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CONTENTS

Editorial

The Editorial board is pleased to announce the bi-annual publication of the Indian Journal of Animal Reproduction. The premier souvenir issue was released at the inaugural function at the Third All India Symposium on Animal Reproduction held at Bombay in December, 1981. As per decision of the general body of the ISSAR from now onwards the journal will be published hi-annually. The next issue is due in August, 82 and the subsequent souvenir issue will be released at the 4th All India Symposium on Animal Reproduction proposed to be held at Haryana Agricultural University, Hissar in February, 1983.

We are sure that the members will appreciate that Conferences can only be held once in two or three years which give an excellent opportunity to the scientists to meet at a common platform and present their research/clinical papers in the field of animal reproduction. But the greatest service to the Veterinary profession specially in the field of reproduction in farm animals is the dissemination of the scientific knowledge of the subject to the scientist veterinarians and animal breeders periodically to enable them to keep pace with the time. It is needless to say therefore that the transmission of information can only be done through a journal devoted to the discipline. A modest attempt is therefore being made by the ISSAR, to publish this journal regularly.

It is a tremendous task to manage the publication of a scientific journal and the editorial board therefore expects all possible co-operation from members of the ISSAR and scientists in all allied disciplines. Financial aid predominently comes in the picture and in that respect we look forward with hopes to the Indian Council of Agricultural Research, New Delhi, Pharmaceuticals, concernes dealing with instruments, glasswares, laboratory furnishers, feed factories, milk federations, Goshalas and Panjrapoles for financial assistance.

The journal is solely devoted to dissemination of scientific information on Reproduction in Farm Animals.

Research/clinical papers on impact of genetic, environmental, nutritional, hormonal, infectious and stress factors on efficiency of reproduction, semen studies, breeding by artificial insemination, problems of andrological and gynaecological importance, abstracts of important research papers and thesis would be accepted for publication.

This journal is the first of its type in India solely devoted to dissemination of the latest news on reproduction in farm animals. The chief objectives of the journal is to give scope to research and clinical articles on physiology and pathology of reproduction. A wide coverage will be given to articles on problems of fertility and infertility due to genetic, environmental, managemental and nutritional factors. Studies on seminology, artificial insemination and andrology, histo-pathology of the reproductive tract in the male and female would be welcome.

A special section is devoted to farm news in respect of progress achieved in production and reproduction with special concentration on the notification of valuable strains with high fertility and production. This will certainly help us to find whether valuable researches are being properly utilised to enhance production. This will also serve as a source of information as to the potential of various livestock farms existing in India, which would in turn help us in spotting out a high grade stock. Recommendation to this effect was made to the Central Govt. at the All India Symposium on Animal Reproduction held at Bengalore in August, 1980.

Editorial board would request the members of the ISSAR to appreciate that the very existence of the ISSAR is dependent on how efficiently we conduct the business of the journal. With all the hurdles a good beginning has been made and we would request one and all for active co-operation.

Editorial Board

Progesterone Assays and Rectal Palpation in Cycling and Non-cycling Buffalo-heifers

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ABSTRACT

In the present investigation serum progesterone concentration alongwith the palpable changes in the ovaries of cycling (n=10) as well as non-cycling (n=27) Murrah buffalo heifers were recorded. The mean concentration of progesterone in cycling buffalo heifers was found to be low (0.22±0.09 ng/ml) on the day of estrus. However, in the three animals progesterone levels were higher on the day of estrus and on rectal palpation regressing corpora lutea of preceding cycles were detected. 80% of the heifers on day 4 of the estrous cycle had a soft palpable growth of corpus luteum with a concomitant sharp increase in average concentration of progesterone to 1.22 ng/ml. During the mid luteal phase a high correlation ($r=0.98$, $P<0.005$) between the palpable size of the corpus luteum and corresponding progesterone level was observed. The mean peak progesterone concentration (4.97±1.97 ng/ml) was observed on day 15 of the cycle. In non-cycling buffalo heifers the mean level of progesterone (estimated at weekly intervals) was 0.493 ± 0.218 ng/ml. Possibility of occasional ovulation in prepuberal heifers was determined on the basis of rectal palpation and progesterone concentration.

The relationship between palpable changes in the corpus luteum and the concentration of progesterone in serum in cycling Murrah buffalo heifers remains elusive although their progesterone levels during different phases of the estrous cycle have been reported by Bachlaus *et al.*, 1979 and Takkar, 1979. Furthermore, in prepuberal dairy calves presence of graffian follicles of various sizes and upto a diameter of 20 mm have been observed without subsequent ovulation (Howe *et al.*, 1964 and Morrow, 1969), the progesterone concentrations of which were apparently not available. An attempt has, therefore, been made in the present study to correlate the palpable changes in the corpus luteum with the levels of progesterone in Murrah buffalo heifers during estrous cycle and also to explore the occurrence of ovulation with concomitant changes in progesterone concentration in buffalo heifers, before attainment of puberty.

MATERIALS AND METHODS

Data for this study were collected from 10 cycling and 27 non-cycling (prepuberal) Murrah buffalo heifers maintained at Dairy Farm, P.A.U., Ludhiana. All heifers were in good physical and reproductive health. Blood samples from the animals were collected in the month of October between 10.00 a.m. and 12.00 noon. Blood samples from cycling animals were obtained on days 0, 1, 2, 4, 7,

TABLE 1: PROGESTERONE CONCENTRATION (ng/ml) IN BLOOD SERUM DURING ESTROUS CYCLE IN BUFFALO HEIFERS.

Day of Cycle	Heifer Numbers										Mean±S.D.	Coefficient of variation (%)
	P-295	P-272	P-227	P-314	P-255	P-281	P-291	P-191	P-297	P-321		
0	0.16	0.28	1.20*	0.06	0.82*	0.14	1.16*	0.31	0.34	0.28	0.22±0.09	40.90
1	0.26	0.50	1.06	0·32	0.64	0.64	0.44	0.38	0.40	0.33	0.49±0.22	44.89
2	—	0.80	0.58	0.32	0.62	—	0.56	0.62	0.72	0.58	0.60±0.13	21.66
4	1.20	1.24	1.30	0.60	1·60	1.22	1·44	1.42	0.82	1.34	1.22±0.28	22.95
7	—	2.32	2.40	1.81	2.15	2·35	2.28	2.32	2.55	2.40	2.28±0.20	8.77
8	2.10	4.32	2.50	1.85	2.25	2.45	2.70	3.10	2.95	3.30	2.75±0.67	24·36
11	4·60	5.60	2.40	2.05	2.54	7.50	3.65	4.60	3.70	5.95	4.26±1.65	38.73
13	4.65	—	2.45	2.79	2·55	7·48	—	4.80	—	5.94	4.38±1.77	40.41
15	4·65	8.50	3.82	4.60	2.52	8.52	3.95	3.30	3.80	6.05	4.97±1.97	39.63
16	3.28	—	3.30	4.55	2.60	9.20	—	3·30	—	5.55	4.54±2.11	46.47
18	3.00	3.40	3.00	3.20	4.75	—	2.20	2.00	3.00	5.45	3.20±1.13	35.31
19	2.45	2.10	2.32	3.00	3.40	3.40	0.38	1.80	2.40	4.75	2.59±1.09	42.08
—3	0.42	2.10	2.02	3.00	2.15	0·90	0.38	1.80	1.80	4.06	1.86±1.07	57.52
—2	018	1.44	0.34	0.80	0.36	0.40	0.31	0.52	0.62	2.52	0.75±0.68	90.66
—1	0.14	0.32	0.18	0.32	0.34	0.37	0.29	0.31	0.42	0.43	0.31±0.09	29.03
0	0.10	0·16	0.08	0.16	0.18	0.28	0.28	0.28	0.30	0.22	0.20±0.87	3·500

*Regressing corpus luteum of previous cycle palpated and the values were excluded for the mean value on the day of estrus.

8, 11, 13, 15, 16 of the estrous cycle and daily till the animal returned to the next estrus while in the non-cycling prepuberal buffalo heifers blood samples were collected at 3-4 consecutive weekly intervals. The animals were examined rectally before obtaining blood samples and palpable changes of ovaries and uterus were recorded on the gynaecological cards.

Serum progesterone levels were estimated by radio immuno assay (Nanda, 1979 and Chauhan, 1980). Ovulation in a buffalo heifer was assumed if progesterone was at the base line and subsequently showed a sustained increase persisting for about two weeks alongwith a palpable corpus luteum on one of the ovaries.

Corpus luteum was characterized by liver like consistency and by a definite line of demarcation that existed between itself and substance of the ovary (Zemjanis, 1970). For measuring the size of the corpus luteum the required ovary was secured per rectum and the corpus luteum was palpated between thumb and fingers. A vernier caliper was taken in the other hand. The sliding jaw of vernier caliper was moved backward and forward till the distance between the two jaws coincided with the maximum size (length) of corpus luteum as felt by the inserted hand. The reading of the caliper was noted and the above procedure was repeated three times to obtain the size of the CL with accuracy.

RESULTS AND DISCUSSION

Serum Progesterone concentration in cycling heifers

Serum progesterone pattern in the peripheral blood of normal cycling buffalo heifers is furnished in Table 1. The concentration of progesterone was found to be low (0.22±0.09 ng/ml) on the day of estrus and this is in agreement with earlier reports on buffaloes (Kaur and Arora, 1978; Bachlaus *et al.*, 1979 and

TABLE 2: PALPABLE CORPUS LUTEUM SIZE AND THE PROGESTERONE CONCENTRATION DURING MID LUTEAL PHASE.

Animal No.	P-295	P-272	P-227	P-314	P-255	P-281	P-291	P-191	P-297	P-321
Maximum size of the corpus luteum (cm)	1.70	2.00	1.60	1.70	1.70	2.20	1.60	1.70	1.60	1.90
Peak progesterone level (ng/ml)	4.65	8.50	3.82	4.60	4.75	9·20	3.95	4.80	3.80	6.05

($r = 0.98$, $P < 0.005$)

Takkar, 1979). However, in three animals progesterone levels were higher on the day of estrus and on rectal palpation regressing corpora lutea of preceding cycle with slight soft consistency were found. Progesterone levels in these heifers declined during days 1 and 2 of the estrous cycle and rose subsequently with the formation of corpus luteum. Gomes *et al.*, 1963 also reported regressing corpus luteum and corresponding higher level of progesterone in cows on the day of estrus.

In 80 percent of the heifers on day 4 of the estrous cycle a very soft palpable growth of the corpus luteum was observed with concomitant levels of progesterone exceeding 1 ng/ml (average 1.22 ng/ml). The peak mean progesterone concentration (4.97 ± 1.97 ng/ml) was observed on day 15 which finds support from the results obtained by Bachlaus *et al.*, 1979 and Takkar, 1979 in buffalo heifers. Bowerman and Melamply, 1962 also observed the maximum corpus luteum weight and progesterone concentration on days 14 to 16 of the estrous cycle in beef and dairy cow. Moreover, during mid luteal phase peak progesterone concentration in the peripheral blood of the heifers could be highly correlated ($r=0.98$, $P<0.005$) with the increased size of the palpable corpus luteum tissue (Table 2). It was therefore, inferred that the level of progesterone in the serum depended upon the size of the palpable luteal tissue. Gomes and Erb, 1965 also reported that increase in the weight of corpus luteum, progesterone content, synthesis and secretions were closely related to the degree of luteinisation.

After attaining the peak, the serum progesterone concentration declined to its basal levels of 0.20 ± 0.07 ng/ml on the day of subsequent estrus. The findings are in agreement with those of Kaur and Arora, 1978; Bachlaus *et al.*, 1979 and Takkar, 1979.

Wide variations in the progesterone level were observed during all the phases of the estrous cycle (Table 1). However, most variations were observed during regression of the corpus luteum. This was reflected in rectal palpation that the regression of CL started earlier in certain heifers while in a few others the regression was quicker. The variations in the regression of the CL are said to be due to both genetic and environmental factors (Henricks *et al.*, 1971; Echternkamp and Hansel, 1973).

Serum Progesterone Concentration in Non-cycling (Prepuberal) Heifers:

In 27 non-cycling buffalo heifers, the mean level of progesterone (estimated at weekly intervals) was 0.493 ± 0.218 ng/ml (Table 3). Similar level of progesterone in non-cycling Murrah buffalo heifers was recorded by Takkar, 1979.

TABLE 3: PROGESTERONE CONCENTRATION (ng/ml) IN BLOOD SERUM OF NON-CYCLING BUFFALO-HEIFERS.

