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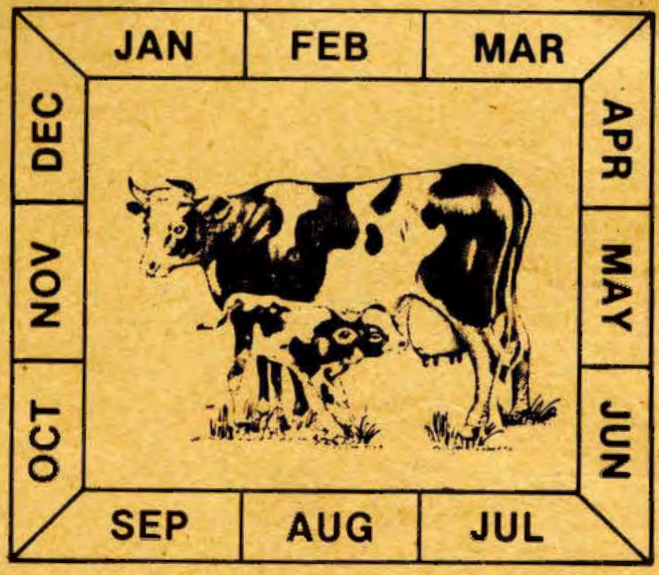

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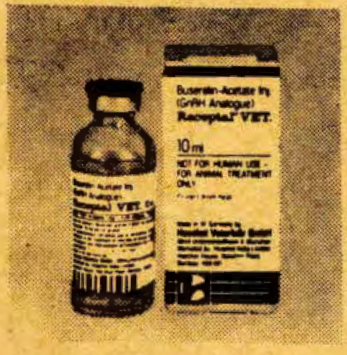

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- DELAYED OVULATION, ANOVULATION
- ANOESTRUS
- FOLLICULAR CYST
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and Animal Sciences, Marathwada Agricultural University,
PARBHANI - 431402 (Maharashtra State)

EDITORIAL

Animal Reproduction research has helped in achieving a phenomenal breakthrough to controlled breeding by hormonal therapy. It is estimated that there are over 8 million cases of hormonal infertility in cattle and buffaloes in India which could be restored to normal fertility by Prostaglandin or hormonal therapy. Proprietary preparations containing Gonadotrophin Releasing Hormones (GnRH) are very effective in such cases. However, at present this effective herapy is very costly. The cost can be considerably brought down by 40% or more by:

- addition of GnRH and GnRH-like products in the table (list) of the new Customs Duty Exemption Notification No. 27/88 issued by the Government of India
- extending the duty concession facilities to bonafide pharmaceutical concerns to import such products for veterinary use and
- simultaneously taking effective steps to encourage the indigenous manufacture/production of such products on priority basis.

We had drawn the attention of the Govt. of India through an earlier Editorial (IJAR 8(2): December 1987) requesting consideration on these lines. However, the matter still remains to be heeded to at the National Level.

Union Government is committed to accelerate the growth of Agrarian economy of rural population comprising Farmers, livestock breeders, small and marginal farmers and people below the poverty line (BPL) who are dependant on soil fertility and livestock productivity.

We earnestly renew our Appeal to Prime Minister Shri V.P. Singh and Deputy Prime Minister Shri Devilalji, the champion of Farmers and rural masses, to help solve this vexing problem. Its solution will lead not only to restoration of Livestock fertility of highly productive cows and buffaloes but instil the much needed confidence in their owners, with ultimate economic benefit.

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THE INDIAN JOURNAL OF ANIMAL REPRODUCTION

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Vol. 11 No. 1 June 1990

1. Gynaecology & Obstetrics.

Announcement

NATIONAL SYMPOSIUM ON "RECENT BIOTECHNOLOGICAL ADVANCES IN ANIMAL REPRODUCTION" AND IXth ANNUAL CONVENTION OF INDIAN SOCIETY FOR THE STUDY OF ANIMAL REPRODUCTION AT

Department of Gynaecology & Obstetrics, College of Veterinary Science, H.A.U., Hissar–125004.

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IJAR:11:1:1-5:1990

The Effect Of Preserving Bovine Spermatozoa At Ambient Temperature On The Release Of Phosphatases And Lactic Dehydrogenase Enzymes

O.I. AZAWI, M.M. ZENAD[1] and L.H. AL-JARRAH[2]
Department of Surgery and Obstetrics, College of Veterinary Medicine, University of Mosul, Mosul, Iraq.

ABSTRACT

Sixteen semen ejaculates from two Friesian bulls were collected and diluted in a Russian dilutor and preserved at ambient temperature. Samples were taken at 0, 24, 48, 72, 96 and 120 hr. of preservation and analysed for percent of progressive individual motility, percent of sperm with aged acrosome, lactic dehydrogenase (LDH), alkaline phosphatase (ALP) and acid phosphatase (ACP). The activity of LDH was significantly increased ($P < 0.05$) at 120 hr. of preservation with a mean value of $155.57 + 14.46$ IU/10^9 sperm. ALP and ACP enzymes showed no significant release in extra-cellular fluid at different times of preservation. Enzymes activity was negatively correlated with progressive indiviudal motility and positively correlated to the spermatozoa with aged acrosome.

* * *

Lactic dehydrogenase, alkaline and acid phosphatases are important enzymes in bovine semen, which provide a substrate energy, forming essential link in the energy generating cycles in sperm metabolism in the process of fertilization and the maintenance of constant osmotic pressure during preservation. Mahmoud *et al* (1986) reported a significant increase in phosphatase activity of bovine semen after freezing and storage in liquid nitrogen. A few reports are available to show the correlation between lactic dehydrogenase and phosphatases with spermatozoal viability (Kupfer, 1972; Singh and Sadhu, 1972; Zverva and Chuhriy, 1972; Kaker and Arora, 1973; Dhami and Kodagali, 1987). The present study was undertaken to investigate the correlation between storage at ambient temperature, spermatozoal progressive motility and spermatozoa with aged acrosome on the release of LDH, ALP and ACP enzymes in bovine seminal plasma.

