

Research Article

INCIDENCE OF INFERTILITY AND BIOCHEMICAL PROFILE OF CROSSBRED COWS IN CUTTACK DISTRICT OF ODISHA, INDIA

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ABSTRACT: The incidence of infertility and biochemical profile of crossbred cows in Cuttack district of Odisha, India was studied. The survey on reproductive disorder distribution revealed, that the incidence of reproductive problems were 33.4% in cross bred cows and 51.2% in heifers. Out of the total reproductive disorder cases, 26.62%, 2.52% and 4.32% of cases were recorded as repeater, anoestrus and others, respectively in crossbred cows and the corresponding reproductive disorders were recorded as 12.24%, 37.41% and 1.36%, respectively among the crossbred heifers. Among anoestrus animals the percentage of non-functional ovary was found in 44.0% cows. The presences of sub active ovary percentages were 50.66 among anoestrus cows and 27.96 among repeat breeding cows. The average levels of serum glucose, ranged from 52.57 ±1.76 to 59.40±2.32 mg/dl, serum cholesterol ranged from 118.30±3.38 to 129.10±6.98 mg/dl, total protein ranged from 6.63±0.31 to 7.32±0.24 g/dl, serum albumin ranged from 2.64±0.27 to 3.23± 0.06 g/dl, serum globulin ranged from 3.40±0.30 to 4.37±0.32 g/dl, serum urea ranged from 24.80±2.14 to 29.70±2.22 mg/dl, triglyceride ranged from 77.58±2.45 to 83.36±2.02 mg/dl, SGPT ranged from 15.58±0.26 to 16.43±0.22 U/L, SGOT ranged from 76.38±3.41 to 77.69±2.17U/L, ALP ranged from 126.62±4.94 to 128.42±3.72 U/L. No significant (P<0.05) difference was observed in studied biochemical parameters, except serum glucose, globulin and phosphorus between cyclic and other reproductive disorder cows.

Key words: Reproductive disorder, Crossbred cows, Biochemical parameters.

INTRODUCTION

Optimal reproductive rhythm is a prerequisite for success in dairy husbandry. To breed regularly, the animal has to have

functional ovaries, normal oestrus behaviour, and ability to mate, conceive and sustain embryonic development. Any impairment in normal reproductive function of the cows may

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lead to infertility and sterility resulting in widening of dry period, reduced number of calving and lactations and a consequent economic loss.

Incidence of anoestrus has been reported higher in indigenous (25-67%) cattle than the exotic or crossbred (2-20%) cattle (Singh *et al.* 2003; Pandit 2004). Anoestrus has been reported as the single most frequently observed reproductive disorder problem in cattle of rural areas in India (Naidu and Rao 1982). The incidence of anoestrus in cows reported by different workers reveals that, it ranges from 5.01 (Selvaraju *et al.* 2005) to 65.00 percent (Kutty and Ramachandran 2003) in different states of India. In the state Orissa, as per the different studies undertaken, the incidence of anoestrus in cows ranges from 15.97% (Das *et al.* 2004) to 60.82% (Mohanty *et al.* 1997). Since these studies were decade old and strategic planning of dairy improvement on the basis of these studies may not serve the objectives of increasing the productivity of dairy animals. In view of these, the present study was undertaken in Cuttack district of Orissa for assessing the incidence of infertility in dairy cows.

MATERIALS AND METHODS

The survey was carried out in Niali block of Cuttack district. This block was selected because of the higher crossbred cow density in the district. Two villages from each Gram Panchayat totalling to ten villages of the block were randomly selected for the survey work. The reproductive statuses of the dairy cows were assessed by per-rectal examination of individual cows. For this study, a total of 425 cows and heifers (278 cows and 147 heifers) were per rectally examined. Internal

reproductive organs of the cows were examined by inserting lubricated gloved hand. After back racking, the cervix was palpated through the rectal wall on the ventromedial aspects of the pelvic brim. Body of the uterus and uterine horns were palpated by using cervix as a guideline on either side of the pelvic brim or pelvic cavity. The ovaries were palpated gently after retracting the cervix and uterus. Ovaries were palpated as distinct rounded masses on either side of the body of the uterus. When cradled between middle and index finger, the surface of the ovary explored. About 20 ml blood was collected from each of the identified and selected animal through jugular vein puncture and was transferred to a centrifuge tube without anticoagulant. The serum was harvested by standard procedure and stored in separate sterile vials at -20^o C for estimation of biochemical profile. Blood biochemical parameters such as blood glucose, cholesterol, total protein, albumin, globulin, triglycerides, serum urea, alkaline phosphatase (ALP), serum alanine amino transferase (ALT) and aspartate amino transferase (AST) were estimated by using kits (Span Diagnostics Ltd.). All the data generated in the above experiments were statistically analyzed using SPSS (1996) computer package.