Heifer No.	Age in months	Samples				Mean±S.D.
		I	II	III	IV	
1	2	3	4	5	6	7
P-306	31.0	0.340	0.300	0.132	0.186	0.239±0.084
P-325	29.0	0.526	0.500	0.474	—	0.500±0.021
P-335	28.3	0.454	0.460	0.450	—	0.454±0.004
P-348	27.0	0.188	0.288	0.188	0.208	0.218±0.041
P-349	26.7	0.198	0.264	0.242	0.460	0.291±0.100
P-350	26.7	0.600	0.460	0.388	0.320	0.442±0.103
P-353	26.7	—	0.320	0.356	0.562	0.412±0.106
P-354	26.0	0.540	0.562	0.590	0.580	0.568±0.019
P-359	25.2	0.800	0.900	0.900	—	0.866±0.047
P-361	25.0	0.256	0.286	0.286	0.276	0.276±0.012
P-365	24.5	—	0.260	0.260	0.360	0.293±0.047
P-366	24.0	0.640	0.550	0.520	0.500	0.552±0.053
P-367	24.0	—	0.402	0.434	0.360	0.398±0.030
P-374	24.0	—	0.396	0.680	0.116	0.397±0.230
P-376	22.5	—	0.314	0.322	0.304	0.313±0.007
P-377	21.0	—	0.380	0.280	0.480	0.380±0.081
P-378*	21.0	0.570	0.480	1.640	2.000	1.172±0.660
P-379	21.0	0.480	0.490	0.470	—	0.480±0.008
P-381	20.0	—	0.450	0.444	0.500	0.464±0.025
P-383	19.7	—	0.376	0.352	0.720	0.483±0.167
P-387	19.3	—	0.510	0.400	0.480	0.463±0.046
P-392	19.0	—	0.730	0.850	0.610	0.730±0.093
P-394	18.3	0.390	0.380	0.342	—	0.372±0.020
P-396	18.3	0.430	0.440	0.560	—	0.476±0.059
P-400	18.0	0.824	0.850	0.880	—	0.851±0.022
P-401	18.0	1.230	1.240	1.080	—	1.183±0.073
P-406	18.0	0.570	0.600	0.760	—	0.643±0.083
P-414*	17.0	0.928	2.520	1.260	—	1.570±0.685
P-416	17.0	0.524	0.660	0.376	—	0.520±0.115
		Overall Mean				0.493±0.218

*Two heifers showed a cyclic variation in the progesterone level and their values were excluded from the overall mean.

In the present study a high variation (44.21%) was recorded in the mean level of progesterone among the heifers. Moreover, the mean progesterone level in non-cycling heifers was higher than the mean basal level of progesterone in cycling heifers on the day of estrus. The adrenal cortex was reported to be an extraovarian source of progesterone (Pope *et al.*, 1969; Randel *et al.*, 1971; Robinson, 1977). Hence the higher level of progesterone observed in the non-cycling heifers might be due to the hyperactivity of adrenal cortex.

The level of progesterone in two prepuberal heifers showed a cyclic tendency and on rectal examintaion small corpora lutea (1.4 — 1.5 cm) were also palpated. However, subsequent repeated examinations did not reveal any corpus luteum in the ovaries of these heifers. Therefore, it is suggested that occasionally a large

follicle can ovulate resulting in the formation of corpus luteum in prepuberal heifers but the normal cyclicity will occur only after the attainment of puberty i.e. the optimum size of the uterine cornua.

In view of the present study it may be concluded that palpation of the corpus luteum at regular intervals supported with the estimation of progesterone could be guideline in establishing the stages of the estrous cycle in cycling buffalo heifers. It also emerges that frequent rectal palpation could reveal occurrence of occasional ovulation in prepuberal buffalo heifers which was also established by the level of progesterone.

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Correlation Studies Between Different Microscopical and Biochemical Characteristics of Semen in Cross Bred Bulls*

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ABSTRACT

Sperm concentration was found to be significantly positively correlated with initial fructose, inorganic phosphorus, total protein and negatively significantly correlated with GOT. Motility was positively significantly correlated with GOT. In general the sperm abnormalities did not show any significant correlation with different biochemical parameters.

*

Correlation between different microscopical and biochemical characteristics of semen may be useful in evaluation of a bull. Very few reports are available indicating the correlation of these traits in crossbred bulls (Kaker and Arora, 1973 and Roy Choudhary, 1977). In the present study an attempt has been made to find out the magnitude of correlation between microscopical and biochemical parameters of semen in crossbred bulls.

Materials and Methods

Six young crossbred (75% *Bos Tauras* ×25 per cent *Bos indicus*) bulls belonging to All India Co-ordinated Research Project on cattle, College of Veterinary Science & A.H., Jabalpur, were included in the present study. Semen was collected in artificial vagina from each bull twice a week. Sixty nine samples were studied with atleast 10 samples from each bull. Microscopical attributes i.e. Mass activity, motility, sperm concentration, sperm abnormalities and biochemical characteristics i.e. initial fructose, inorganic phosphorus, total protein and GOT/10^9 spermatozoa were recorded as per standard procednres. Glutamic Oxaloacetic Transaminase was estimated by the procedure as described by Yatzidis (1960).

Results and Discussion

The correlation coefficient between different microscopical and biochemical characteristics were calculated and presented in Table 1.

Mass activity was non-significantly correlated with different biochemical characteristics studied. Motility was significantly ($P<0.01$) negatively correlated with initial fructose. Kaker and Arora (1976) also obtained similar findings in crossbred bulls. This could be possible since more motile spermatozoa shall utilize higher amounts of fructose for their metabolic activity, there by, reducing the initial concentration. Motility is positively significantly ($P<0.01$) correlated with GOT activity in present study which is in agreement with the findings of Kaker and Arora (1973). Roy Choudhary (1977) reported that sperm motility has got a direct correlation with GOT content in the sperm cell. Thus GOT in semen can be used as one of the method for bull evaluation.

Sperm concentration is positively significantly correlated with initial fructose ($P<0.05$), with inorganic phosphate

* Part of M.V.Sc. & A.H. Thesis submitted to J.N. Krishi Vishwa Vidyalaya, Jabalpur (M.P.) by senior author.

TABLE 1: COEFFICIENT OF CORRELATION BETWEEN DIFFERENT SEMINAL ATTRIBUTES

Seminal attributes	Initial fructose	Inorganic phosphorus	Total protein	GOT/10^8 spermatozoa
Mass activity	0.0182	0.0073	0.2250	0.2717
Motility	—0.2818*	—0.1497	—0.1156	0.5171
Sperm concentration	0.2727*	0.4399**	0.3718**	—0.7806**
Abnormal heads	—0.0014	0.0772	—0.0174	0.2474
Free loose heads	0.1248	0.3523**	0.1360	—0.2493
Acrosome defects	—0.0339	0.1234	0.1429	0.0102
Proximal protoplasmic droplets	—0.0412	—0·0495	—0.0557	—0.0947
Middle piece defects	0.1975	—0.2704*	0.0873	—0.0409
Tail abnormalities	0.0750	0.963	0.0046	—0.2050

* Significant at $P < 0.05$, ** Significant at $P < 0.01$.

($P<0.01$) and with total protein ($P<0.01$) GOT is highly significantly negatively ($P<0.01$) correlated with sperm concentration. Singhal *et al.* (1976) obtained the correlation of similar magnitude in cross bred bulls.

Head abnormalities did not show any significant correlation with any biochemical attributes studied. Free loose heads had a highly significantly ($P<0.01$) positive correlation with inorganic phosphorus while with other biochemical attributes it had a non-significant correlation. Acrosome defects had a non significant correlation with all biochemical characteristics studied. Proximal protoplasmic droplets was negatively correlated with all the biochemical parameters. The correlation coefficient obtained was non-significant to zero. Middle piece defect was significantly negatively correlated with inorganic phosphorus but had no important correlation with other biochemical parameters. Tail abnormalities had nonsignificant correlation with all biochemical characteristics of semen.

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Relationship between Temporary Engorgement of Teats (Tet) and Estrus in Buffaloes*

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ABSTRACT

A study was conducted on 20 Murrah buffaloes in order to find out whether any relationship exists between the temporary Engorgements of teats (a phenomenon) and the estrus behaviour in this species. The animals were divided in two groups of old and young buffaloes. Each buffalo was followed for TET and subsequent estrus after 45 days of calving. The ascorbic acid, pH and fern pattern were studied from the mucus discharge. The results showed that TET phenomenon is more pronounced in multiparous animals as compared to the younger ones and about 80% of the buffaloes experience TET before coming into to estrus. The parameters studied indicated that post TET estrus was a true normal estrus. This sign can help the buffalo breeders to anticipate estrus in buffaloes and reduce the calving interval.

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One of the biggest handicap for long calving interval among buffaloes has been non-availability of any reliable tool to detect estrus. Some attempts in this country (Goswami and Nair, 1965; Basu, 1962; Tomar, 1965 and Singh, 1966) have been made to come out with one or a combination of various aids for estrus behaviour in water buffalo. But, unfortunately, no trustworthy test has emerged from these and other attempts.

The main reason for such a state of affairs, probably, has been the lack of understanding the normal reproductive pattern of this species and in this, the most neglected portion has been the symptoms this animal shows before coming to estrus. The animals exhibit a peculiar type of phenomenon. This phenomenon has not been studied so far, in this species and is being termed as "Temporary Engorgement of Teats" (TET). During this stage, the teats engorge with milk for a temporary period and it appears as if the animal has filled all the four teats with milk and it can be milked any time This situation remains for 2-3 days depending upon the individual animal.

Hence a study was planned to investigate this phenomenon and establish the relationship of TET, if any, with oestrus behaviour among buffaloes.

MATERIALS AND METHODS

Twenty Murrah buffaloes selected for the study were divided into 2 groups of young and old buffaloes depending upon the lactation numbers. The animals were maintained under standard identical management practices. Each animal was followed for TET symptoms after 45 days of calving. The buffaloes which showed signs of TET were also observed for subsequent estrus. The heat detection was carried with a teaser bull twice a

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TABLE 1. RELATIONSHIP BETWEEN TET AND ESTRUS

Age group	Animal No.	Interval in days for TET after parturition	Interval in days for estrus after TET	Interval in days for estrus without TET	Duration of TET
Young animals	108	—	—	133	—
	190	126	8	—	3
	192	148	7	—	4
	196	72	6	—	3
	217	140	10	—	2
	218	—	—	140	—
	222	111	8	—	3
	225	116	7	—	3
	262	—	—	49	—
	281	—	—	137	—
Mean±S.E.		118.8±10.9	7.67±0.56	114.75±21.96	3.0±0.26
Old animals	S-9	105	7	—	4
	13-A	72	10	—	3
	S-23	83	10	—	4
	32-A	79	7	—	3
	37	98	8	—	2
	65	101	8	—	3
	67	60	7	—	3
	123	69	6	—	3
	124	87	10	—	2
	894	91	8	—	4
Mean ± S.E.		86.36±4.83	8.1±0.46	—	3.1±0.22

day. In case of shy breeders, the heat was confirmed by rectal examination. The cervical mucus was collected as suggested by Noble *et al.* (1977). A part of mucus was utilized for preparing crystallization slide for fern patterns studies while the second part was used for pH and ascorbic acid determination. The ascorbic acid was estimated as per method of Harris and Ray (1935) while the pH was obtained with pH meter.

RESULTS AND DISCUSSION

The data regarding TET and estrus occurrence in young and old buffaloes appears in Table 1. It would appear from the table that six young animals out of 10 showed TET and subsequent estrus. The remaining four animals escaped TET. Hence 80 % of the buffaloes had experienced TET symptoms. This phenomenon was more prominent in old animals where all 10 animals evinced TET first and then came in heat. The postpartum estrus period was higher in young animals as compared to old ones. The young buffaloes showed TET behaviour after 118.8 days after calving while the same was much shorter in multiparous animals (86.3 days). All the animals in both of the groups exhibited estrus on an average of 7 to 8 days after disappearance of TET. It remained on an average for 3 days in both the groups.

In order to establish whether the estrus evinced after TET is a true one, the cervical mucus was subjected to ascorbic acid, pH and fern pattern tests.

Ascorbic acid concentration

The ascorbic acid content estimated

TABLE 2. ASCORBIC ACID CONTENT IN CERVICAL MUCUS (/ug/100 ml)

Young buffaloes		Old buffaloes	
Animal number	Ascorbic acid	Animal number	Ascorbic acid
108	2241.17	S-9	2151.11
190	2143.86	13-A	2219.51
192	2120.77	S-23	2225.79
196	2133.86	32-A	2369.58
217	2105.61	37	2235.86
218	2169.72	65	2112.66
222	2232.24	67	2317.58
225	2205.81	123	2307.59
262	—	124	2261.53
281	2197.93	894	2143.66
Average	2172.33±156.89		2234.44±196.29

from the cervical mucus of female buffaloes is given in Table 2. An apparent look at the data indicated that ascorbic acid concentration was less in young animals as compared to older ones. The average values of ascorbic acid level in young and old animals were 2172.33± 156.89/ug/100 ml and 2234.44±196.29 /ug/100 ml, respectively. These values can be compared well with the reports of Noble *et al.* (1977) who reported a mean value of 2157.89±138.89 /ug/100 ml for ascorbic acid in highly fertile buffaloes. Paul *et al.* (1970); Noonan *et al.* (1975) and Lalita Thakral *et al.* (1981), though in cattle, have confirmed that the values for ascorbic acid within range of 1900 to 2000 /ug/100 ml are highly correlated with ovulatory heat. This may be due to the fact that ascorbic acid plays an important role in the composition of cervical mucus by way of providing reducing substances in the mucus. And cervical mucus, in turn, provide the optimum environment for the sperm survival.

TABLE 3. pH OF CERVICAL MUCUS

Young buffaloes		Old buffaloes	
Animal number	pH	Animal number	pH
108	7.5	S-9	9.0
190	8.0	13-A	9.0
192	8.5	S-23	8.5
196	8.0	32-A	9.0
217	8.0	37	9·0
218	8.5	65	8.5
222	8.5	67	9.0
225	8.0	123	8.5
262	—	124	8·5
281	8.5	894	8.5
Average	8.16±1.016		8.75±1.021

pH

The mean pH values of cervical mucus are presented in Table 3. By comparing the pH values in young and old buffaloes, it was found that, like ascorbic acid, pH was also higher in old group. The respective values for pH in young and old animals were 8.16±1.016 and 8.75± 1.021, respectively. When the variance between the young and old buffaloes was subjected to C.D. test, a significant ($P<0.05$) difference was found out between the two. This difference might be due to increase in size of the reproductive organs along with the age in old animals and subsequently the secretions released at the time of oestrus might be in large amount containing a higher concentration of salt particularly the sodium.