Materials and Methods

Semen from 3 to 4 years old Friesian bulls was collected using artificial vagina. Immediately after collection, semen receptacle was placed in a water bath at 37°C and evaluated for its general appearance, volume, consistency, mass motility, rate of individual motility and sperm concentration (Salisbury *et al*, 1978).

Each ejaculate included in this study was extended to obtain 100×10^6 sperm per ml of a Russian diultor (Milovanov *et al*, 1964). Diluted semen samples were stored in a dark room at 20-28°C and were examined for sperm progressive individual motility, percent of sperm with aged acrosome, LDH, ALP and ACP at 0, 24, 48, 72, 96 and 120 hr of preservation. Spermatozoa with aged acrosome was identified using fast green fast stain (Wells and Awa, 1970). Samples for LDH, ALP and ACP analysis were obtained by centrifugating 3 ml of diluted semen at

1. Department of Internal and Preventive Medicine.
2. Department of Physiology and Biochemistry.

5000 rpm for 10 minutes. Determination of LDH, ALP and ACP enzymes in a diluted cell free semen sample was carried out using commercially available diagnostic kits (Boehringer Mannheim, Diagnostics GmbH, West Germany).

Analysis of variance, Duncan's multiple range test and correlation coefficient were used for statistical analysis of data (Steel and Torrie, 1980).

Results and Discussion

A total of 16 ejaculates with a mean volume of 5.24 ± 0.37 ml were collected from two Friesian bulls included in this study. The mean percent of progressive individual motility and sperm concentration of the fresh semen were $78.57 \pm 1.78\%$ and $1.01 \pm 0.27 \times 10^9$ sperm per ml, respectively.

The percent of motile spermatozoa showed gradual significant decrease ($P < 0.01$) at 72, 96 and 120 hr of preservation, while the percent of sperm with aged acrosome showed gradual significant increase ($P < 0.05$) at 120 hr of preservation (Fig. 1). The mean values of LDH, ALP and ACP enzymes post-preservation are given in Table 1. The maximal release of these enzymes was observed at 120 hr of preservation (Fig. 2), specially LDH enzyme activity which was significantly increased ($P < 0.05$) at 120 hr of preservation with a mean value of 155.57 ± 14.46 I.U./10^9 sperm. Preserved and aged spermatozoa are likely to suffer a considerable membrane alteration resulting in increased membrane permeability (Bishop, 1970). The LDH enzyme released to extracellular fluids was significantly negatively correlated ($P < 0.01$) to the percent of progressive motile spermatozoa and positively correlated to the percent of sperm with aged acrosome ($r = -0.778$) and ($r = 0.920$) respectively. Singh and Sadhu (1972) reported a highly significant correlation between LDH activity and both initial sperm motility and percentage of motile spermatozoa after storage at 5^0C for 24 and 72 hr. The findings are in agreement with Harrison and White (1972) who suggested LDH enzyme activity in seminal plasma originating from disintegrated cytoplasmic droplet and plasma membrane when spermatozoa were subjected to stress conditions like cold and osmotic shocks.

Alkaline and acid phosphatases did not change significantly (Table 1). The two enzymes were significantly negativey correlated ($P < 0.01$) to spermatozoal motility and positively to the percentage of spermatozoa with aged acrosome. This is in agreement with the findings of Zverva and Chuhriy (1972). Also, Moniem and Glover (1972) found an alteration in phosphatases activity in cytoplasmic droplet of spermatozoa and suggested that this alteration in phosphatase activity might be due to degenerating spermatozoa. However, Kupfer (1972) reported a significant correlation between phosphatases activity in bovine seminal plasma and pH, concentration and motility of spermatozoa, but concluded that alkaline phosphatase activity can not be used to evaluate semen quality of an individual ejaculate.

