karnataka

Materials and Methods

Animals having problems of reproductive failure, presented during clinical examination and in infertility camps from different parts of Uttara Kannada districts were included in the study. Current research work conducted in different taluks of the Uttara Kannada district as mentioned in Fig.1. The breeds and number of animals included in the study are as follows cross breeds of Jersey-32, Holstein Friesian -41, Native Cross cattle-4 and Buffalo-21. Total 98 animals of different lactation stages were examined for the different reproductive associated problems like repeat breeding (RB) and anoestrous (AE).

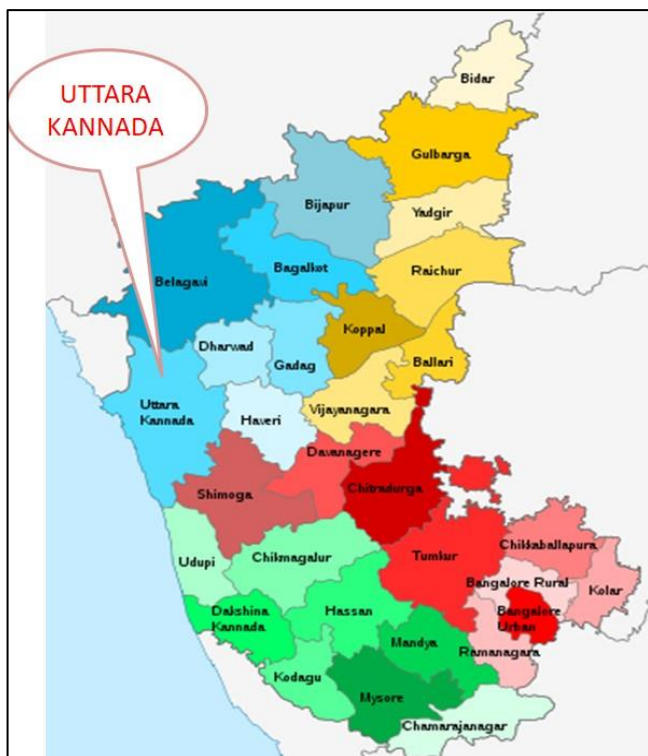


Fig 1: Uttara Kannada District of Coastal Karnataka consisting of taluks like Sirsi, Siddapura, Yellapura, Mundagod, Haliyal, Kumta, Honnavara and Ankola. Joida, Batkala, Karwar. Geographical Location of the Study area (15.06546243117558, 74.57783117032989)

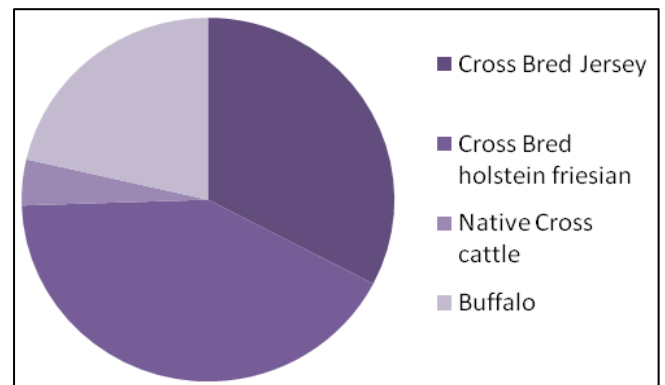
Ascertaining the causes of reproductive failure

1. Comprehensive history of the animals and herd collected with respect to cyclicity, number of inseminations carried out, duration of estrous, type of discharge, quantum of discharge, estrous signs, age, number of lactations, peri-parturient problems, nutrition and supplementation of micronutrients.
2. Animals were examined visually for body condition score, obesity, silent heat, type of cervico-vaginal discharge, masculinization, behavioral changes.
3. Animals uterine structures and ovaries were examined per-rectally to know the consistency, development, texture, tonicity, pyometra, adhesions and ovary for presence of different structures on ovary and cystic

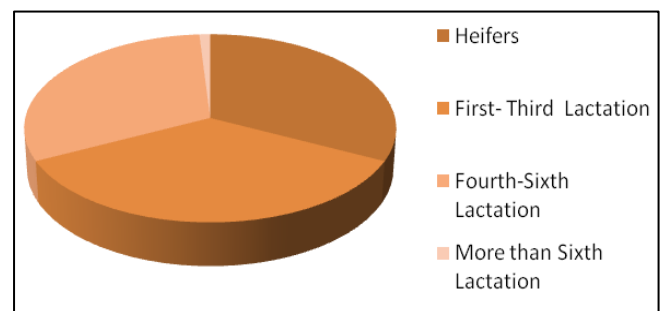
4. Cervix and vagina examined presence of clinical endometritis, i.e. presence of purulent discharge. The uterine discharge was examined by using white side test for presence of sub-clinical endometritis.
5. Serum samples were examined for biochemical parameters like micro minerals, and metabolites like glucose, urea, albumin, globulin levels.
6. Based on the history, physical examination and biochemical parameters the problem underlying the reproductive failure was ascertained.