The results in the present study tally with the observations made by More *et al.* (1970) and Narasimahan *et al.* (1980). However, the values reported herein are more than those reported by Hamana *et al.* (1976), who worked out pH values in cows. The values reported by Akhtar and Singh (1979) in Tharparkar cows are close to the figures in the present study. The cervical mucus pH is highly alkaline as compared to the vaginal pH. As is known, the acidic pH

is injurious to the sperm survival, the alkaline pH may serve as a better pool for sperm transport and metabolism. Hence, on the basis of results obtained in the present investigation, it may be concluded that the heat exhibited by both groups of females in the post-doka period was a fertile and real one.

Fern pattern

In order to confirm further the type of oestrus exhibited by each animal in post-TET phase, the cervical mucus was subjected to crystallization pattern commonly known as Fern Pattern test. It was observed that the post-TET heat had a typical fern like pattern. Such views have been accepted as optimum signs of fertile heat both in buffaloes as well as cattle. The present study is supported by the work of Galhotra *et al.* (1971), Deo and Roy (1971) and Lalita Thakral *et al.* (1981). On the basis of fern pattern studies conducted in this investigation it may again be pointed out that the heat symptoms showed by the different groups of buffaloes were the real one.

In the absence of any scientific evidence, it is very difficult to pin-point the physiological basis for TET, but the results in the present study confirm the general belief of the farmers as a whole and in Northern India particularly that this species exhibit a peculiar behaviour in the form of TET before showing the signs of oestrus. Therefore, this sign may be adopted as a tool for catching the buffalo in heat. The buffalo breeders have to be vigilant until about a week after the disappearance of TET phenomenon.

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Oestrous Signs and Significance for Fertility in Surti Buffaloes*

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ABSTRACT

The study outlines the various breeding practices followed by the farmers and observations made by them on oestrous signs and behavioural patterns. In all a total of 500 (151 heifers and 349 buffaloes) animals in heat brought for artificial insemination were studied for oestrous signs and significance for fertility in Surti breed of buffaloes. These observations were compared with the results of clinical examinations and the inter-relationships between various oestrual criteria and conception rates were studied.

Highly significant difference in conception rates were obtained in respect of certain criteria while in others the differences were significant at 5% level or non-significant. Intense heat, copious oestrual mucus discharge, good uterine tone and frequent micturition had highly significant beneficial effects on conception rates. Significant beneficial effects on conception rates were observed with regards to decrease in milk yield. Better conception rates were noted in cases of ease of passing pipette, opening of OS, bellowing, appearance of vaginal mucus membrane however the results when compared were statistically non-significant.

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Surti breed of buffaloes is well known in the Charotar tract of Kaira district in Gujarat state. Non-availability of certain basic information on oestrous signs and their significance for fertility in buffaloes has hampered the rate of progress in artificial insemination. The low breeding efficiency is considered to be a major factor in the improvement of buffalow production and reproduction. Artificial insemination in buffaloes has been reported to produce low conception rates (Cockrill, 1966).

Perusal of the literature did not reveal many studies on the oestrous signs and fertility conducted on buffaloes (Hafez, 1953; Rao, 1970; Gill and Gangwar, 1972; Gill *et al.*, 1973; Abhi *et al.*, 1973). Therefore, a study on oestrous signs and their significance on fertility in buffaloes was conducted and the findings have been reported.

MATERIALS AND METHODS

A total of 500 (151 heifers and 349 buffaloes) Surti breed buffaloes in oestrous under field conditions were studied. These buffaloes were brought for artificial insemination at the Artificial Insemination Clinic of the Gujarat Veterinary College, Anand. A total of 1005 inseminations were performed. Information about the oestrous signs was gathered by a questionaire. This was based on the signs of bellowing, frequent micturition, decreased milk yield and noting oestrual mucus. Also, the degree of os opening (partially/fully), ease with which the pipettee could pass (easilyl/not easily), uterine tonicity (good/weak) and presence of cervical mucus (scanty/copious)

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TABLE 1. OESTROUS SYMPTOMATOLOGY AND FERTILITY IN SURTI BUFFALOES.

Sr. No.	Character	Observations in Heifers (151) Observed	Pregnancy in Observed	Cal. X^2	Buffaloes (349) Observed	Pregnancy in Observed	Cal. X^2
		Unobserved	Unobserved		Unobserved	Unobserved	
1.	Oestrual mucus (presence/absence)	66 / 85	30 / 21	7.15**	178 / 171	129 / 96	5·172*
2.	Vaginal m.m (red/pale)	126 / 25	43 / 8	0.421NS	303 / 46	199 / 26	2.229NS
3.	Uterine tone (Good/weak)	Combined for heifers & buffaloes			445 / 55	256 / 19	10.446**
4.	Cervical passage of pipette (easily/not easily)	111 / 40	40 / 11	0.957NS	278 / 71	175 / 50	1.509NS
5.	Decreased milk yield (observed/not observed)	—	—	—	265 / 84	179 / 46	6.359*
6.	Bellowing (observed/not observed)	77 / 74	26 / 25	0.031NS	225 / 124	162 / 63	2.988NS
7.	Frequent micturition	13 / 138	7 / 44	2.189	156 / 193	114 / 111	9.123**

were recorded according to Hahn (1969).

Vaginal inspection and rectal palpation during artificial insemination yielded the information on changes in the genitalia. Mid-cervical inseminations were performed with liquid semen and inseminated animals were examined rectally for pregnancy diagnosis after 60-90 days period. The data was processed through IBM-1620 Computer for statistical analysis by standard statistical methods (Snedecor and Cochran, 1967).

RESULTS AND DISCUSSION

The results are based on a total of 1005 inseminations performed in 500 (151 heifers and 349 buffaloes) animals. Various breeding practices followed by the farmers and observations made by them on oestrous signs and behavioural patterns were compared with the results.

Highly significant difference in conception rates were obtained in respect of intense heat, copious mucus discharge, good uterine tone and frequent micturition. Significant beneficial effects on conception rates were observed with regards to decrease in milk yield. Better results were noted in cases of ease of passing pipette, oepning of os, bellowing, appearance of vaginal mucus membrane, the results were however, statistically non-significant when compared. The details are presented in Table 1.

Lagerlof (1951) described the wide variations in intensity of heat symptoms in domestic cattle ranging from mild to intense. The mating drive in the female showed bellowing, locomotor changes, investigative behaviour, tail reflex and the physiological changes in the genital organs. Hahn (1969) described the oestrous characters viz: good standing heat, presence of heat mucus, intense red colour of internal part of vagina, easy passage with pipette, good uterine contractions and normal ovary and Graffian follicle in cattle that were present at the

time of insemination. He also found that all these characters proved highly significant in relation to the conception rate in heifers and cows.

Farmers' observations as criteria for detecting oestrus in buffaloes included bellowing, mucus discharge and decreased milk yield. The intensity of observations for these signs has been presented in Table 2.

TABLE 2. INTENSITY PATTERN OF SYMPTOMS OF OESTRUS IN SURTI BUFFALOES.

Sr. No.	Character	In heifers (151)	In buffaloes (949)
1.	Bellowing	41.06%	56.70%
2.	Oestrual mucus	56.29%	52.28%
3.	Decreased milk yield	—	75.93%
4.	Micturition	51.72%	68.76%
5.	Hyperaemia of vaginal m.m.	83.44%	86.81%
6.	Uterine tonicity	52.98%	64.46%

The variation in observations may be due to the unpronounced signs of oestrus in heifers and buffaloes. Also, that the oestrual mucus which is scanty may pass un-noticed along with micturition. Incidence of silent heat is more common in buffaloes (Luktuke and Ahuja, 1961). Unless great care is exercised in detection of oestrus which is evasive in character and weak in manifestation might remain un-noticed (Roy, 1974). Hafez (1954) and Bhosrekar (1973) reported on the low intensity of symptoms of heat in buffaloes. These observations support the farmers observations to the extent the heats were detected. The details of the intensity pattern of symptoms in oestrus observed during the present study has been presented in Table 2.

The oestrous signs and the significance for fertility observed in the present study on Surti buffaloes differed considerably. This might be due to the conditions like breed, management and climatic factors.

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Anaerobic Genital Infections in Buffaloes with Remedial Measures—A Preliminary Report

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SUMMARY

The anaerobic bacteria peptococci, peptostreptococci, bacteroides and clostridia were isolated from buffaloes in cases of abortion, postpartum metritis and repeat breeders. Treatment with 0·5% metronidazole (intrauterine) was found to be encouraging as judged by clinical recovery and actual conception. No records are available on this aspect.

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Infectious infertility in the bovines is a major block in the economy of dairy breeding. A lot of work has been done on the isolation of aerobic microfiora of the genital tract in reproductive disorders and the remedial measures undertaken according to their sensitivity to various antibiotics (Panangala, et al. 1978; Namboodiripad, et al. 1978).

Infections due to the non-clostridial anaerobes are generally endogenous as most of these bacteria form a part of the normal bacterial flora. The non-sporing anaerobes particularly bacteroides are responsible for a wide variety of infections especially sepsis of the gastro-intestinal tract and of the female genital tract in humans (Nalini, et al. 1978; Bhargawa, et al. 1978; Singh, et al. 1978).

There is no published work in India, on the isolation of anaerobic bacteria from the buffalo uterus eventhough this is generally the most suitable place for their growth and thus a major source for causing reproductive disorders due to infection. In the present paper the authors have reported on the isolation of anaerobes causing reproductive disorders and the remedial measures undertaken probably for the first time in India.

MATERIALS & METHODS

Thirty-five buffaloes having reproductive disorders from the commercial Dairy Farms, Bombay were selected for the trial.

1) Collection of Samples:

Samples of discharge were collected directly from the uterus or the cervix by the Tampon Method' without contamination of the vaginal cavity. The soaked gauze was then inserted into Stuarts' transport medium and stored in ice and brought to the Laboratory within 6-24 hours.

2) Isolation of anaerobic bacteria:

The tampon was inoculated on Neomycin blood agar and vancomycin blood agar plates. Discs containing 5 mg. of FLAGYL were also implanted on the medium. The plates were kept in oxoid/ Gallenkemp anoerobic jar. After creating a vacuum, the jars were filled with a CO_2 10%+90% H_2 mixture or gas pack (oxoid) and indicator and were then incubated at 37°C. The plates were examined 48-72 hours later depending upon the growth. The sensitivity of tbe organisms to metronidazole was noted.

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Sr. No.	Condition	Treatment		
		No. of Buffaloes	Commencement	Dose (ml.) of 0.5% w/v Metronidazole, every alternate day for 3 days
1.	Abortion (1½ to 6 months)	10	Within 6 days	25-50 ml.
2.	Postpartum Metritis	22	Within 10-20 days	25-50 ml.
3.	Repeat breeding	3	Within 6 days	20 ml.

TABLE SHOWING ANAEROBIC INFECTIOUS REPRODUCTIVE DISORDERS IN BUFFALOES WITH RESPONSE TO METRONIDAZOLE TREATMENT

Sr. No.	Reproductive Disorder	No. of cases treated	Anaerobic bacteria isolated	Response to treatment		Remarks
				Clinical %	Conception %	
1.	Abortion	10	Clostridia *B. fragilis* *B. melaninogenicus* Peptostreptococci	90	70	
2.	Post-partum Metritis	22	Peptostreptococci Peptococci *B. fragilis* *B. melaninogenicus*	77.27	30*	*Only 10 buffaloes exhibited oestrus when serviced at 42-3 days
3.	Repeat Breeding	3	Peptococci Peptostreptococci	100	33.33	
	Over all	35		82.85	47.81	

The organisms were identified using bacteriological methods.—(Holt, 1977).

3) Treatment:

Treatment with Metronidazole (FLAGYL) if the isolates were found sensitive to it was then carried out as follows:

4) Genital examination of buffaloes:

All the buffaloes were examined per-rectally every seven days for clinical recovery. Animals clinically responding had a normal size, shape and tone of the uterus and without any abnormal discharge within 7 days of treatment. Buffaloes in heat were given natural service and pregnancy was confirmed after 50-60 days of gestation.

RESULTS AND DISCUSSION

In all 35 buffaloes with reproductive disorders (abortion, post-partum metritis

and repeat breeding) the discharge of which were found sensitive to metronidazole were treated and followed up for clinical recovery and conception. Isolation of the anaerobic bacteria and the subsequent results are presented in the following table.

The above table shows that in infectious reproductive disorders (abortion, postpartum metritis and repeat breeding) anaerobic bacteria can play a significant role in their causation and they have been isolated for the first time in this country. As the cultures were sensitive to Metronidazole, the buffaloes were given intrauterine treatment. The response of treatment especially in abortions is worth noting as it is actually based on conception. In post-partum metritis even though the clinical recovery was encouraging the conception rate was low as all the buffaloes in this group were freshly calved and only 10 buffaloes out of 22 came in heat and were serviced. In repeat breeders, the clinical recovery was excellent. The conception rate in all these animals was based on the first service after the treatment which on an average for abortion, post-partum metritis and repeat breeding was 18, 42.3 and 24.6 days respectively.

Considerable work has been done on the isolation of aerobes and the remedial measures to be adopted as per their sensitivity to various antibiotics to solve the problem of infectious infertility (Panangala, et al. 1978; Namboodiripad, et al. 1973). However, no report is available in the literature on the role of the anaerobes for the purpose of comparison.

The anaerobic bacteria isolated in the present series viz. peptococci, peptostreptococci, bacteroides and clostridium sp. are fastidious and some of them very fragile and unless special precautions and improved techniques are used, their isolation could be difficult. A special transport medium (Stuart's) to transport the tampon to the Laboratory is essential. Perhaps due to these reasons other workers have not been able to isolate these organisms in the past. Bacteroides have been reported to be responsible for infections of the reproductive tract of human (Nalini, et al. 1978 and Joshi, 1978). These anaerobes and other bacteria may also play a similar role in infections of the genital tract in bovines.