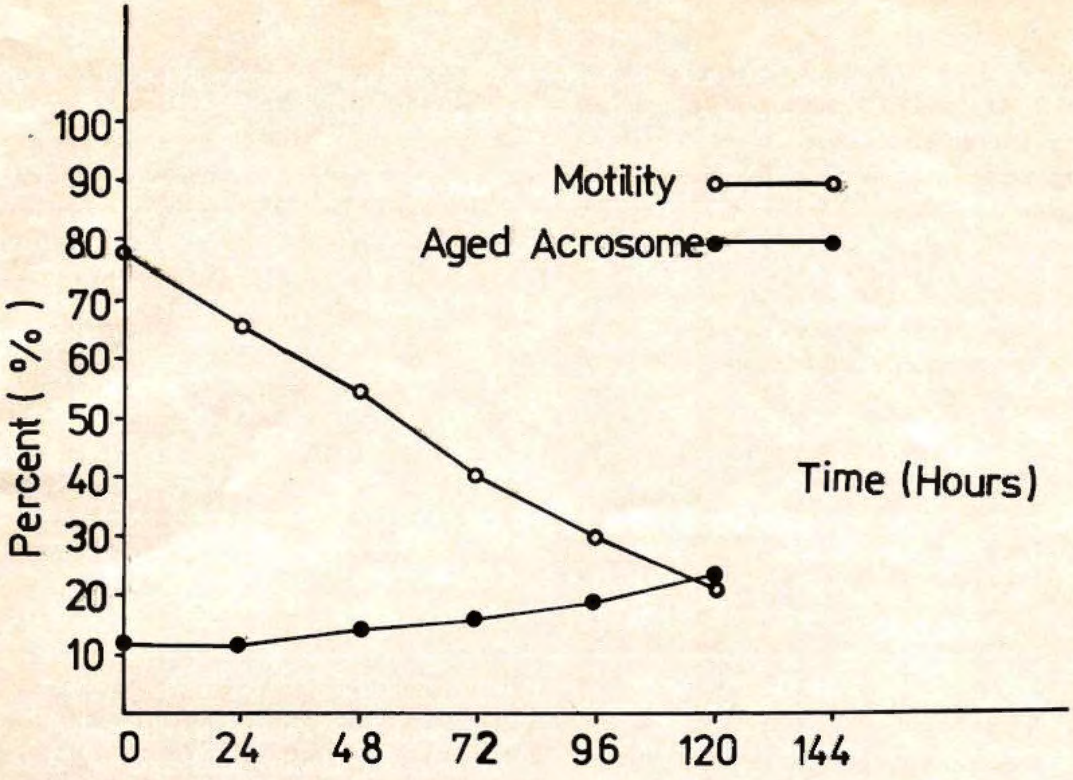

Fig. 1: Effect of sperm preservation at ambient temperature on motility and aged acrosomes.

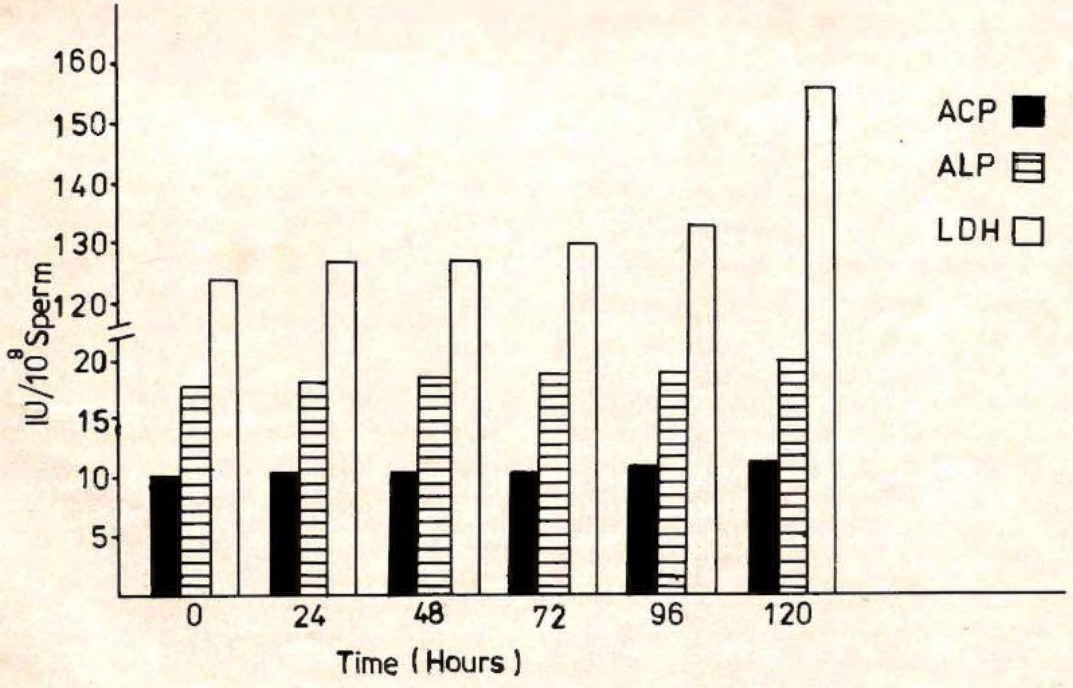

Fig. 2: Enzyme mean values at different times of preservation.

Table 1. Mean values of LDH, ALP, ACP enzymes I.U./10^9 sperm, progressive motility and percentage of spermatozoa with aged acrosome.

Parameters	Time of preservation (hours)					
	0	24	48	72	96	120
LDH	124.57^a ± 9.27	127.71 ± 8.72	128.07 ± 10.63	130.14 ± 9.60	133.14 ± 11.03	155.57^b ± 14.46
ALP	17.64 ± 1.47	17.78 ± 1.42	18.9 ± 1.71	19.01 ± 1.75	19.24 ± 1.63	20.07 ± 1.66
ACP	10.52 ± 1.5	10.68 ± 1.38	10.81 ± 1.29	10.89 ± 1.45	10.91 ± 1.02	11.62 ± 1.25
Progressive motility (%)	78.57^c ± 1.76	65.35^c ± 3.16	55.00^a ± 3.74	40.72^d ± 3.05	30.71^d ± 3.69	22.50^{bd} ± 3.65
Sperm with aged acrosome (%)	12.09^a ± 1.45	12.95^a ± 1.31	14.80 ± 1.62	16.31 ± 1.75	19.15 ± 2.07	23.13^b ± 2.64

a-b ($P < 0.05$)
c-d ($P < 0.01$)

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IJAR:11:1:5-6:1990

Effect Of Antibiotics On Chilled Bovine Semen

K.B. PANDA, B.N. MOHANTY, S.K.H. RAY and D.N. MOHANTY
Department of Gynaecology, Orissa Veterinary College, Bhubaneswar-751 003.

ABSTRACT

Preservation of semen is one of the prime factor for successful artificial insemination. Microbial contamination of semen can cause serious hazards to cattle industry. Bacteria in semen is likely to occur at various stages of semen processing and transportation. Therefore, the use of different chemotherapeutic agents and antibiotics has become imperative to prolong the quality of semen. Hence, the present investigation was designed to study incorporation of some broad spectrum antibiotics with conventional antibiotics in the liquid semen in order to enhance the keeping quality and prevention of some of the venereal infections.