Results and Discussion

In the present study total 98 animals with the history of conception failure were ascertained for the cause of reproductive failure. Among this the cows comprised of 78.7% (77 animals) and buffaloes 21.2% (21 animals) of the cases. The incidence of the reproductive failure was higher in HF crossbred cows (41.4%), followed by Jersey cross bred cows (32.3%), buffalo (21.2%) and lowest in Native cows (5.0%) as depicted in the graph1. This indicates there is predisposition of breed to reproductive failure. The cross bred cows with higher production capacity are at higher risk of developing reproductive disorders in compared to indigenous cattle and buffaloes.



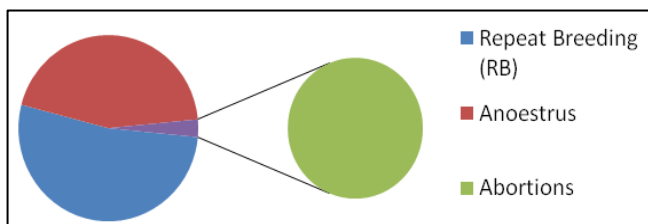
Graph 1: Depicting the Different breeds suffering from the reproductive associated problems in the Uttara Kannada District.



Graph 2: Depicting the Different Lactation stages associated with the reproductive problems in the cattle and buffalo.

Earlier studies on RB the prevalence of repeat breeding is much greater in crossbred cows (17.57%) as compared to buffaloes (12.74%) and indigenous cows (8.64%) (Verma. S *et al.*, 2018) [3]. In the current study the incidence of reproductive failure in heifers is 30.61%, animals of first to third lactation is 31.63%, fourth to sixth lactational animals is 34.69% and in more than sixth lactational animals is 3.07% as depicted in the graph. 2. It is evident that the root causes of the RB in heifers are mainly attributed to the nutritional

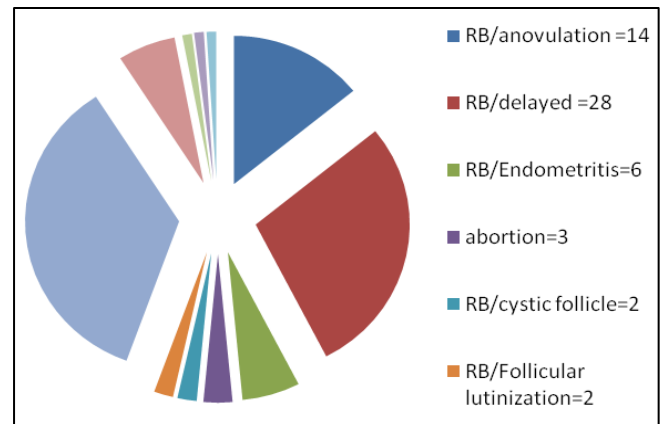
deficiency, managemental practices, malnutrition, and improper development of the reproductive organs. Further in the present study the incidence of the RB is highest in the Fourth to sixth lactation than in the first to third lactation, suggesting that the high risk of becoming RB animal was positively correlated to lactation number as reported earlier by H. Gustafsson and U. Emanuelson 2002 [2]. In addition it is evident from the present study that though the risk of RB is associated with the stage of lactation but it is not beyond the sixth lactation suggesting that the animals were highly prone for the RB during its peak milk production stages like third to fifth lactation also it is clearly evident from the animal health point of view that the nutritional requirement for maintenance and also huge milk production of the crossbred animals were more during the productive stage of the lactation thereby essential minerals like calcium, magnesium, vitamins and other milk constituents are continuously drain out for the milk production on the other side posing the animals to be prone for the high risk of RB. Micro nutrients such as Cu, Co, Zn, Fe, Se, I, Mo, Mn and some macro elements like K, Ca, Na, Cl, P are found to be very essential for normal livestock growth and reproductive performance. Normally roughages and green fodder are deficient in micro and macro minerals (Satapathy *et al.*, 2018) [4]. Imbalances and inadequacy of these minerals results in reproductive tract disorder that's why minerals are crucial for vigorous fertility of animal (Ibtisham *et al.*, 2018) [5].



Graph 3: Depicting the different Reproductive associated ailments in cattle and buffalo

Repeat breeding (RB), defined as cow's failure to conceive from 3 or more regularly spaced services in the absence of detectable abnormalities, is a costly problem for the dairy producer. In the present study the prevalence of RB is 52.04% and prevalence of the Anoestrus is 44.89%, prevalence of Abortions is 3.06% as depicted in Graph.3. suggesting that the prevalence of the RB is more compared to other causes. Major causes of RB in cattle and buffalo are due to Ovulation disruption, Ovarian Pathologies, Metritis and Endometritis. Earlier studies reported the prevalence of RB associated with cystic ovaries ranges between 2.7% to 15.1% in cow (Cattaneo *et al.*, 2014) [6]. The incidence of oviduct abnormalities varies between 6-15% of adult cows (Kumar and Singh, 2018) [7]. Studies on endometritis revealed that the nearly about 40% dairy cattle suffer from puerperal problems and the prevalence of clinical endometritis was 16.67% (Gahlot *et al.*, 2016) [8]. Anoestrus is also one more major cause which is due to Nutritional deficiency, poor body condition score (BCS) underdeveloped genitalia, (Manisha

Sethi *et al.*, 2022) [9]. At calving, a BCS of 3.5 (on a five-point scale) is required for optimal reproductive function (Shah *et al.*, 2021) [10]. Feed restriction during late pregnancy and the early postpartum period results in reduced BCS, which contributes to extended postpartum anestrus. It is also evident from the current study that anoestrus will also be a threat to the cross bred dairy cattle.