The present work has brought in the limelight a new concept — the significance of anaerobes in nterine infections which needs careful and elaborate study of the normal and the infectious cases to solve the problem of reproductive disorders in bovines.

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Studies on Tubal Patency in Surti Buffaloes

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ABSTRACT

A study was conducted for testing tubal patency in 451 genitalia obtained from abattoir and in 40 live buffaloes. For tubal patency testing insufflation apparatus was employed for airo, hydro and chromotubations. In live buffaloes PSP solution (0.1% in saline and alcoholic) were used, in addition to airo-tubation for testing tubal patency.

Out of 451 organs, 13 (2.28%) organs were found gravid. Out of the remaining 438 organs, 89 (20.32%) organs were found to have tubal blocks. In these 19 (4.34%) organs had bilateral blocks and 70 (15.98%), organs had unilateral block. The right and left fallopian tube involvement was 36 (8.22%) and 34 (7.76%), respectively. In the abattoir material studied, tubal factor as a cause of infertility and sterility could be 20.32% and 4.34%, respectively. In order of meriting attention the most frequent site of tubal block was utero-tubal junction (72.50%) next in order were isthmus (22.25%) and ampulla (5.25%). The antibiotic insufflation may reduce about 5% of the blocked tube conditions. With the methods tried for testing tubal patency in live buffaloes, the results were not conclusive, as there was a possibility of getting 15 to 17.5% false positive indications.

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The diagnosis, treatment and prognosis of the diseases of the fallopian tubes have not received the due attention in farm animals. Tubal factors of infertility include congenital, developmental anomalies and occlusion; partial, complete, proximal, distal, unilateral or bilateral involvement of the tubes (Michael Arrata, 1977).

Deshpande (1963) reported the results of his studies on salpingitis in Murrah buffaloes meant for slaughter. Kodagali and Kerur (1968) in their study on 1068 Jaffri buffalo genitalia reported tubal lesions in 24 (2.24%) organs. Out of them 8 (0.75%) were unilateral and 16 (1.49% were bilateral affections of the fallopian tubes. Studies on tubal patency in cattle have been reported by various workers (Rowson, 1942; Henley, 1953; Koike and Kavata, 1959; Becze and Stark, 1968). Shevichik and Gamchik (1964) have reported on diagnosis of diseases of fallopian tubes in cattle. Amongst buffalo breeds in Gujarat State, Surti breed of buffaloes play a very important role in dairy industry. As limited information is only available on tubal patency in buffaloes, it was decided to study tubal patency in abattoir material and on live buffaloes. The results are presented in this paper.

MATERIALS AND METHODS

A total of 451 genital organs and 40 live buffaloes were utilised for the study. Out of 451 organs, 13 (2.88%) were found gravid and were not included in the study. On the remaining 438 genitalia, tubal patency was tested by airo-tubation technique (Chenne Gowda and Abdulla Khan, 1975), injection of distilled water (hydro-tubation) and injection of

TABLE. FALLOPIAN TUBE BLOCKING IN SURTI BUFFALO GENITALIA

Method of testing	Total	Fallopian tube blocking		
		Bilateral	Uni-lateral	
			Right	Left
Airo-tubation	20.32% (89)	4.34% (19)	8.22% (36)	7.76% (34)
Hydro-tubation & Chromo-tubation	15.29% (67)	2.28% (10)	6.84% (30)	6.17% (27)

Figures in parenthesis indicate the number of organs.

dye (ink) solution (Chromo-tubation) into the fallopian tubes.

In airo-tubation, measured amount of air was injected under pressure between 60 to 150 mm Hg, through the cervix using a pipette fitted with cervical stop. When the organ was submerged in the water, air bubbling out from the infundibular region of fallopian tube, indicated the patency of tubes. When distilled water or dye was injected through the apex of the uterine horn into the fallopian tube, easy flow of the water or dye solution indicated the patency.

The dye was injected to find out the exact location of the block in the tube. On location of the block, microdisection was carried out to study the nature of the block. In 15 cases histological sections were prepared to study the lesions. In few cases X-ray films were taken to liquid contrast medium (codin). In the genitalia under study ovarian morphology, uterine contents and the tubal patency or impatency were recorded. The phase of the oestrous cycle was assessed by morphological changes.

In live animals, the following methods were used for testing the tubal patency.

1. Phenosulfonaphthalein (PSP) 0.1% in normal saline (Speck test),
2. Phenosulfonaphthalein 0.1% alcoholic solution,
3. Airo-tubation using insufflation apparatus.

In the first two methods 20 ml PSP solution was injected in both the uterine horns, taking care that there was no back flow of PSP solution. Urine samples were collected by catheterization after 30, 45 and 65 min. of intra-uterine injections. A reddish or pink colour reaction in the urine indicated patency. In third method measured amount of air was injected for creating air pressure between 60 to 150 mm Hg. by using of the Tubal patency testing apparatus devised by Chenne Gowda and Abdulla Khan (1975). A total of 40 live buffaloes were tested and the diagnosis was compared with the examination of the genitalia for patency on slaughter.

RESULTS AND DISCUSSION

Out of 438 organs tested with various methods viz., airo, hydro and chromo tubation; in airo-tubation 89 (20.32%) organs were found to have tubal blocking. In 19 (4.34%) organs there were bilateral blocks and in 70 (15.98%) organs the block was unilateral. The right side tube was blocked in 36 (8.22%) organs and the left tube blocked in 34 (7.76%)

organs. In hydro and chromo-tubation technique 67 (15.29%) organs were found to be having tubal blocking in 10 (2.28%) organs in both the fallopian tubes and in 57 (13.01%) organs the block was unilateral. In these right side tube was blocked in 30 (6.84%) organs and left tube blocked in 27 (6.17%) organs. The results are presented in Table.

The utero-tubal junction was found to be the most frequent site of tubal block (72.50%); next in order the blocks were in isthmus (22.25%) and ampulla (5.25%). From the above Table it is apparent that hydro and chromo-tubation reduced the number of bilateral blocks by 2.06% (from 19 to 10) and unilateral blocks by 2.97% (from 70 to 57). Thus in the field antibiotic insufflations may reduce the tubal blocks by 5.03%. The X-ray films exposed showed the location and length of block.

The results of observations on the tubal patency and phase of oestrous cycle noted was that out of 89 genitalia with tubal blocks 59 (66.29%) were cyclical and 22 (24.71%) non-cyclical. In 8 (8.98%) organs, there were gross pathological lesions like hydro-salpinx, pyo-salpinx, salpingitis and extensive ovaro-bursal adhesions in addition to the fallopian tube block.

The results of testing for tubal patency in live buffaloes did not yield consistent results. When organs from the live buffaloes showing tubal impatency were obtained after slaughter to confirm the diagnosis, the error was as much as 17.5% (in 7 out of 40). The PSP alcoholic solution caused irritation in the genitalia and the saline PSP solution had no untoward effect. The airo-tubation was also tried in live animals and the results pointed out the chance of getting 15% (6 out of 40) false positive results.

The histological study in 15 tubal blocks revealed the confirmation of the diagnosis of tubal block. In majority of them it appeared that the tubal occlusions resulted from inflammatory diseases.

Deshpande (1963) pointed out that in repeat breeding buffaloes the inflammatory lesions in the tube were responsible for non-breeding. Chenne Gowda and Abdulla Khan (1975) examined 250 apparently normal genitalia and found bilateral impatency of 13.51% and 8.92% in heifers and parous animals, respectively, at 60 to 300 mm Hg pressure. Under the present study the tubal block in airo-tubation was higher (20.32%) as compared to hydro and chromo-tubation (15.29%). The difference in tubal blockages observed might be due to the efficiency of hydro and chromo-tubation over the airo-tubation for removing the transitory blocks. The transitory blocking of the tubes may be due to mucosal agglutination and denuded cells in the mucosa of the tubes could be easily flushed out by hydro and chromo-tubation under pressure. In live animals, unilateral blocking and bilateral patency conditions are required to be differentiated. This has been the limitation in the present study, with the methods under test. However, with the usage of endoscopic technique and controlling the tubal perfusion and spillage of the dye under injection, accurate diagnosis needs further studies.

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Blood Picture and Arborisation Pattern of Cervical Mucus in Nymphomaniac Rathi Cows

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ABSTRACT

Blood picture for Differenial Leucocytic Count (D.L.C.) and arborisation pattern of cervical mucus was studied in thirty nymphomaniac Rathi cows and compared with ten healthy cycling Rathi cows in estrus. Neutrophilia was significant in nymphomaniac Rathi cows. However, differences in arborisation pattern were non-significant.

*

Leucocytosis occurs in physiological, pathological and emotional conditions (Oser, 1976). Moberg (1955) reported neutrophilia in nymphomaniac cows. Kallella and Moberg (1965) produced neutrophilia in ovariectomised ewes with oral phytoestrogens. Soliman *et al.* (1965) and Moberg (1965) observed neutrophilia following estrogen administration in cattle.

Crystallization pattern tests of cervical mucus are of diagnostic value in human beings but at infancy in animals. Papanicolau (1945) and (1946) observed fern like crystallization pattern of human cervical mucus at ovulation period. Rydberg (1948) observed absence of arborisation pattern in luteal phase of the estrus cycle. Garm and Skjerven (1952) reported fern like crystals of bovine cervical mucus during estrus and its disappearance in luteal phase and pregnancy.

Present study was undertaken due to scarcity of literature on blood picture and arborisation pattern of cervical mucus in nymphomania or cystic ovarian degeneration in Indian cattle.

MATERIALS AND METHODS

Present study included thirty nymphomaniac Rathi cows having follicular cysts. These nymphomaniac cows were reported in outdoor obstetrics and gynaecology clinics and in infertility camps organised by Rajasthan Dairy Development Corporation, Bikaner in collaboration to Department in rural areas of Bikaner district.

Blood samples were collected from jugular vein and smears were prepared on clean and grease free microglass slides. The blood smears were stained with Giemsa stain (B.D.H.) and cells were counted by Battlement method described by MacGregor *et al.* (1940). The cervical mucus was collected by the method described by Alliston *et al.* (1958). Mucus smears were prepared on microglass slides and arborisation pattern was classified as typical, atypical and nil (Luktuke and Roy, 1967).

RESULTS AND DISCUSSION

The mean values of lymphocytes, neutrophils, monocytes and eosinophils in estrus cows were 57.30, 35.90, 3.90 and 2.80 per cent, respectively (Table-1). These findings are in accordance with Purohit (1971) who had reported lymphocytes 56.20 per cent, neutrophils 36.36 per cent, monocytes 5.63 per cent and eosinophils 2.76 per cent in estrus Rathi cows. Nymphomaniac cows showed lymphocytes 34.43 per cent, neutrophils

TABLE 1: DIFFERENTIAL LEUCOCYTIC COUNT (D.L.C.) IN ESTRUS AND NYMPHOMANIAC RATHI COWS

Group	Lymphocytes	Neutrophils	Monocytes	Eosinophils
Estrus cows	57.30±0.97A	35.90±0.97	3.90±0.27	2.80±0.32
	(50-60)B	(32-42)	(3-5)	(1-4)
Nymphomaniac	34.43±0.52N.S.	58.50±0.44**	4.40±0.14N.S.	2.66±0.20N.S.
Cows	(29-41)	(53-63)	(2-6)	(1-5)

A = Mean±S.E. B = Range N.S. = Non-significant
** = Highly significant at 1 per cent level of significance.

58.50 per cent, monocytes 4.40 per cent and eosinophils 2.66 per cent (Table-1).

Neutrophilia was highly significant in nymphomaniac cows (Table-1). Similarly, Moberg (1955) reported neutrophilia in nymphomaniac cows. Moberg (1955) and Soliman *et al.* (1965) produced neutrophilia in cows with estrogen administration. Kallela and Moberg (1965) observed neutrophilia in ovariectomised ewes treated with oral estrogens of plant origin. Neutrophilia in nymphomaniac cows can be attributed to increased synthesis of estrogen.

Estrus cows showed 80 per cent typical and 20 per cent atypical fern pattern (Table-2). Similarly, Purohit (1971) observed 75 per cent typical and 15 per cent atypical and 10 per cent nil fern pattern in estrus Rathi cows. Nymphomaniac cows showed 70 per cent typical and 30 per cent atypical fern pattern (Table-2). Differences in fern pattern between estrus and nymphomaniac cows were non-significant (Table-2).

Arborisation pattern of cervical mucus is dependent on estrogen (Bone, 1954; Bane, 1957; Quayam, 1962). Moberg (1957) observed absence of arborisation in ovariectomised heifers and reported arborisation of cervical mucus following estrogen administration whereas progesterone administration caused disappearance of arborisation pattern.

Electrolytes, mucoproteins, water and chlorides of sodium and potassium are responsible for arborisation of cervical mucus, secreted under the influence of estrogen (Devuyst *et al.* 1961). Secretion of these constituents and arborisation of cervical mucus in nymphomaniac cows may be due to increased production of estrogen. Watson (1939) also influenced cervical mucus secretion with estrogen administration. Garm and Skjerven (1952) reported absence of crystallization pattern

TABLE 2: ARBORISATION PATTERN OF CERVICAL MUCUS IN ESTRUS AND NYMPHOMANIAC RATHI COWS

Group	Number of cows	Arborisation pattern		Chi-Square Value
		Typical	Atypical	
Estrus cows	10	8 (80.0)	2 (20.0)	0.38N.S.
Nymphomaniac cows	30	21 (70.0)	9 (30.0)	

Figures in parentheses are percentages.
N.S. = Non-significant at 1 per cent level of significance.

of bovine cervical mucus in luteal phase and pregnancy.