RESULTS AND DISCUSSION

The incidence and distribution of reproductive disorder of CB cows in Niali block of Cuttack district is presented in Table 1 and Table 2, respectively. The survey on reproductive disorder distribution revealed that, of those 278 cows surveyed, 33.4% were found to have reproductive problems and of 147 heifers, 51.2% were found to have reproductive disorders. In comparison to the percentage of

Table 1. Incidence of reproductive disorder animals in Niali block of Cuttack.

SI No.	Species	No. of Animals
1	Number of CB cows surveyed	278
2	Number of CB cows with reproductive disorder	93
3	Percentage of CB cows with reproductive disorder	33.4
4	Number of CB heifers surveyed	147
5	No of CB heifers with reproductive disorder	75
6	Percentage of CB heifers with reproductive disorder	51.02
7	Total CB animal with reproductive disorder (%)	39.52

cows with reproductive disorders (CRD), higher proportion of CB heifers were found to have a reproductive problem. Out of the total reproductive disorder cases, 26.62%, 2.52% and 4.32% of cases were recorded as repeater, anoestrus and others, respectively in crossbred cows and the corresponding reproductive disorders were recorded as 12.24%, 37.41% and 1.36%, respectively among the crossbred heifers. On total basis, the incidence of repeater was 54.76% while the anoestrus was 36.90%. Anoestrus, repeat breeding, cystic ovarian degeneration, uterine and tubal disorders have been observed as the most common gynaecological problems in cattle and buffaloes in India as per reports from different states

(Agarwal *et al.* 2005). Although causes of infertility are many and may be complex, anoestrus and repeat breeding have been identified as the main factors responsible for this malady. High incidence of anoestrus in cows were also reported by Singh *et al.* (2003) and Pandit (2004), which ranged from 49.70 to 67.11 percent in Andhra Pradesh, Punjab and Madhya Pradesh, Mohanty *et al.* (1997) also reported high incidence of anoestrus cases in Odisha. In contrast to this, Das *et al.* (2004) reported occurrence of 15.97% anoestrus cases in Cuttack and Bhubaneswar. The incidence of repeat breeding in cows corroborated with the findings of many workers (Kulkarni *et al.* 2002; Das *et al.* 2004). The variation in incidence might be due to nutrition, environmental factors, population size and method of survey adopted.

Table 2. Distribution of Reproductive Disorder Cases in Niali block of Cuttack*.

Disorders	Crossbred cow (%)	Crossbred heifer (%)	Total (%)
Repeater	26.62	12.24	54.76
Anoestrus	2.52	37.41	36.90
Others [#]	4.32	1.36	8.33
Percentage	33.45	51.02	100.00

* Total number of cases = 425, # Silent heat, endometritis.

Table 3. Percentage wise observations of ovarian condition of the reproductive animal animals.

Attributes	Crossbred heifer	Crossbred cow
Non-functional	44.0	0
Sub-active	50.66	27.96
Functional	5.33	72.04
Total	100	100

Table 4. Serum biochemical profile of Reproductive disorder cows and cyclic cows.

	Repeater	Anoestrus	Cyclic	P Value
Serum Glucose (mg/dl)	52.57 ±1.76 ^a	54.17±1.01 ^a	59.40±2.32 ^b	0.04
Serum Cholesterol (mg/dl)	123.04±4.10	118.30±3.38	129.10±6.98	0.30
Serum triglyceride (mg/dl)	77.58±2.45	83.36±2.02	82.91±1.09	0.10
Serum protein (g/dl)	6.63±0.31	7.26±0.25	7.32±0.24	0.18
Serum albumin (g/dl)	3.23± 0.06	2.64±0.27	2.94±0.24	0.17
Serum globulin (g/dl)	3.40±0.30 ^a	3.62±0.23 ^a	4.37±0.32 ^b	0.02
Serum urea (mg/dl)	24.80±2.14	29.70±2.22	27.59±1.57	0.19
Serum calcium (mg/dl)	8.17±0.53	7.68±0.19	8.38±0.31	0.33
Serum phosphorus (mg/dl)	5.21±0.46 ^a	5.13±0.24 ^a	6.48±0.20 ^b	0.04
SGPT	15.58±0.26	16.43±0.22	16.33±0.31	0.05
SGOT	77.51±3.65	76.38±3.41	77.69±2.17	0.67
ALP	126.62±4.94	128.42±3.72	127.50±5.24	0.46

Means with same superscript did not differ significantly (P<0.05).