* * *

Semen evaluation was made from 4 bulls as per standard procedure. Such semen samples were diluted with egg yolk citrate (EYC) and divided into 4 parts and different antibiotics were added: Gentamycin 250 mg./ml; Chloramphenicol 500 mcg/ml; Ampicillin 500 mcg/ml and Penicillin and Streptomycin 250 I.U. and 500 mcg/ml, respectively (Salisbury *et al*, 1985).

The initial motility and live sperm percentage of the semen samples were found to be within normal range. The percentage of motile and viable spermatozoa at different hours of preservation were found to reduce gradually during the present experiment, which is in close agreement with Aydin *et al*, (1984). The significant reduction of livability from 0 to 24 hours and subsequently at 48 hours without any significant reduction in 24 to 28 hours is indicative of non-adjustment of spermatozoa to a new environment at early hours of preservation and their subsequent acclimatization as the hours of preservation increased.

As regards viability and motility between the antibiotics extended semen, the livability was highly significant ($P < 0.01$) and the motility also differed significantly ($P < 0.05$). The least square difference between 0 to 24 hours and 0 to 48 hours preservation was significant only so far as livability was concerned which is in confirmation with the findings of Almquist (1949).

Though the addition of conventional antibiotics has been accepted as a routine

practice in the commercial artificial insemination organisations, the present finding of non-significant difference in livability and motility of semen without any adverse effect on the quality of semen, substantiated that with the addition of newly introduced antibiotics, the optimum quality of a particular semen can be maintained. However, Gentamycin and Chloramphenicol proved to be better, thereby suggesting that these two drugs can be safely used as semen additives.

Table 1.: Least Square Difference value of means at different hours of storage of spermatozoa.

	0 hour	24 hours	48 hours	L.S.D. value	Remarks
Livability	70.54^a	64.92^b	58.88^b	6.15	Means followed by same superscripts in a row do not differ significantly from each other at 5% level of L.S.D. Value.
Motility	86.08^c	76.78^c	65.42^c	55.33	

F values : Antibiotics with Livability = 3.97 *
Antibiotics with Motility = 2.75 *
Storage hours with Livability = 57.94 **
Storage hours with Motility = 3.82 *

** $P < 0.01$ significant at 1% level.
* $P < 0.05$ significant at 5% level.

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IJAR:11:1:7-10:1990

Studies On Factors Influencing Efficiency Of Liquid Nitrogen Production

A.B. CHITNIS[1], L.R. SAGDEO[2], S.N. DESHMUKH[3] and A.S. KAIKINI[4]
Regional Artificial Insemination Centre, Telankhedy, Nagpur-440 001.

ABSTRACT

Studies on working of LN_2 Plants throughout the year indicate that their efficiency is influenced by diurnal temperature and relative humidity (R.H.)

* * *

It is well known fact that climatological factors like ambient temperatures and relative humidity affect the efficiency of Liquid Nitrogen production considerably. A study was therefore undertaken to find out different environmental factors associated with the efficiency of Liquid Nitrogen (LN_2), production (Litres/hour) at Nagpur which has extremes of temperatures in summer months (40°C to 45.5°C) with negligible humidity due to which the LN_2 production in summer months is lower than in winter months.

Efforts to lower down the ambient temperature and increase humidity in plant room were made by providing (1) Two Jumbo desert air coolers in front windows of Plant room, working from 9 A.M. to 9 P.M. during summer months. (2) Two ordinary air coolers inside the plant room. (3) Khas tattis to all the doors and windows of the entire Plant building and sprinkling of water on these Khas tattis during daytime. (4) Covering the roof of the Plant room with bamboo matting painted from outside with thick layer of Lime so as to reflect sunrays. (5) Stabiliser room adjacent to plant room which was having an iron rolling shutter was replaced with iron rolling grill gate which was also provided with Khas tattis kept wet with water dropping slowly from top through water-pipeline provided over it. This room was also provided with two air coolers kept inside, working from 9 A.M. to 9 P.M. and (6) Planting of trees such as Neem and Ashoka around the LN_2 Plant building for cooling effect on the building.

Materials and Methods

The LN_2 Plants 108-S model of Philips (India) with production capacity of 6 to 8 Litres/hour were installed at Frozen Semen Station, Nagpur in late 1985. The data on LN_2 production in Litres per hour for two plants for a period of three years (1986-89) was studied. Care was taken to record the total number of hours the plants were functioning in each month of the year with a total quantity of LN_2 produced in Litres monthwise. LN_2 produced in Litres per hour was also recorded. Similarly monthwise maximum and minimum temperature and relative humidity inside the Plant room was recorded with the help of Dry and Wet bulb thermometer.

Standard statistical procedure to estimate mean, standard error and coefficient of

1. Asstt. Director of A.H. (Frozen Semen Lab.), Nagpur.
2. Asstt. Dir. of A.H., D.A.I.C., Wardha.
3. Associate Professor, Genetics, Nagpur Vety. College, Nagpur.
4. Emeritus Scientist (ICAR) and Ex-Dean, Faculty of Veterinary Science, PKV, Nagpur.

variation of LN_2 production (Litres/hour) was followed. Analysis of variance to test the differences among means of LN_2 production, among plants, years, seasons and months was carried out using the following statistical model:-

$Yijkl = \mu + ai + bj + CK + aL + eijkl$

where Yijkl is an observation with μ as overall mean; ai, effect of Plant; bj, effect of years; CK, effect of season; aL, effect of months (12) and eijkl as random error independently distributed with mean zero and variance as unity.

Results and Discussions

Overall mean LN_2 production was 6.16 ± 10 Litres per hour with a coefficient of variation of 13.80 per cent, based on 68 observations spread over a period of three years, including both Plants. (Table 1).