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Studies on Secondary Sex Ratio In Equine

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ABSTRACT

Secondary sex ratio was worked out in Horse Breeding (HB) mares and Mount Artillery (MA) mares of Equine Breeding Stud, Babugarh (U.P.). Sex ratios revealed 46.3% and 47.1% colts and 53.7% and 52.9% fillies for the respective type of mares. Foaling order did not show any significant effect on sex ratio. Mating of MA mares during winter season however, showed significant effect.

Studies on the determination of sexes and sex ratios at the time of fertilization and at birth have gained momentum during the last two decades while attempting to study on the control of sex. The present investigation was taken to put on record the sex ratio in equines.

MATERIALS AND METHODS

Data pertaining to the period of 16 years from 1949 to 1965 were collected from Equine Breeding Stud, Babugarh, U.P. Records pertaining to sex of 151 foals of Horse breeding (HB) mares and 138 foals of Mountain artillery mule breeding (MA) mares were analysed for the present study. Sex of only normal foals was considered. The mares to which these foals belonged, were of different age groups and were in good condition of health. As per routine of the stud, the mares were frequently examined and teased daily soon after parturition for detection of heat. The mares were bred three times on an average during oestrus, the first service commencing on 3rd or 4th day depending upon the intensity of heat and the remaining services on alternate days. Only natural service was allowed and no artificial insemination was practiced.

These studies were conducted by considering all the animals in two different groups of mares namely:

(i) Horse Breeding (HB) mares and
(ii) Mountain Artillery Mule Breeding (MA) mares

For studying seasonal influence, five seasons as described by Ahuja (1958) were considered. These are given below:

(i) Summer (dry) — May and June
(ii) Summer (wet) — July, August and September
(iii) Autumn — October and November
(iv) Winter — December, January and Febru.
(v) Spring — March and April.

For statistical analysis of this data, standard statistical procedures (Snedecor and Cochran, 1967) were followed.

RESULTS AND DISCUSSION

The statistical analysis of the data on 151 births in HB mares and 138 births in MA mares revealed that 70 colts (46.3%) and 81 fillies (53.7%) were born in the former group while 65 colts (47.1%) and 73 fillies (52.9%) were born in later group (Table I). The variations in these secondary sex ratios however, were not found significant.

Singh and Dhinsa (1967) recorded the birth of 389 horse foals from Horse Breed-

TABLE I: SEX RATIOS IN HB AND MA MARES

Mares	Foals	Seasons of mating					
		Summer (dry)	Summer (wet)	Autumn	Winter	Spring	Total
HB	Colts No.	17	26	2	3	22	70
	Fillies No.	22	27	6	7	19	81
	Colt%	43.6	49.0	25.0	30.0	53.6	46.3
	Fillies %	56.4	51.0	75.0	70.0	46.4	53.7
	X^2 value	0.641	0.018	2.00	1.600	0.219	0.810
		NS	NS	NS	NS	NS	NS
MA	Colts No.	20	25	2	2	16	65
	Fillies No.	21	14	2	8	28	73
	Colt %	48.7	64.10	50.1	20.0	36.3	47.1
	Fillies %	51.3	35.9	50.0	89.0	63.7	52.9
	X^2 value	0.024	3.102	0	3.600	3.272	0.463
		NS	NS		*	NS	NS

NS = Non significant * = Significant (P < 0.05)

TABLE II: FOALING ORDER-WISE SEX RATIO IN MARES

Mares	Foals	Foaling Order				
		I	II	III	IV	V
HB	Colts No.	32	35	8	1	1
	Fillies No.	49	30	5	6	3
	Colts %	39.5	53.8	61.5	13.7	25.0
	Fillies %	60.5	46.2	38.5	86.3	75.0
	X^2 value	3.272	0.384	0.692	0.356	1.000
		NS	NS	NS	NS	NS
MA	Colts No.	77	39	29	17	9
	Fillies No.	70	49	29	19	5
	Colts %	52.4	40.2	50.0	47.2	64.3
	Fillies %	47.6	59.8	50.0	52.8	35.7
	X^2 value	0.332	3.122	0	0.110	1.142
		NS	NS		NS	NS

NS = Not significant.

ing mares out of which 210 were filly foals and 179 were colt foals and 167 foalings in Mule Breeding mares out of which 87 were colt foals and 81 were filly foals at Equine Breeding Stud, Saharanpur. Duruttya (1975) worked out the secondary sex ratio in three groups of stud breeding working horses in Slovakia and observed the percentage of female foals as 53.4, 50.4 and 53.4 respectively. According to Nishida *et al.* (1976) percentage of male offspring for the 20662 horses involved averaged 49.3.

From the analysis of the data in the present studies it was observed that variations in the sex ratio occurred in both the types of mares due to season of mating (Table I) and also due to foaling order (Table II). However, this variation was found significant statistically only

when mating occurred in winter season in MA mares. Nishida *et al.* (1976) reported non-significant effect of season on sex ratio in Japanese horses.

Formation of sex of an individual at the time of fertilization of gametes or conception is called genetic or primary sex ratio which theoretically is 50:50. Proportion of the sexes at the time of birth (secondary sex ratio) sometimes deviate significantly from the expected equality. Observations as reviewed by Nalbandov (1970) suggest strongly that both genetic and environmental (internal and external) factors are capable of modifying the secondary sex ratio.

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Incidence of Pre and Neonatal Calf Mortality in Livestock Farms in Andhra Pradesh

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ABSTRACT

The incidence of abortion (non-contagious), still births, dystokia and neonatal calf mortality has been reported among Ongole, Hallikar, Sindhi, Murrah, Jersey, Exotic × Zebu crosses and Zebu × Zebu crosses maintained at 5 Livestock Farms in Andhra Pradesh.

The rate of abortion, still birth, dystokia and neonatal mortality are important parameters in a assessing, among other things the relative adaptability of exotic and crossbred cattle in hot humid tropics as compared to native cattle.

*

The present paper reports their incidences among indigenous and exotic cattle breeds and their crosses maintained in 5 livestock farms in Andhra Pradesh.

MATERIALS AND METHODS

A total of 2606 calving records of Ongole, Hallikar, Red Sindhi, Murrah, Jersey, Jersey × Zebu and Zebu × Zebu cows maintained at 5 livestock farms in Andhra Pradesh were utilized in the study. The data pertaining to the breed, total conceptions, total births, calving difficulties, and age at the time of death were utilized and the rates of abortion (non-contagious), still birth, dystokia and neonatal mortality were estimated. The animals were fed according to N.R.C. requirements. The climate was uniform in all the places and was hot humid with temperatures soaring to 110°F during summer and RH % to 90 during autumn months. The data were subjected to statistical analysis as per the methods described in Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Prenatal mortality

The results of incidence of abortion and still births (Table 1) revealed that among zebu, the rate of abortion varied from 0 to 3.3 % whereas it was 11.9 % in Jersey, 9.8 % among exotic × zebu crosses and Murrah buffaloes, it was 2·2 %. Incidence of still births also followed the same pattern with lower incidence among zebu and their crosses and higher incidence among exotic and exotic zebu crosses. The overall incidence of prenatal mortality was found to be 6.06 %. The variation in the rates of abortion, still birth and neonatal mortality among different genetic groups was statistically highly significant ($P<0.01$). However, between Jersey and Jersey × zebu, the difference was not significant.

Prabhu and Chatterjee (1970) recorded an overall incidence of abortion of 4.72 % in Indian breeds. Kaikini *et al.* (1977) reported incidence of 1.3 % and 1.5 % of abortion, and 1.1 % and 2.3 % of still births in Sahiwal and Murrah breeds respectively which were similar to the present results. Among exotic breeds, Arnold and Becker (1956) reported 4.9 % still births in Jersey cows at Florida State, from 5 to 10 % by Hull *et al.* (1940) and 6.6 % by Weaver *et al.* (1949). Richter (1955) recorded 3.7 % in German Hohen-

TABLE 1. THE RATES OF ABORTION, STILL BIRTHS, DYSTOKIA AND NEO-NATAL CALF MORTALITY AMONG VARIOUS CATTLE AND BUFFALO BREEDS IN 5 LIVESTOCK FARMS IN ANDHRA PRADESH.

Breed	Total conceptions	Abortions	Still-births	Prenatal mortality (3+4)	Total calvings	Dystokias	Neo-natal mortality 0-8 days
Ongole	399	12 (3.0)	7 (1.8)	19 (4.8)	380	6 (1.6)	5 (1.3)
Hallikar	163	—	2 (1.2)	2 (1.2)	161	1 (0.6)	1 (0.6)
Sindhi	30	1 (3.3)	—	1 (3.3)	29	—	1 (3.5)
Murrah	1072	24 (2.2)	21 (2.0)	45 (4.2)	1027	3 (0.3)	8 (0.8)
Jersey	210	25 (11.9)	12 (5.7)	37 (17.6)	173	2 (1.2)	9 (5.2)
Exotic X Zebu crosses	369	36 (9.8)	15 (4.1)	51 (13.9)	318	4 (1.3)	9 (2.8)
Zebu X Zebu crosses	363	3 (0.9)	—	3 (0.9)	360	—	2 (0.6)
Overall	2606	101 (3.88)	57 (2.19)	158 (6.06)	2448	16 (0.7)	35 (1.4)

Note: Figures in the parenthesis denote percentages.

veih breed. While studying the adaptability of exotic crosses in India, Amble and Jain (1967) found the rate of abortion, still births and premature calvings to be 8% in Sahiwal, 11% in 5/8th and 21% in 31/32 Holstein grades. Similarly, Sen *et al.* (1953) observed that the rate of abortion increased from 2.6% in Red-Sindhi to 7.3% and 13.4% respectively in Sindhi×Ayrshire half-breeds and three quarter-breds. Rao *et al.* (1976) reported rise in the rate of abortion with increase in Jersey inheritance from 1.58% in 1/4 to 9.63% in 3/4 Jersey×Deshi crosses in Andhra Pradesh. Likewise, at Indo-swiss Project, Kerala, abortion rates of 1.0%, 2.9% and 14.0% and still birth rates of 0.3%, 1.5% and 4.7% were observed among non-descript, halfbred and pure Brown Swiss cows respectively (Rama chandra Nair, 1973). The results in this study are in agreement with the earlier findings in respect of exotic and crossbred cattle.

Dystokia:

The overall incidence of dystokia was 0.8% and ranged from 0 to 1.7% among zebu breeds, 0.3% in Murrah, 1.2% in Jersey and 1.3% among Jersey×zebu crosses, while no dystokia was recorded among zebu crosses in this study. The breed differences were significant ($P < 0.01$).

Kaikini *et al.* (*loc. cit*) reported similar incidence of dystokia in 1.7% of 530 Sahiwal cows and 1.1% of 132 Murrah buffaloes.

Neonatal Mortality

The mortality from birth to 8 days varied between 0.6 to 3.5% in zebu, 0.8% in Murrah, 5.2% in Jersey, 2.8% among Jersey×Zebu crosses and 0.6%

among zebu × zebu crosses with an overall incidence of 1.43 per cent. Among breeds, the differences were statistically significant ($P < 0.01$).

The results in the present study are in congruity with the earlier findings in that the rates of prenatal and post-natal mortality were lower in well adapted zebu breeds and their crosses, higher in exotic breeds and at intermediate levels in exotic × zebu crosses. Statistically, the incidences of different conditions in indigenous breeds differed from those of exotic and their crosses while they did not differ between the latter two types.

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The Pelvimetry in Buffaloes (Bos Bubalus) During Pregnancy and Puerperium

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ABSTRACT

A study of pelvic dimensions of 25 primiparous and 42 pluriparous buffaloes during various stages of gestation revealed that in primiparous buffaloes the growth of internal pelvic area was steady throughout gestation. The growth rate of pelvic area was estimated to be 0.57 cm^2 per day. In pluriparous animals the growth of pelvic area was comparatively slow and the growth rate was found to be 0·5 cm^2 per day. The internal pelvic area reduced significantly from first to 35th day postpartum. The regression was almost complete by 21st day and 35th day in primiparous and pluriparous animals, respectively.

*

The internal pelvic area in the dam has a great bearing on the normal parturition. The growth of pelvis during pregnancy has been studied extensively in beef heifers (Price and Wiltbank, 1978). Present study reports the findings on pelvic changes during pregnancy and puerperium in buffaloes.

MATERIALS AND METHODS

The buffaloes used in the present study were of Murrah and Nili Ravi breeds and their crosses, maintained at the Dairy Farm, Punjab Agricultural University, Ludhiana.

The pelvic dimensions of 25 primiparous and 42 pluriparous buffaloes were measured at different stages of gestation. Six primiparous and 22 pluriparous buffaloes were studied for the regression of pelvis from first to 35th day postpartum. The details of external pelvimetry

TABLE 1. GROWTH OF PELVIS IN BUFFALOES DURING GESTATION

Stage of gestation	Mean pelvic area ($cm^2 \pm$S.D.)	
	Primiparous buffaloes	Pluriparous buffaloes
Day of breeding	306.00±43.11 (10)	—
90 days	356.34±48.60 (11)	—
180 days	405.23±49.70 (7)	458.98±54.20 (6)
240 days	443.58±38.90 (11)	488.52±48.60 (26)
270 days	460.69±54.50 (13)	502.35±52.50 (33)
300 days	475·94±56.90 (15)	520.89±52.80 (42)

Figures in the parenthesis denote number of observations

TABLE 2. REGRESSION OF PELVIS IN BUFFALOES DURING PURPERIUM

Days after calving	Pelvic area (cm^2)					
	Primiparous			Pluriparous		
	Range	Mean	No. of observations	Range	Mean	No. of observations
1	395.62 to 543.11	481.48	6	393.47 to 620.80	464.64	22
3	371.88 to 530.03	457.46	6	380.13 to 600.70	484.56	22
7	366.62 to 530.03	450.96	6	374.69 to 567.97	472.88	22
14	363.99 to 530.03	445.51	6	374.69 to 536.46	460.59	22
21	363.99 to 468.58	423.25	5	360.20 to 530.93	455.11	22
28	361.35 to 468.58	422.72	5	360.20 to 523.38	449.70	22
35	361.35 to 468.58	422.72	5	360.20 to 523.38	444.37	22

method used has been described before (Dhaliwal, et al., 1981).