Agarwal *et al.* (2005) also reported that the incidence of true anoestrus in cattle and buffalo varied widely depending upon the level of feeding and management.

Percentage wise observations of ovarian condition of the reproductive animal animals in Niali block of Cuttack district is presented in Table 3. Ovarian condition depicts the reproductive status of the animals and also presents the cause of reproductive problems as imbalanced feeding or suboptimal nutrition and management. Among anoestrus animals the percentage of non-functional ovary (hard, small, flat and smooth) was 44.0%. This is the indication for delayed maturity, improper hormone secretion and improper nutritional status of the animal. Sub active ovaries are classified as ovaries with soft, rough and round structure. This is an indication of gradual follicular activity. There was presence of

50.66% among anoestrus cows and 27.96% among repeat breeding cows. The functional ovary speaks about the presence of either CL or RCL or a regressed CL indicating regular cyclic activity of ovary resulting in formation of CL. This type is found mostly in the repeat breeding animals *i.e.* 72.04%.

In the present study, significantly (P<0.05) higher serum glucose level was observed in cyclic cows than that of the anoestrus heifers and reproductive disorder cows. The blood glucose level has been acclaimed to be a reasonably accurate test to measure the energy status of the animal (Madan 1979). Presence of higher level of serum glucose in cyclic cows has been observed by many research workers (Arosh *et al.* 1998; Singh and Singh 2005), while some workers did not find any significant difference in serum glucose level between cyclic and anoestrus animals (Kumar and

Sharma 1991). The low level of blood glucose in anoestrus cows and heifers than cyclic cows observed in the present investigation indicates the poor energy status and a consequent infertile condition of the anoestrus cows. Similar to the present findings, higher level of serum cholesterol in cyclic cows has been reported by many research workers (Devanathan *et al.* 1984; Singh *et al.* 2004). Cholesterol is one of the precursors for synthesis of steroid hormones such as and rostenidione, progesterone and oestrogen (Arosh *et al.* 1998). Perek and Deen (1985) have suggested that subnormal energy status induces hypocholestermia which in turn leads to improper output of steroids. Though statistically non-significant, but higher levels of serum cholesterol was observed in cyclic cows. The high level of cholesterol in cyclic animals was indicative of more secretion of steroids during oestrus due to increased ovarian activity (Dutta *et al.* 1988). The declined level of cholesterol in the anoestrus cows suggested the reduced steroidogenesis in the ovaries. Non-significant difference in serum albumin and serum protein content between cyclic cows and anoestrus cows was also observed by Dhama *et al.* (2004). There was no significant difference in blood urea nitrogen level in cyclic and anoestrus cows as per the findings of Arosh *et al.* (1998), which corroborates well with the findings of the present study. The higher level of serum globulin levels in cyclic cows than that of the anoestrus cows and heifers have been reported by many workers (Arosh *et al.* 1998; Singh *et al.* 2004; Muthukumar *et al.* 2004; Kumar *et al.* 2005; Singh and Singh 2005). Rowlands *et al.* (1980) reported that there was a direct relationship between concentration of globulin and number of services required for conception. The decreased globulin concentration is suggested to be influencing the

biosynthesis of gonadotropins and gonadal hormones in anoestrus cows (Singh *et al.* 2004). As regard to serum SGOT, SGPT and ALP levels, no significant difference ($P>0.05$) was observed among the treatment groups.

Kumar and Sharma (1991) could not find significant difference between serum Ca level of cyclic cows and anoestrus cows and heifers which corroborated to this findings. In contrast to this, higher serum Ca concentration in cyclic cows than that of the anoestrus cows and heifers has been observed by many research workers (Das *et al.* 2002c; Singh and Singh 2005). The present observation of higher serum P concentration in cyclic cows than that of anoestrus cows corroborated the findings of number of research workers (Arosh *et al.* 1998; Das *et al.* 2002c and Singh and Singh 2005). Hypophosphatemia adversely affects the cell functions, as P is an integral component of nucleic acid, nucleotides, phospholipids and some protein. Phosphorus is essential for transfer and utilization of energy, phospholipid metabolism and large number co-enzyme activation (Hurley and Doane 1989). Inorganic P plays a vital role in hastening the process of ovulation and fertilization in cows (Stephan 1971). Hence, phosphorus is often associated with reproduction in cattle and its deficiency induces anoestrus and reduced ovarian activity (Pugh *et al.* 1985). Anoestrus, suboestrus, irregular and delayed sexual maturity have been reported to be the consequence of P deficiency (Blood *et al.* 1994). Even a marginal deficiency of P was found to be sufficient enough to cause disturbances in pituitary-ovarian axis without manifestation of deficiency symptoms and might be a cause for inducing infertility (Das *et al.* 2002 c).

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