Analysis of variance revealed no significant differences ($P > 0.05$) among the Plants. However, year, season and month differences (Table 2) were found to be highly significant ($P < 0.01$).

It is therefore evident that the efficiency of LN_2 production (Litres/hour) is similar for both Plants.

The mean LN_2 production was found to be high in the first two years (1986-87 & 1987-88) with a significant decline in the third year (1988-89). In the first year after installation (1986-87) both LN_2 Plants worked efficiently. During the subsequent year (1987-88), measures to lower down temp. and increasing humidity in summer months were taken as indicated earlier, which helped in increasing the efficiency of LN_2 plants. This is further proved by observing the total working hours and total LN_2 production during 1987-88 of individual as well as of both the Plants. There was a significant decline in LN_2 production in 1988-89 since the measures taken for increasing nitrogen production were not followed rigidly in that year.

The analysis of seasonal variation for LN_2 production revealed that winter (Oct. to Jan.) production (6.49 Lit./hr.) and summer (Feb. to May) production (6.31 Lit./hr.) were significantly higher than in rainy (June to Sept.) season (5.71 Lit./hr.), although summer production was higher than in rainy season, but slightly lower than winter season.

Analysis of monthly LN_2 production indicates that Oct. to March months which include full winter and part of summer season (6.08 to 6.92 Lit./hr.) were similar and higher in production, while April to Sept. months which include full rainy season and part of summer season, were found to have similar but significantly lower production (5.68 to 6.03 Lit./hr.).

The average data of maximum and minimum temp. and relative humidity percentage records for 3 yrs. in summer, rainy and winter season were 32.45^0C, 20.81^0C and 29% R.H.(Production 5.71 Lit./hr.); 28.78^0C, 19.83^0C and 40% R.H. (Production 6.49 Lit./hr.) respectively. This proves that temperature and relative humidity inside the Plant room affects the LN_2 production. Thus, it is evident that in summer season if the room temperature inside LN_2 Plant is lowered and humidity increased, production per hour can be increased and brought at par with that of winter season. Likewise reduction in humidity during rainy season will help in increased LN_2 production.

It is theefore concluded that LN_2 Plant efficiency is influenced by diurnal temperature and humidity.

On scanning available literature parallel references, of LN_2 Plant efficiency under Indian/Tropical conditions were found lacking and hence it was decided to place on record the present findings.

Acknowledgements

Sincere thanks are due to Shri V.P. Rane, I.A.S., Director of Animal Husbandry, Maharashtra State, Pune; Dr. S.G. Manwatkar, Joint Director of Animal Husbandry, Nagpur; Dr. R.G. Radke and Dr. M.V. Nisal, present and Ex. Dy. Directors of Animal Husbandry (Frozen Semen), Nagpur for providing facilities.

Table 2: Mean, Standard Error (S.E.) and Coefficient of Variation (CV) of LN2 production (Litres/hour) in plants, years, seasons and months.

S. No.	Item	No. of observations	Mean LN_2 Production Litres/hour.	S.E.	C.V.%
1.	Plants.				
	(1) Plant 1	34	6.24[a]	0.15	13.62
	(2) Plant 2	34	6.07[a]	0.15	14.00
2.	Years				
	(1) 1986-87	20	6.57[a]	0.13	11.42
	(2) 1987-88	24	6.22[a]	0.16	12.38
	(3) 1988-89	24	5.75[b]	0.18	14.96
3.	Seasons				
	(1) Summer (Feb. to May)	21	6.31[b]	0.16	11.57
	(2) Rainy (June to Sept.)	24	5.71[a]	0.17	14.89
	(3) Winter (Oct. to Jan.)	23	6.40	0.15	11.09
4.	Months				
	(1) Jan.	5	6.42[a]	0.27	9.35
	(2) Feb.	5	6.44[a]	0.17	6.52
	(3) March	5	6.86[a]	0.36	11.81
	(4) April	5	5.98[b]	0.41	15.74
	(5) May	6	6.03[b]	0.24	9.62
	(6) June	6	5.78[b]	0.24	10.38
	(7) July	6	5.68[b]	0.31	13.20
	(8) Aug.	6	5.70[b]	0.46	19.65
	(9) Sept.	6	5.68[b]	0.44	19.01
	(10) Oct.	6	6.08[a]	0.34	13.65
	(11) Nov.	6	6.51[a]	0.33	12.44
	(12) Dec.	6	6.92[a]	0.15	5.35
	Pooled average	68	6.16	0.10	13.80

Means bearing same superscript do not differ significantly from each other.

Table 1: Details of LN2 Production

Year	Total Working Hours			Total LN2 Production (Litres).		
	Plant 1	Plant 2	Total	Plant 1	Plant 2	Total
1986-87	6301	6009	12310	42185	38739	80924
1987-88	7877	7778	15655	49897	47966	97863
1988-89	7480	7564	15044	43908	43197	87105

Table 3: Analysis of variance for testing differences among means of plants, years, seasons and months in LN2 production (Litres/hr).

Sr. No.	Source of Variance.	df	Sum of Squares.	Mean Squares.	F/Values	Tab. 0.01 Values
1.	Plant	1	0.43	0.43 NS	1.23	7.19
2.	Years	2	7.36	3.68**	10.51**	5.08
3.	Season	2	8.99	4.49**	12.83**	5.08
4.	Months	11	13.74	1.24*	3.54**	2.74
5.	Error	51	17.70	0.35		
6.	Total	67	48.22			

** denotes significance at $P < 0.01$ level of probability.
NS denotes not significant.

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Effect Of Supplementation Of Prostaglandins On Post Thaw Motility And In Vitro Motility In Cervical Mucus Of Frozen Buffalo Spermatozoa

E. MURALINATH, A.S.N. MURTHY, A.V. NARASIMHA RAO[1], G.B. HARANATH[2]
B. BRAHMANADA REDDY and V. HANUMANTHA RAO
Department of Physiology, College of Veterinary Science, Tirupathi-517 502. (A.P.)