RESULTS

Growth of pelvis in buffaloes during gestation

The growth of internal pelvic area in primiparous buffaloes was found to be quite steady throughout gestation (Table 1). The growth rate of pelvic area was estimated to be 0.57 cm^2/day. The leaniarity of growth curve permitted the calculation of expected pelvic area at calving from the pelvic area at the time of breeding.

In pluriparous animals, the growth of pelvic during gestation was comparatively slow. The growth rate of pelvic area in these animals was found to be 0.5 cm^2/day.

Post-partum regression of pelvis

The internal pelvic area reduced significantly from first to 35th day postpartum in both, the primiparous and the pluriparous buffaloes (Table 2). In primiparous animals, there was a sharp fall in the pelvic area during first 3 days postpartum. Subsequently, the pelvic area regressed comparatively slowly and by 21st day postpartum the regression was almost complete. However, in pluriparous animals the pelvic regression was slow and it continued till 35th day post-partum.

DISCUSSION

The growth rate of pelvis in buffaloes was found to be more pronounced and steady in primiparous animals than in the pluriparous animals. Similar pattern of growth has been reported in beef heifers (Price and Wiltbank, 1978). In the present study the growth rates of pelvis in primiparous and pluriparous buffaloes were found to be 0.57 and 0.5 cm^2/day, respectively. These findings are comparable with those reported for cattle (Prentiss, 1971).

The parallelism between the actual and the calculated pelvic area at different stages of gestation using regression equation allowed the prediction of pelvic area at calving from the values obtained at the time of breeding. This finding may have a great bearing in the obstetrical prediction of events at calving, so that the animals likely to have dystocia could be treated accordingly. The involution of pelvis after calving was found to be faster in the primiparous than in the pluriparous buffaloes. The factors governing it are not known. However, these findings might be suggestive of the fact that primiparous buffaloes may need

a shorter service period than the pluriparous buffaloes and early breeding of such animals may be more economic in buffalo husbandry practices.

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Effect of Season of Calving on Service Period of Sahiwal Cows and Murrah Buffaloes

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ABSTRACT

The effect of season of calving on service period of Sahiwal cows and Murrah buffaloes are studied.

The season of calving had a slight but significant effect on the length of service period in the case of Sahiwal cows. Higher reproductive efficiency was recorded in the winter and spring season in the case of cows but in case of buffaloes winter and rainy season were found to be season for high reproductive efficiency. During summer season only one calving was found in the case of buffaloes, but 61.6% calving were recorded in the Rainy season.

*

Indian cows and buffaloes give their 1st calf at a late age and have a long calving interval. Season of calving of cows and buffaloes also appears to affect the length of service period.

Ragab *et al.* (1956) reported a service period of 177 days in case of Egyptian buffaloes. Kohali and Malik (1960) reported an average service period of 201 ± 11.3 days in Indian buffaloes. Venkayya and Anantkrishnan (1963)

reported an average service period of 173.9 days in the Murrah buffaloes.

Sikka (1931) observed a slight but significant variation in service period due to month of calving in Sahiwal cows at Military dairy farm, where Malik and Sindhu (1968) reported a significant effect due to season. Kohali and Suri (1960) also reported similar results in Hariana cattle.

MATERIALS AND METHODS

Five hundred and twenty two calving and breeding records of Sahiwal cows and 138 records of Murrah buffaloes maintained at Dairy farm of C.S. Azad University of Agricultural and Technology, Kanpur between the years 1970-80 were used to collect the data. Records showing a service of longer than 300 days were rejected.

RESULTS AND DISCUSSION

Distribution of frequency calving in different season in relation to four service period groups were calculated and are presented in Table I.

From Table I it can be seen that 13.7 & 34.0% of the total cows and buffaloes under study had a service period less than 60 days, respectively. About 23.60 & 36.3% conceived in about 61-120 days respectively whereas 36.9% cow and 19.5% buffaloes had an average service period longer than 180 days. The average length of service period for the herd under study was found to be 155.8 days and 163.6 days in the cows and buffaloes respectively. The winter calves showed highest average service period of 220 days and 215 days respectively in both cases whereas lower average service period (118 days) was found in the summer season calves in the case of cows and 110 days in case of Rainy season calves in buffaloes. In the case of cows no significant seasonal variation was found for the number of calvings but about 61.6% calvings were recorded

TABLE 1. (A) SERVICE PERIOD IN SAHIWAL COWS

Sr. No.	Season of calving	Service period in days: Less than 60	61-120	121-180	Above 180	Total no. of calving	%	Av. of service period
1.	Spring	15	17	18	45	95	18.2	160
2.	Summer	12	13	21	18	64	12.3	118
3.	Rainy	18	31	36	49	134	25.8	145
4.	Autumn	11	29	33	25	98	18.6	136
5.	Winter	15	33	27	56	131	25.1	220
	Overall	71	123	135	193	522	—	155.8
	%	13.7	23.6	25.8	36.9	100	—	—
	(B) SERVICE PERIOD IN MURRAH BUFFALOES							
1.	Spring	0	0	1	0	1	0.7	168
2.	Summer	1	7	5	3	16	11.6	135
3.	Rainy	35	38	7	5	85	61.6	110
4.	Autumn	9	3	1	10	23	16.7	190
5.	Winter	2	2	0	9	13	9.4	215
	Overall	47	50	14	27	138	—	163.6
	%	34.0	36.3	10.2	19.5	100	—	—

TABLE 2. ANALYSIS OF VARIANCE. LENGTH OF SERVICE PERIOD OF SAHIWAL COWS AND MURRAH BUFFALOES CALVING IN DIFFERENT SEASONS.

Name of species	Source of variation	Degree of freedom	Sum of square	Mean square	Variance ratio at 5% level
Cows	Between season	4	939506	23487	3·4*
	Within season	517	3571436	6908	
Buffaloes	Between season	4	212164	53041	4.2*
	Within season	133	1679530	12628	

* Significant at 5% levels.

in the rainy season in the case of buffaloes.

The data were statistically analysed and result are presented in Table II.

The results presented in Table II reveal that there exists a slight but significant effect of season of calving on the variability of length of service period in case of Sahiwal cows. Our results are similar to those of Sikka (1931). In case of buffaloes highly significant effect of season on length of service period was found. Those cows which calved in winter season they have greater average length of service period (220 days) while summer season calvers had shorter length of service period (118 days). In case of buffaloes winter season calvers had also greater service period (215 days) but lower service period (110 days) were recorded in the rainy season calvers. In case of buffaloes 61.6% calvings were recorded in the Rainy season.

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Removal of Bovine Haematic Mummy by Laparo-Hysterotomy A Case Report

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ABSTRACT

An uncommonly found case of haematic mummification is reported in a 7 years old heifer at 8½ months gestation. Laparo-hysterotomical removal of the mummy through left lower flank, oblique incision followed by successful recovery of the animal is discussed.

*

The incidence of bovine haematic foetal mummification is not well documented from this country. However, occurrence of bovine foetal mummification (Haematic or papyraceous) is reported to range between 0.43 to 1.8% from abroad Roberts, (1962). Here, removal of haematic foetal mummy is reported in a heifer cow by laparo-hysterotomy.

CASE HISTORY

A local breed of heifer, aging 7 years was presented to the clinic from a distant village. The history revealed that the animal was about 8½ months pregnant and showing labour pains since more than a day without any progress. The villagers had tried their best to remove the foetus unsuccessfully.

CLINICAL EXAMINATION

The animal was registered as indoor patient (Ref. No. 3, dated 6th April, 1982). The general condition of the animal was fair. Temperature, pulse and respiration were normal with partial anorexia. Rectally less than normal uterine fluids were felt with the uterine wall slightly thick and closely applied to irregular, inert foetal mass. Cotyledons were not palpable. The right middle uterine artery was small with weak fremitus. The left artery was not palpable. The vulva and vagina were swollen and oedematous. The vaginal discharge was tenacious with reddish brown in colour. The cervix was partially open with hoof of both the fore limbs of foetus protruding. There were all signs present indicative of foetal extraction being tried injudiciously.

TREATMENT

For dilation of cervix and expulsion of foetus, Vetoesterol[1], 50 mg was given intra-muscularly. When, even after 7 hours there was no progress in dilation of cervix, it was decided to remove the foetus by laparohysterotomy operation in recumbency. Anaesthesia given was, chloral hydrate 30 gm orally followed by Novocaine[2], 2%, 8 ml epidurally and 60 ml as infiltration at the site of incision. During operation, Dextrose saline, 5%, 900 ml was given with Terramycin[3], 30 ml intra-venously.

Laparotomy was performed by giving about 25 cm incision at left lower flank obliquely followed by hysterotomy incision on right uterine horn (which had foetus) longitudinally at the greater curvature avoiding cotyledons. The foetus was then taken out through the

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incision in posterior presentation by grasping the hind limbs. After this, dark brown autolysed foetal membranes were also taken out. The size and development of the foetus indicated that it must have mummified around 6½ to 7 months of gestation. The condition of the foetus was shrivelled. Compron[4], 5 gm, 2 pessaries were placed in the uterus and Combiotic[5], 2.5 gm was dusted on incision site. The uterine incision was then closed with a double row of lambert continuous suture with number 1 chromic catgut. The peritoneum and muscles were closed together with continuous suture using number 4 chromic catgut. Mattress, interrupted nylon suture were used to close the skin.

For post-operative care, Avil[6], 10 ml and Oxytocin[7], 40 units were given intra-muscularly immediately after the operation. Dressing of the wound was done daily with Furacin[8] water soluble ointment till the wound healed. Terramycin, 30 ml and Vibelan[9], 15 ml were injected intramuscularly daily for 4 days. Calborol[10], 450 ml was injected intravenously daily for two days. Following two days of the operation the animal showed the symptoms of endometritis which was cured by giving Mastalone[11] 'U', 10 ml intra-uterine for 4 days. The skin suture were removed on 10th day as the animal became clinically healthy with normal uterine involution.

Pathogenesis of haematic mummification is unknown, though in some breeds of cattle it is reported to be of hereditary basis, which is governed by autosomal recessive genes. It seems that foetal death occurs from 5 to 7 months of gestation (as indicated in the present case also) due to inter-placental haemorrhage and a resultant failure of placental function because of abnormal hormonal balance or constriction of the umbilical cord or an exaggeration of normal foetal mobility within the amnion at mid pregnancy (Arthur, 1975). After the removal of mummified foetus the recovery of the animal is fast since infectious factors are usually not involved for the causation of malady. Conception may occur within 4 month subsequent to treatment, but there may be foetal mummification again in the same animal

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Epididymal Sperm Reserve of the Local Goats

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ABSTRACT

In 10 sexually mature local male goats the number of spermatozoa in caput, corpus, cauda and whole epididymus were found to be 1.73 ± 0.14, 0.77 ± 0.07, 8.31 ± 0.71 and $10.82 \pm 0.82 \times 10^9$, respectively. The relative distribution of sperm reserve amongst caput, corpus and cauda epididymis were 16.85%, 7.13% and 76.77%, respectively.

*

The reports on the sperm reserves in goats are scanty. In the present investigation, an attempt has been made to study the sperm reserves in the epididymis of local y available goats.

MATERIALS AND METHODS

The studies were conducted on 10 adult sexually mature local male goats. The testes and epididymis (right and left) were collected immediately after the slaughter into chilled polythene bags. The testes and epididymis were separated and weighed individually. The caput, corpus and cauda regions of epididymis were also carefully separated. The various parts of the epididymis were minced in 10 ml normal saline in the homogenizer and the sperms were obtained and counted according to the method described by Jindal and Panda (1980). The data were analysed as described by Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

The mean and standard error of the values are presented in Table 1.

The values for sperm concentration in caput and corpus epididymis are in agreement with Jindal and Panda (1980) but there is slight difference for sperm concentration in cauda and whole epididymis. The epididymal sperm reserves in this species is much lower than those found for bulls (Amann & Almquist, 1962), rams (Ortavant, 1958) and boars (Egbunke & Eleme, 1978).

The relative distribution of spermatozoa in the caput, corpus and cauda

TABLE 1. MEAN AND STANDARD ERROR OF THE WEIGHT OF THE ORGANS AND SPERM CONCENTRATION

Particulars	Mean±S.E.	
	Weight (gms)	Sperm concentration (billions)
Testis	52.53±1.85	—
Epididymis	7.40±0.24	10.82±0.82
Caput epididymis	3.69±0.13	1.73±0.14
Corpus epididymis	1.05±0.03	0.77±0.07
Cauda epididymis	2.66±0.11	8.31±0.71

Average of 10 animals.

TABLE 2. COEFFICIENT OF CORRELATION (r)

Correlations between	Coefficient of correlation (r)
Testicular weight and epididymal weight	0.72**
Testicular weight and epididymal sperm conc.	0.42N.S.
Epididymal weight and epididymal sperm conc.	0.72**
Caput epididymal weight and sperm conc.	0.77**
Corpus epididymal weight and sperm conc.	0.62*
Cauda epididymal weight and sperm conc.	0.82**

N.S. = Non significant; * $P < 0.05$; ** $P < 0.01$.

regions of epididymis of goats were 16.85%, 7.13% and 76.77%, respectively. This is in agreement with the reports of Amann & Almquist (1962) for the bulls and Jindal & Panda (1980) for goats.