Graph 4: Describing the Different ovarian /uterine causes of the Reproductive problems associated with cattle and buffalo.

Incidence of RB associated with several ovarian and uterine problems are well studied and are represented in the current study the RB/anoovulation is 25.45 %, RB/delayed ovulation is 50.90%, RB/Endometritis is 10.90%, Abortions is 5.45, RB/Cystic follicle is 3.63, RB/Follicular luteinization is 3.63% as depicted in the graph. 4. Among all the causes the RB/delayed ovulation is highest followed by RB/Anovulation and least are RB/cystic follicle. The incidences of the RB/delayed ovulation in the post partum dairy cows are mainly attributed to the delayed uterine involution and also endocrinal changes in the dairy cows (Abuelo *et al.*, 2014) [11]. Serum samples of representative animals from RB and anoestrus were subjected for biochemical analysis and results are shown in the table-2. Earlier studies on the serum parameters in the HF cross bred with RB were like Urea 35.13±1.76 mg/dl, Glucose 52.33±20 mg/dl, Total protein 8.50±0.14 g/dl, Albumin 3.76±0.05 g/dl P 5.0±0.23 mg/dl (Melis Sila *et al.*, 2002) [12]. However the values of serum Calcium 9.51±0.29 (mg/dl), Mg 2.25±0.18 (mg/dl) in the HF cross bred RB animals (Moo Young Jung *et al.*, 2021) [13]. The serum calcium, Serum phosphorous levels in the current study were either at lower margin or below the normal reference range of RB animals (Moo Young Jung *et al.*, 2021) [13]. But the lower levels in the animals of AE are attributed to the dietary nutritional deficiency. Similarly, the total protein and albumin levels in anestrus animals, nutritionally deficient groups were below the normal reference range. However, the blood urea nitrogen, magnesium levels were within the normal range in all groups of animals but the level of serum glucose was not consistent Melis Sila *et al.*, 2002) [12].

Table 2: Results of serum biochemistry of representative animals

Sl.no.	Urea mg/dl	Glucose mg/dl	Total protein (g/dl)	Albumin (g/dl)	Mg (mg/dl)	Calcium (mg/dl)	P (mg/dl)
1	22.6	68.9	6.8	2.4	2.2	8.3	7.0
2	13.4	90.5	7.6	3.0	2.4	7.7	9.5
3	13.0	68.7	6.1	3.1	2.4	7.9	7.4
4	6.3	78.2	4.6	3.1	2.3	7.8	7.8
5	14.2	83.0	6.9	2.9	2.5	5.3	6.7
6	14.8	98.7	4.3	3.4	2.4	8.5	5.7
7	10.5	78.0	5.0	2.6	2.3	7.2	6.8
8	20.5	87.5	6.3	2.4	4.0	8.7	8.4
9	8.4	41.0	5.6	1.6	2.3	8.7	7.1
10	8.9	46.0	5.6	1.1	2.4	10.6	6.4
11	22.9	28.6	5.3	1.6	2.2	7.8	6.5
12	14.0	32.6	4.8	1.4	2.3	8.6	6.8
13	26.2	70.2	6.8	2.2	2.8	5.6	3.7
14	16.6	38.9	7.6	3.1	3.0	8.3	3.6
15	14.3	45.3	6.1	3.2	2.9	7.6	3.2
16	9.7	48.6	4.5	3.1	2.9	8.9	4.5
17	11.6	79.3	5.0	2.6	2.3	9.3	3.6
18	9.0	66.2	6.6	2.5	2.5	5.1	4.8
19	22.4	58.4	5.9	1.8	2.9	4.2	3.2
20	15.3	53.5	5.6	2.1	2.6	5.8	4.5
21	18.0	87.3	5.2	1.8	3.1	8.6	2.6
22	29.1	49.6	4.7	1.5	2.7	8.3	2.8

Conclusion

The outcome of the current study paves the way for the better understanding of the incidence of RB in dairy cattle, where in which the reproductive failure was higher in HF crossbred cows than other animals like jersey cross bred cows and buffalo. Also the RB incidence is more in fourth to sixth lactation, the major causes for repeat breeding are delayed ovulation followed by anovulation, endometritis and cystic ovarian diseases. It is concluded from the current study that In order to overcome the RB in dairy cattle in India it is advisable to feed should be good quality fed to the animals as per recommendations of bureau of Indian standards. Mineral mixture supplements are essential at the rate of 2% of ration to full fill the daily maintenance and production requirement of animal. Do not inseminate the heifer which is under weight that is less than 300 kg In order to avoid the problem of RB.

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