ABSTRACT

Thirty-six ejaculates from 6 Murrah buffalo bulls were treated with a combination of PGF_2 and $PGF_2\alpha$ at lower (2.5 + 1.5 ng/ml) and higher (5.0 + 3.0 ng/ml) concentrations, to study the effect of added PG's on post-thaw motility (PTM) and *in vitro* penetrated sperm motility (PSM) at fixed distances of 10, 20 and

1. Dairy Training Centre, Visakhapatnam-530 040 (A.P.)
2. Frozen Semen Bull Station, Indo-Swiss Project, Visakhapatnam-530 040 (A.P.) .

30 mm in mucus tubes till 6 hrs of incubation at 37°C. Addition of PG's at lower concentration significantly ($P < 0.01$) improved both PTM at O-h and PSM after 30 minutes of initial semen-mucus contact (0-h) at 10 mm distance compared to higher concentration and untreated controls. However, this effect was transient and not seen after 2, 4 and 6 hr. incubation. Significant variation among bulls and replicates also existed.

* * *

Cervix presents the first barrier to sperm transport towards the site of fertilisation in cattle, buffalo, sheep, goat etc., as semen is deposited into vagina/cervix in natural service/ A.I. Thus, the cervical mucus plays an important role for the sperm penetration and a positive correlation was observed between mucus penetration capacity of sperm and fertilising ability in humans (Insler *et al*, 1979). Further, large amounts of prostaglandins (PG) present in seminal plasma of some species (man, ram) seem to influence the barriers which face the sperm transport. An increase in sperm number in the oviducts following A.I. with PG supplemented semen was found in rabbit and sheep (Edquist *et al*, 1975; Gustafsson *et al*, 1977) and improved fertility in ewes (Dinov, 1977).

Information on the effect of PG's on buffalo sperm is not available. The present study was therefore undertaken to investigate the effect of pre-freeze supplementation of buffalo semen with lower and higher concentrations of PGE_2 and $PGF_2\alpha$ on post-thaw motility and *in vitro* penetrated sperm motility in cervical mucus of buffaloes.

Materials and Methods

Six fertile Murrah bulls (4 to 6 years) of the Indo-Swiss Project, Visakhapatnam (A.P.) were utilised for this study. Thirty six ejaculates obtained by A.V. at twice weekly schedule were extended in Tris-Egg Yolk - Glycerol to 20×10^6 sperm per ml. Aliquots of the semen were untreated (T_1) or treated with a combination of PGE_2 and $PGF_2\alpha$ at lower (T_2 - 2.5 + 1.5 ng/ml) or higher (T_3 - 5.0 + 3.0 ng/ml) concentrations, filled in 0.5 ml French straws, cooled and held at 5°C for 6 hrs and frozen in liquid nitrogen.

After one week of preservation, semen was thawed at 37°C for 30 sec and scored for post-thaw motility (PTM) at 0 h and at 2 h intervals up to 6 hrs of incubation at 37°C or till motility ceased, whichever was earlier.

The pooled mid-oestrual cervical mucus of buffalo-cows was used to study the *in vitro* motility of frozen-thawed sperm in mucus as per the method described by Kremer (1965) with slight modifications. The mucus filled capillary tube (8 cm × 0.8 mm) was brought into contact with the semen reservoir in a vertical position, held at 37°C for 30 minutes and the penetrated sperm motility (PSM) evaluated under a phase contrast microscope at fixed distances of 10, 20 and 30 mm, immediately (0 h) and at 2 hr intervals, for 6 hrs of incubation at 37°C.

Statistical analysis of the data was done by ANOVA after arcsin transformation (Snedecor and Cochran, 1967).

Results and Discussions

The mean PTM at 0 h was significantly ($P < 0.01$) higher (Table 1) in the samples treated with lower concentration of PG's (T_2) compared to higher concentrations (T_3) and untreated controls (T_1). The motility of T_2 after 2 and 4 hrs was also better although non-significant, while at 6 h motility ceased in all, except for one bull in T_2. Bull differences in motility were also significant ($P < 0.01$) with improvement seen in all bulls for T_2 and 3 bulls for T_3 which is suggestive of individual

bull differences in the seminal concentration of PGE_2 and $PGF_{2\alpha}$ and the effect of added PG's may depend on these initial levels.

The mean PSM at 10 mm distance in the mucus tubes after 30 minutes of initial semen-mucus contact (0 h) improved in all the samples compared to PTM (Table 1), the difference for T_2 being significant ($P < 0.01$). The PSM for T_2 was also significantly ($P < 0.01$) higher than T_1 and T_3. Treatment effects on PSM at 0 h at distances of 20 and 30 mm were, however, non-significant. The mean PSM at the 3 distances after 2, 4 and 6 h incubation also reflected similar trend as was seen after 0 h with differences mostly arising due to absence of motility at later evaluations. Bulls also differed significantly ($P < 0.05$) in PSM at 20 and 30 mm after 6 h as motility was apparent in 3, 6 and 5 bulls at 20 mm and 0, 4 and 4 bulls at 30 mm for T_1, T_2 and T_3 respectively. Replicate variations were also significant.

Our results corroborate with those of improved motility obtained by adding PGE_2 and $PGF_{2\alpha}$ at lower concentration to chilled buffalo spermatozoa by Ramana (1986). Further, the results are in congruity with the findings that PGE_2 was more directly concerned with motility of sperm and stimulates spermatozoal activity (Schoenfeld *et al*, 1975), while $PGF_{2\alpha}$ was inhibitory to sperm motility (Cohen *et al*, 1977; Rabbit *et al*, 1981).