All the correlations (Table 2) examined were significant except between testicular weight and epididymal sperm number.

Almquist & Amann (1961), Verma *et al.* (1965) and Jindal and Panda (1980) reported high and significant correlations between testicular and epididymal weight, epididymal weight and epididymal sperm numbers and testicular weight and epididymal sperm numbers.

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SHORT COMMUNICATIONS

Cytomorphology and Cytochemistry of Bovine Endometrium in Relation to Fertility

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Present study was conducted in two cattle farms (HAU Animal Farm and Government Livestock Farm, Section I, Hissar) and one buffalo farm (Progeny Testing Bull Farm, Hissar) involving a total of 183 cows and 31 buffaloes. Endometrial biopsies were collected with the help of Nielsen's uterine biopsy catheter, slightly modified to maintain proper aseptic conditions. All the samples were collected at the time of standing oestrus, just before insemination. Animals were followed up and repeat inseminations were made on the animals at subsequent oestrus. Non-repeaters were examined per rectum for pregnancy after a period of 40-54 days. The animals were graded on the basis of number of services required for conception as grade I, II and III corresponding to one, two and more than two inseminations. It was observed that statistically there was no difference in conception rate between the experimental (Biopsied) and contemporary (non-biopsied) groups of cattle.

Cytomorphological studies revealed that:

1. Grade I cattle had a significantly smaller glandular length, width and epithelial height as compared to grade II and III animals. Similar results were observed in buffaloes also. The luminal epithelial height did not show any characteristic pattern of difference among different grades of cattle and buffaloes.
2. A significant correlation was observed between periglandular fibrosis and fertility grades in cattle. If more than 40% of the glands were having more than two layers of fibrosis the percentage of subfertile cows increased sharply. However, the results were inconsistent in buffaloes.
3. Although statistically not significant, inspissated mass was observed to accumulate in higher percentage of glandular lumen in subfertile (grade II and III) group of cattle as compared to fertile (grade I) group.
4. Lymphocytic infiltration score if increased above 0.5 the percentage of subfertile cattle (grade II and grade III) rose up sharply. Similar results were observed in buffaloes.
5. Increase in concentration of glycogen (score$>$0.5) was directly related to conception rate in cattle. The percentage of subfertile cattle increased significantly in the group having a glycogen score value below 0.5.
6. Lower concentration of protein and nucleic acids (score value$<$0.5) was more congenial for good fertility as observed by the increased percentage of grade I animals in the group.
7. The lipids were faintly distributed in the endometrium. Acidic and phospholipids were concentrated in various components of endometrium; lipofuscin pigments were also observed.
8. A comparatively lower score value ($<$0.5) of alkaline phosphatase was good for fertility as in such a group

of cattle, grade I percentage was higher when compared to group having a higher score value (>0.5).

After perusal of the results it could be concluded that the biopsy examination technique can be used safely, as a regular prognostic and diagnostic measure for the evaluation of the chances of conception at the time of service.

This evaluation may be of use in several ways:

1. Insemination only at the time of fertile estrus will save valuable germplasm, time and labour by reducing the total number of fetile inseminations in a herd.
2. Early diagnosis of impaired fertility can help in timely treatment of such cases thus reducing the unproductive days of an animal.
3. Prognosis of fertility can help in detection of probable subfertile animals if they are already inseminated as they can be grouped and watched closely for their next due estrus with the additional help of heat expectancy chart.

Effect of Stages of Oestrus on Conception Rate in Cross-Bred Cattle

Dr. J. C. Dutta, Dr. B. N. Kakati*, Dr. C. K. Rajkonwar and Dr. B. N. Borgohain

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A study was undertaken to record the effect of stage of oestrus on conception rate in cross-bred cattle reared in and around Guwahati and the findings are reported here.

Fifteen hundred and sixty one cross-bred cows and heifers with normal reproductive health maintained under similar managerial and dietary conditions were included in the study. These animals were classified into three groups as follows in relation to their stages of oestrus at which they were inseminated.

The onset of oestrus was recorded from the time of first mounting over herd mates associated with swollen and congested vulva, profuse and thin vaginal discharge, restlessness, off fed condition, bellowing, and reduced milk production. The end of oestrus was marked when mucus mem-

Group		*Stages of oestrus*
I	Early —	0-8 hours after the onset of oestrus.
II	Mid —	8-16 hours after the onset of oestrus.
III	Late —	16-24 hours after the onset of oestrus.

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brane of the vagina became pale in colour, no visible signs of mounting on other animals, and discharge of vaginal mucus ceased to occur. The animals were inseminated by rectovaginal technique with 1 ml of liquid semen (20 million sperm) preserved for 0-72 hours at 4°C. The pregnancy of the animals which did not return to oestrus at 60-90 days after insemination was confirmed by rectal palpation.

The conception rates resulting from Artificial Insemination in early, mid, and late stages of oestrus were found to be 46.04, 54.75, and 52.07 per cent, respectively (Table 1).

TABLE 1. EFFECT OF STAGES OF OESTRUS ON CONCEPTION RATE

Stage of oestrus	Number of first A.I.	Conception rate %
Early	367	46.04
Mid	641	54.75
Late	553	52.07
Total	1561	51·76

The highest conception rate (54.75%) was recorded when inseminations were performed in mid oestrus. There was a significant ($P<0.05$) difference in conception rate between early, and mid stage of oestrus (Table 2).

TABLE 2. ANALYSIS OF VARIANCE, STAGES OF OESTRUS & CONCEPTION RATE

Source	D.F.	S.S	M.S.	F
Stages of oestrus	2	147.39	73.69	
Error	6	84.69	14.11	5.22*
Total	8	232.08		

Significant ($P<0.05$)

From the above findings is is apparent that to obtain higher conception rate in cross-bred cattle the animals are to be inseminated between mid, and late stage of the oestrus.

Quail Egg Yolk as New Semen Preservative

Uma Shanker and R. P. Verma

Indian Veterinary Research Institute, Izatnagar, U.P.-243 122.

Five Holstein Friesian bulls and three buffalo bulls, which were maintained at Institute farm under conventional feeding and managerial condition, constituted experimental animals for semen preservation in quail egg yolk citrate. Quails, eggs of which are produced at Central Avian Research Institute, Izatnagar, were obtained and washed with distilled water and dried with alcohol. A solution of 2.9% sodium citrate (Sarabhai Chemical) of 294.1 m. wt. was prepared in distilled water. After breaking the egg of quail (*Coturnix coturnix*) at its narrower end, all the albumen was drained out with the help of forceps. The yolk ball was transferred on the filter paper and was rolled to clear

TABLE 1. VIABILITY OF SPERMATOZOA AT DIFFERENT INTERVAL OF PRESERVATION IN QUAIL'S EGG DILUTOR AT 5-7°C.

Species	No. of semen samples	Motility of spermatozoa after preservation at 12 hrs intervals (70% motility)					
		24 hrs	36 hrs	48 hrs	60 hrs	72 hrs	84 hrs
Cattle	90	—	—	—	72 (80%)	—	18 (20%)
Buffalo	30	—	18 (60%)	—	12 (40%)	—	—

the chalaza. After breaking the egg yolk membrane, clear yolk was poured into a measuring cylinder and immediately a dilutor of one part homogenised yoilk and three parts 2.9 per cent sodium citrate solution was mixed it with a fine blunt sterilized glass-rod into a homogenised mixture. This dilutor was maintained at 30 to 35°C before mixing the semen. Keeping quality of semen was observed as the days in storage at 5 to 7°C till +3 motility of spermatozoa was maintained.

The keeping quality of semen in quail's egg dilutor have been presented in Table 1. The overall average keeping quality with quail's egg yolk citrate extender for semen preservation and insemination were observed 80 per cent and 20 per cent at the interval of 60 hrs and 84 hrs respectively of semen preservation in cattle. Table has further illustrated that the overall average keeping quality with quail egg yolk citrate extender for preservation and insemination were found to be 60 per cent and 40 per cent at the interval of 36 hours and 60 hours of semen preservation in buffalo.

The findings revealed that the quail's egg, which is cheaper could be successfully used during the preservation of semen.

Climatic Effect on Sexual Behaviour and Semen Quality of Jersey Bulls in Arid Zone of Rajasthan

R. K. Sharma, P. K. Pareek and K. K. Vyas

College of Veterinary and Animal Science, Bikaner.

The study was carried out on 378 ejaculates of 6 Jersey bulls of approximately 3 years of age over a period of one year. Bulls were maintained on standard feeding and management conditions. The stalls were cooled during summer months by providing electric fans and Khus-mattings sprinkled with water. For sexual behaviour parameters like reaction time, number of jumps to ejaculate and intensity of thrust at the time of ejaculation whereas for semen ejaculate volume, colour, consistency, mass activity, initial motility, pH and concentration of spermatozoa per ml were recorded. On the basis of atmospheric temperature data from the Meterological Department, the whole period of study was divided into 3 seasons: Season I, II and III with mean temperature of 26.47°, 39.30° and 34.54°C, respectively.

The mean values of different seminal parameters were reaction time, 114.83 $\pm$159 seconds, volume 3.67$\pm$0.04 ml, mass activity, 4.27$\pm$0.03 (0 to 5 scale); initial motility 80.61$\pm$0.48 per cent, sperm concentration 1274, 18$\pm$14.76 million per ml, pH 6.52$\pm$0.03; jumps per ejaculation, 1.72 and intensity of thrust, 2.71.

The seasonal variation was observed to be significant for the reaction time only and not significant for the rest of the parameters studied.

Reproductive Problems in Rnral Buffaloes

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Reproductive parameters are the important factors determining the economics of livestock production. Majority of Indian buffaloes are located in rural areas. The reproductive performance of the rural buffaloes is poor. They are confronted to a great extent, with the problems like delayed maturity, prolonged postpartum anoestrum, weak or silent estrus syndrome and repeat breeding. In the present study the various reproductive problems in the rural buffaloes are reported.

Gynaecological investigations on 567 rural buffaloes for the study of physiopathological conditions of genital organs revealed 32.28% buffalo heifers and 40.90% buffalo cows as pregnant and 7.87% and 9.35% respectively as cycling but the heats were missing. A large proportion of buffalo heifers (59.85%) and buffalo cows (45.00%) were found in anoestrous condition. Details presented in Table.

TABLE

Conditions	Buffalo heifer		Buffalo cows	
	No.	%	No.	%
1. Pregnant	41	32.28	180	40.90
2. Cycling with missing heats as detected:				
(a) with corpus luteum	8	6.30	32	7.30
(b) in heat	2	1.57	9	2.05
3. Anoestrus:				
(a) with subactive ovary	16	12.60	70	15.90
(b) true anoestrous	28	22.05	111	25.24
(c) hypoplastic ovary	32	25.20	—	—
(d) atrophied ovary	—	—	17	3.86
4. Genital pathology:				
(a) cystic ovary	—	—	5	1.13
(b) bursal adhesion	—	—	9	2.04
(c) metritis/pyometra	—	—	5	1.13
(d) cervicitis	—	—	2	0.45
Total	127	100.00	440	100·00

Anoestrum in Cross-Bred Cattle: Clinical Trial

A. R. Bhattacharya and R. N. Shanmugha Sundaram
ICAR Research Complex (CPCRI) Margao—Goa.

Higher incidence of infertility due to long post-partum anoestrus condition among the crossbred cattle is a major problem in cattle development programme. Systematic investigations carried by conducting infertility camps revealed that as high as 17.9% of the animals in Goa suffered from long postpartum anoestrus condition at a particular time and about 21% of the reproductive problem cases in crossbreds were due to true anoestrus.

Considering the importance of the condition, trials were conducted, to induce heat and restore fertility by Tonophosphan and prepalin forte (Vitamin A) therapy, for three consecutive years in farm and field conditions. Five ml, of Tonophosphan and 2 ml of prepalin forte (600,000 I.U.) were simultaneously injected (i/m) for 5 consecutive days to each animal. Altogether 99 cross bred animals were treated and routinely followed for oestrus manifestation, insemination and subsequent pregnancy examination.

It was found that: (a) the average percentages of oestrus induction and fertility were 86% & 73% and 85% & 69% in farm and field conditions, respectively. The animals evinced heat at an average interval of about 29 days after treatment. (b) The overall results obtained indicated that 71% of the animals conceived and calved as a result of the treatment and the year to year results were in accordance.

The result is suggestive that the marginal deficiency of phosphorus and Vit. A is a major contribution factor in anoestrus condition in crossbred cattle in Goa, particularly in field and even in farm conditions. It can thus be concluded that true anoestrus condition in crossbred cattle can be effectively treated by Tonophosphan and prepalin forte and reduce economic losses in livestock production.

Reproductive Efficiency of the Local Cattle

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Regional Research Station (ICAR Research Complex),
Assam Agricultural University, Diphu, Karbi Anglong, Assam, Pin-782460

Present investigation was carried out to ascertain some reproductive characteristics like age at first heat, age at first calving, inter calving period, postpartum oestrous period, gestation period and calving pattern of the local cattle in farm condition of Lumbajong—a hilly area of Assam. The average age at first heat (1451.85$\pm$116.10 days), age at first calving (1720.31$\pm$30.72 days), inter calving period (686.62$\pm$39.42 days), postp artum oestrous period (322.50$\pm$21.29 days). Longer gestation period (284.27 $\pm$1.64 days) was observed in pregnancies with the male than with the female calves (278.60$\pm$2.32 days) and the overall mean gestation period was 281.07$\pm$1.83 days. Seasonal variation in calving pattern indicated significantly ($P<0.05$) more calvings in the season of winter (November to February) followed by summer (March to May) and monsoon (June to October) respectively with no effect on sex ratio.

Honey as an Additive to the Extenders for Preservation of Buffalo Semen

S. S. Kalla, P. K. Pareek, P. K. Dwarknath and K.K. Vyas

College of Veterinary Science, Bikaner, (Rajasthan)

Efficiency of honey for *in-vitro* preservation of buffalo semen in 0.26 Mtris citric acid extender at pH 6.8 was compared with tris citric acid glucose extender using 17 ejaculates from healthy adult Murrah buffalo bulls. The different concentrations of honey used were 1, 2 and 4 per cent. It was compared with 1 per cent glucose, 1 per cent fructose and the combination of the two (0.5 per cent each). Motility score of 3 was maintained in tris ci.ric acid honey (TCH) 1%, TCH 2%, TCH 4%, tris citric acid glucose, tris ctitric acid fructose and tris citric acid glucose—fructose extenders upto 144, 120, 72, 96, 72 and 120 hours of preservation respectively. The live percentage of spermatozoa above 60 were recorded in above extenders upto 168, 120, 96, 120, 96 and 120 hours of preservation respectively. TCH 1% extender was found to be significantly superior to the other extenders compared.

Production and Reproductive Efficiency in Friesian X Sahiwal Crossbreds

Dr. S. P. Ganpule

Krishi Gram Vikas Kendra Tatisilwai, Ranchi, Bihar-835103

Data were collected on 1432 Friesian Sahiwal crossbred cows from five military farms in Northern India to study the Genotype × Environment interactions for various growth, production and reproduction traits. Present report deals with the study of importance of Grade × Season of calving interaction on subsequent milk production and reproductive efficiency. The main effects i.e. Grade and season of calving, as well as the interaction were found to be significant for production and reproduction traits. Parameters of production studied were peak yield and milk yield in 1st lactation, while reproduction trait studied was 1st inter-calving period. These two aspects were combined to find out efficiency of lactation i.e. milk yield per day of calving interval. It was found that cross-bred cows calving in summer season had lower lactation efficiency and this effect was more marked in 3/4th grade crossbreds than in 1/2 & 5/8th breeds.

A Peculiar Abnormality of Male Goat Genitalia

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Assam Agricultural University, Diphu Pin-782460, Karbi, Anglong, Assam.

A male genital system of a local Assam Hill goat with a peculiar anatomical defect was collected from a local abbattoir of Diphu, Assam. The goat was of two pairs of permanent incisor teeth and of 21 kg body weight. The biometrical measures of the genital system were recorded.

On observation a peculiar inverted 'U' shaped accessory tube like conjunctive structure was found in between the ductus deferences and to the posterior ampullary ends. The anatomical position and course of the particular abnormal structure was studied. It was lying on the posterior part of the dorsal surface of the urinary bladder and running over the edge of the anterior part of the urogenital fold. It appeared to be originating at its both ends by bifurcation of the posterior parts of the respective ductus deferens and form a single continuous inverted 'U' shaped tube like structure.

* Senior Research Assistant, Animal Gynaecology and Obstetrics.

FARM NEWS

Dr. K. Janakiraman

All India Co-ordinated Research Project—Endocrinology Unit, Anand Centre.

Note worthy achievements

The centre's main objective is to study the reproductive biology of the Surti buffalo with a view to improve its reproductive efficiency and thereby production performance. Missed heats, calf mortality, late puberty and longer calving intervals are the stumbling blocks to qualify buffalo as a economically viable dairy animal. The following are the salient achievements:

Establishment of blood profile for about 25 different characteristics (biochemical, hormonal and ethological) against different phases of estrous cycle and seasons of the year. Such data was needed for academicians, researchers and field workers to understand the performance and seasonality of buffalo. Data of this nature was not existing before.

The first phase of work 1973-76 revealed that buffalo may not have any inherent genetic character that predisposes this animal to the aberrations of heat, ovulation and associated phenomena. The work further established that buffalo is not synonym to cow. As a distinct species it has to be studied in detail for reproductive efficiency and production capacity.

A specific, reliable, simple and easy to detect heat was located in the phenomenon of "frequent urination" (Details proc., FAO/SIDA/GOI-international symposium, No. 13, Karnal Dec. 1978). This occurs throughout the year and does not occur at proestrus. Hence repeat inseminations can be avoided. Duration of heat and its time of occurrence have also been studied for seasonality against fairly uniform management throughout the year.

Data available at this experimental farm centre reveal no alarming aberrations in Surti buffalo endocrinology that come in the way of postpartum revival of ovarian activity and uterine involution. The average length of pregnancy is 305, 307 and 310 days for the first, Second and Third pregnancies respectively (Range 282-320 days). After calving it is found that the corpus luteum of pregnancy regresses 5-7 days postpartum. Fresh follicular activity starts around this time. By the end of second week postpartum, well developed follicles are palpated and first heat (as detected by the frequent urination) is shown within the first month (around 25 days). This heat is accounted but not used for breeding. Uterine involution is also completed by 29 days (Range 25-35 days). The second heat, which occurs usually around 50 days and the third heat around 70 days are used for breeding. It has been clearly found that proper heat detection is the key factor that influences the postpartum conception and thereby the calving interval. The postpartum fertility which is the key to the economics of dairy farming is achieved at the optimum with rational management. The average calving interval now stands between 13-14 months.

Through a rational calf rearing programme, to which feeding the colostrum within half an hour after birth is the key factor, it is established that Surti buffalo calves can attain puberty around 13-14 months of age and fulfledged maturity around 16 months with a body weight of 240-270 kg. Such female calves as matured heifers conceive and drop the first calf around 26 months. Males proved fertile at 16 months.

ISSAR NEWS

1. ISSAR is pleased to congratulate Dr. Shyam Zanwar, Technical Officer of the Raymond's Sheep and Wool Research and Development Division for having been honoured as a Member of the International Embryo Transfer Society, Fort Collins, U.S.A.
2. ISSAR is pleased to learn that Dr. R. C. Gupta, Dr. S. G. Zanwar, Dr. M. L. Madan and Dr. N. K. Bhattacharya have been appointed as members of the I.C.A.R. Committee "Task Force on Embryo Transplantation—"National Proposals"—Congratulations. ISSAR is in full support to participate in this ambitious project.
3. Hearty congratulations to Padmashree Dr. MANIBHAI DESAI Director, Bharatiya Agro-Industries Foundation, Urulikanchan, for having been honoured with the Wattumul Prize and RAMON MAGSAYSAY INTERNATIONAL AWARD 1982 for his outstanding contribution to the rural development work in Agriculture and Cattle Development. Members of the ISSAR wish him all the best.

ANNOUNCEMENT

The 4th All India Symposium on Animal Reproduction will be held at Haryana Agril. University, Hissar on 14th, 15th and 16th February, 1983. The organizing Secretary Dr. R. C. Gupta, Prof. and Head of the Dept. of Obstetrics & Gynaecology, Veterinary College, Hissar-125 001 will be pleased to receive research/clinical papers on problems of Andrological and Gynaecological importance with particular reference to recent research trends in factors influencing fertility in livestock.

Two copies of the article (with abstracts) should reach the Organising Secretary before 15th November, 1982.

Abstracts of papers accepted for presentation at the symposium will be published in the souvenir issue of the Indian Journal of Animal Reproduction.

For all particulars in respect of the symposium, contact the Organizing Secretary well in advance.

Hon. Secretary,
ISSAR.

NOTIFICATION

Nils Lagerlof Memorial Award for the year 1981

The Indian Society for the Study of Animal Reproduction is pleased to invite research/clinical articles on the subject of Animal Reproduction, published by the Indian authors in any of the journals during January to December, 1981, for consideration of the Nils Lagerlof Memorial Award for the year 1981.

Two copies of the reprints of the articles should be sent by the authors to the Hon. Secretary, ISSAR C/O Dept. of Animal Reproduction, Bombay Veterinary College, Parel, Bombay 400 012. The articles should reach the Hon. Secretary, ISSAR, latest by 15th October, 1982. The award will be presented at the inaugural function of the All India Symposium on Animal Reproduction to be held at HAU. Hissar on 14th February 1983.

Sd. B. R. Deshpande
Hon. Secretary,
ISSAR.

Report on the All India Symposium on "Dairy Farming Today and Tomorrow and Problems of Reproduction in Farm Animals" held at Bombay on 22nd, 23rd and 24th December, 1981.

The Indian Society for the Study of Animal Reproduction in association with the Bombay Gow Rakshak Mandali and Konkan Krishi Vidyapeeth, Dapoli organized the All India Symposium at the Bombay Veterinary College campus on 22nd, 23rd and 24th December, 81. The symposium was attended by 186 scientist delegates in the field of animal reproduction and fodder research and grass land development from various Agril. Universities, National Institutes and State Departments of Animal Husbandry and Agriculture and Remount Veterinary Corps.

Chief Guest Dr. R. M. Acharya, Deputy Director General (Animal Sciences) I.C.A.R. New Delhi, in his key note address enumerated that the major strategy for dairy cattle improvement should be to create new high yielding dairy breeds suitable for different agro-ecological and socio-economic conditions.

The following topics were discussed at various sessions of the symposium.

1. Improvement of grassland.
2. Cultivation of fodder crops.
3. Preservation of fodder crops.
4. Recycling of dairy farm waste.
5. Influence of managemental practices on fertility.
6. Dairying in Israel.
7. Livestock production-Genetic gain.
8. Post-partum anoestrous condition & repeat breeding.
9. Technical papers.
10. Impact of nutrition on fertility in dairy cattle and buffaloes.
11. Infectious Infertility.
12. Problems concerned with teaching and research in the subject of animal reproduction.
13. Male fertility and infertility.
14. Technial papers.

In all 86 papers on the above topics were presented at the sessions of the symposium. The abstracts of relevant papers have been published in the souvenir issue of the Indian Journal of Animal Reproduction which was released at the inaugural function by the Hon-Minister Shri Shivajirao Patil (Nilangekar).

Konkan Krishi Vidyapeeth in association with the Indian Society for the study of Animal Reproduction, felicitated the Bombay Gow Rakshak Mandali for having won the 'Gopal Ratna Award' of Govt. of India. One of their crossbred cow produced 53 litres of milk at the peak of her 3rd lactation.

One of the high lights of the symposium was the live demonstration of 'Ova Transplantation' in sheep (through courtesy of Raymonds Ltd). Mr. C. M. Ketkar made a gift of Rs. 500/- through Nawathe Trust to Dr. S. G. Zanwar for his meritorious work. A gift of Rs. 100/- was also given to Dr. Zanwar by Dr. S. G. Kshirsagar, former Associate Dean, Bombay Veterinary College.

Nils Lagerlof Memorial Award:

This award is instituted by the Indian Society for the Study of Animal Reproduction (ISSAR).

Dr. S. B. Kodagali, Dr. B. R. Deshpande, Dr. C. R. Sane, Dr. A. R. Sheth, Dr. G. V. Shah and Dr. B. A. Gadgil were the recipients of Nils Lagerlof Memorial

Award for the best research publication in the field of animal Reproduction during the year 1980. The article was entitled "LH Levels of Gir cows during post-partum anoestrous and after treatment with Fertivet "FVT-300" In all 31 articles were considered by the selection committee consisting of Dr. S. N. Luktuke, Dr. C. P. N. Iyer and Dr. V. B. Hukeri. The award was presented by Dr. R. M. Acharya, Dy. Director General (ICAR) at the inaugural function of the symposium.

The Indian Journal of Animal Reproduction:

It is a matter of pride that ISSAR has been successful in bringing out the journal of its own—the official organ of ISSAR. Over 86 research/clinical papers were received for publication.

Dr. B. R. Deshpande
Hon-Secretary,
ISSAR.

GUIDELINES TO CONTRIBUTORS

THE INDIAN JOURNAL OF ANIMAL REPRODUCTION is the official organ of the Indian Society for the Study of Animal Reproduction, solely devoted to dissemination of scientific information on REPRODUCTION IN FARM ANIMALS.

Research/clinical papers on impact of genetic, environmental, nutritional, hormonal, infectious and stress factors on efficiency of reproduction, semen studies, breeding by artificial insemination, problems of andrological and gynaecological importance, abstracts of important research papers and thesis would be accepted for publication on the understanding that they have neither been published nor under consideration for publication else where.

A special section is devoted to farm news in respect of progressive achievements in breeding efficiency and notification of valuable strains evolved.

Text

Matter for publication should always be typed and forwarded in duplicate through proper chanel. The type-scripts should be on one side of the paper and double spacing with one inch margin on the left side. Papers should be sent after careful revision and correction and without over-writings. Title of the paper and names of authors be in capital letters and then the address. The paper should begin with the abstract of the article, highlighting the research findings in not more than 150 words written in compact sentences. Short communications and only abstracts will also be accepted. The bulk of the paper should record the actual work done by the author(s). Papers are accepted subject to minor revisions if considered necessary. Tables should be reduced to simplest form. Caption of the table should be brief.

Illustrations

The positions of the illustrations should be indicated in the text. Photographs should be printed on glossy paper and should have high contrast. Line diagrams should be drawn on white tracing paper with black India ink. The author(s)/ Institute will have to bear the cost of block making and printing charges.

References:

The citation of references at the end of each article shall be abbreviated according to World List of Scientific Periodicals.

Reprints:

Each author shall receive 5 copies of reprints free. Orders for extra reprints should be placed in advance and will be charged for.

Note:

The statements and the opinions advanced by the contributors in the article carry the responsibility entirely, on them.