The study thus revealed that pre-freeze addition of PGE_2 and $PGF_{2\alpha}$ at lower concentration (2.5 + 1.5 ng/ml) exerts pronounced stimulatory effect on the post-thaw motility and *in vitro* motility in cervical mucus of buffalo spermatozoa, albiet transiently, while higher concentrations had no adverse effect. Individual bulls differ in this response presumably due to differences in seminal PG concentrations. The enhanced PSM observed due to PG treatment might be a contributory factor in improving fertility of buffalo semen and studies in this direction are in progress.

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Table 1: Mean post-thaw motility and in vitro penetrated sperm motility in cervical mucus of the control and P.G.'s treated buffalo spermatozoa at 3 distances after 0 to 6 h incubation at 37°C.

Evaluation time (at 37°C)	Post-thaw motility (PTM)			Penetrated sperm motility (PSM) at								
				10 mm			20 mm			30 mm		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
0 h	45±0.4	51.1±0.5**	47.1±0.6	51.5	58.1**	49.5	36.6	42.2	39.0	22.6	25.6	24.0
2 h	14±2.0	18.6±2.4	14.5±1.9	36.1	42.8*	39.8	18.8	20.9	20.1	12.3	14.8	13.5
4 h	8.8±1.2	12.3±1.6	9.8±1.6	22.0	32.8*	26.2	13.3	17.2	15.3	3.8	8.4*	2.0
6 h	0	1.6±0.4	0.8±0.3	6.4	12.8*	9.2	4.1	9.1*	3.9	0	3.6	1.8

* Significant at 5% level. ** Significant at 1% level.

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Observations On Nonsurgical Recovery And Transfer Of Embryos In Crossbred Cows

R. MANICKAM[1], M. MOHAN[2], K.G. SADASIVAM PILLAI[3] and C.R. KRISHNAMURTI[4]
Animal Husbandry Department, Tamil Nadu Agricultural University, Coimbatore-641 003 Tamil Nadu.

ABSTRACT

Experiments were undertaken to develop suitable nonsurgical procedures for the recovery and transfer of embryos in crossbred cows using locally available equipment and hormones. A cervical expander was fabricated to facilitate the introduction of Foley catheter into the cervical canal. Super ovulation was induced by the administration of PMSG on day 10 of the oestrous cycle of the donor and synchronization of oestrous was achieved by injection of $PGF_2\alpha$. Embryos were flushed nonsurgically with phosphate buffered saline on day 7 following A.I. The details of the procedures have been described and the reasons for the failure of recovery and/or transfer have been discussed.

* * *

Bovine embryo transfer is a relatively new technique in India and the nonsurgical procedure has to be standardized for application in field. In the present study attempts have been made to standardize the procedure for nonsurgical bovine embryo recovery and transfer of embryos under field conditions, using locally fabricated equipment and indigenous sources of chemicals and hormones, adopting the

1. Professor and Head,
2 & 3 Assistant Professor,
4 Professor, Department of Animal Science, University of British Columbia, Vaucouver, Canada.

techniques of Betteridge, (1977); Church and Shea (1977); Wilmut (1981); Henderson (1983); Coleman *et al* (1987); Hasler *et al* (1987) and Hafez (1987).

Materials and Methods

Animals: Twelve Jersey X Sindhi Crossbred Cows of approximately 75 per cent exotic inheritance and One Sindhi Cow were used in the study conducted between May and September, 1988. Their reproductive status and related parameters are given in Table 1. Due to managerial constraints, donor cows were selected randomly on the basis of regularity of cycling and stage of lactation, rather than on their reproductive efficiency and genetic potential. However, all the animals were subjected to gynaeco-clinical examination to confirm that they did not have any pathology of reproductive tract.

Hormones and Chemicals: For oestrus synchronization, 25 mg of Prostaglandin $F_2\alpha$ (DINOFERTIN, ALVED, Madras) were injected intra-muscularly (I.M.) after rectal palpation for the presence of a corpus luteum (CL). Superovulation was induced by a single I.M. injection of 2000 I.U. of Pregnant Mare Serum Gonadotrophin (PMSG) (FOLLIGON, Intercare, Calcutta). Dulbecco's Phosphate buffered saline (PBS, HiMedia, Bombay) containing 1% heat inactivated bullock serum was used to flush the embryos. Dulbecco's modified Eagle's medium was also used in some cows. Penicillin G. sodium, Streptomycin sulphate and Nystatin, (HiMedia, Bombay) were added at a concentration of 1 lac units, 50 mg and 1.2 lac units per liter of PBS respectively.

Protocol for embryo transfer: For superovulation, 2000 I.U. of P.M.S.G. (Folligon) was administered I.M. to the donor cow on day 10 of the natural or synchronised oestrous cycle. Prostaglandin $F_2\alpha$ (Dinofertin) 25 mg was injected I.M. on day 13 of the oestrous cycle. Heat symptoms were observed and three inseminations were done with double dose of frozen semen on day 15 and day 16. Recipient cows between 5 and 15 day of their oestrous cycle were selected and given Prostaglandin $F_2\alpha$ 25 mg each on day 12 of oestrous cycle of the donor cow.

Non surgical recovery and transfer: The procedure used in non-surgical recovery and transfer of embryos were as per Elsden *et al* (1976) and Betteridge (1977).

Results and Discussions

Following the administration of $PGF_2\alpha$ all the superovulated donor cows came to heat after 48 hours, while the recipient cows which did not receive PMSG injections took 72 to 96 hours (263, 323 and 435). Multiple follicles were felt by rectal palpation during inseminations. Though the effects of different doses and routes of administration have to be studied further, the $PGF_2\alpha$ preparation used appears satisfactory for synchronizing the oestrous cycles of cows in the embryo transfer programme.

The response of the cows to administration of 2000 I.U. of PMSG was variable. In 6 out of 11 cows (54%), the right ovary was enlarged to the size of a golf ball with well developed follicles; in 3 out of 11 cows (27%) both the ovaries responded well; in one cow (241) only the left ovary responded and in another cow (361) there was no ovarian response at all (Table 2). Unless other variables pertaining to nutrition, genetics and management are controlled strictly, it will be difficult to draw conclusions on the dose-response relationship of super-ovulatory treatments. Though it is probable that a higher dose of PMSG than 2000 I.U. may have evoked a better ovarian response, the decision to keep the PMSG dose at 2000 I.U. was made to minimize hormonal stress on nutritionally marginal animals.

Of the six cows from which no embryos were recovered, one (361) did not show ovarian response at all; two cows (324 and 379) exhibited allergic reaction during flushing which was discontinued; the Foley catheter could not be passed in Cows 399 and 323; though the right ovary of cow 294 responded to PMSG, rectal palpation revealed 5 Graafian follicles rather than CL at the time of flushing (Table 2), suggesting a possible deficiency of luteinizing hormone (LH). It may be advantageous to inject an LH preparation, if lack of ovulation is a persistent problem. One embryo was recovered from Sindhi cow 241 which had 4 CL on the left ovary. The number of embryos recovered from the other cows and the number of CL palpated were: 1 and 4 in cow 241; 2 and 5 in cow 299; 3 and 6 in cow 329 and 3 and 8 in cow 420. This amounts to a flushing efficiency of 39% which is likely to improve with experience, skill and better screening of embryos in the sediment microscopically. Most of the embryos were between the morula and blastocyst stages and were of transferable quality with intact zona pellucida and well formed blastomeres. In cow 263, in which 6 CL were palpated, 6 unfertilized ova were recovered suggesting probable errors in the timing or technique of AI.

Though transferable embryos were recovered from 4 cows (241, 299, 329 and 420), no recipient was available for cow 299. The single embryo recovered from Sindhi cow 241 was transferred to a cow belonging to a private owner. One of the embryos recovered from cow 329 was transferred to cow 263. In both cases, the recipients came to heat after 31-32 days. The 3 embryos recovered from cow 420 were of excellent quality and two of them were transferred to cow 421 which came to heat after 14 days. Though several factors such as the quality of embryos and asynchrony of oestrus between the donor and recipients have been considered important in ensuring pregnancy, the lack of success in the present study may be ascribed to poor reproductive history of the recipient cow 263 which had a mean calving interval of 459 days over 5 lactations and took 4.5 inseminations for each conception. This emphasizes the need to pay maximum attention to the choice of only good cows in embryo transfer programmes. It is hoped that the observations presented in this report would benefit the planning and successful execution of future embryo transfer projects.

A very interesting observation was the allergic response of two cows (379 and 324) as soon as PBS containing 1 per cent heat inactivated bullock serum entered the uterine horn. Similarly considerable difficulty was experienced in passing cervical dilators in two cows (Cow 323 and 399) probably due to poor alignment of cervical folds.

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Table 1: Reproductive status of cows used in the Embryo Transfer Programme

Cow No.	Age at first calving (months)	No. of Calvings	Calving interval (days) Mean ± S.E.	Service period (days) Mean ± S.E.	Number of oestrous cycles per pregnancy Mean ± S.E.	No. of inseminations per conception Mean ± S.E.
241	40.0	5	533 ± 113.77	253 ± 113.77	12.0 ± 5.4	4.5 ± 2.38
263	42.0	5	459 ± 61.80	179 ± 61.8	8.5 ± 2.94	4.5 ± 2.51
294	28.0	4	407 ± 26.50	127 ± 26.50	6.0 ± 1.25	3.3 ± 1.15
299	22.5	4	400 ± 93.85	120 ± 93.85	5.6 ± 4.44	3.0 ± 3.46
323	29.0	3	416 ± 31.82	136 ± 31.82	6.5 ± 1.48	2.0 ± 0.00
324	27.5	3	406 ± 76.36	126 ± 76.36	6.0 ± 3.68	3.0 ± 2.83
329	30.0	3	417 ± 14.14	137 ± 14.14	6.5 ± 0.71	4.0 ± 4.24
361	29.0	2	506	226	10.7	2.0
379	30.5	1	–	1.5 years (not conceived)	5.0	5.0
399	26.0	1	–	1.25 years (not conceived)	1.0	1.0
420	27.5	1	–	90	3.0	2.0
421	27.5	1	–	90	1.0	1.0
435	20.5	1	–	150	1.0	1.0

Table 2: Superovulatory response and number of embryo recovered nonsurgically from cows.

Cow No.	Superovulatory response				No. of CL	No. of embryos	Remarks
	RO only	LO only	Both ovaries	No response			
361	–	–	–	+	Nil	Nil	No ovarian response
324	–	–	+	–	4	Nil	Allergic to PBS
379	+	–	–	–	5	Nil	Allergic to PBS
323	+	–	–	–	4	Nil	Cervix could not be penetrated.
399	+	–	–	–	4	Nil	-do-
294	+	–	–	–	Nil*	Nil	* 5 Graffian follicles instead of CL; LH deficiency?
263	+	–	–	–	6	Nil	Six unfertilized ova, Errors in AI?
241	–	+	–	–	4	1	
299	–	–	–	–	5	2	
329	–	–	+	–	6	3	
420	–	–	+	–	8	3	

RO: Right Ovary; LO: Left Ovary; CL: Corpus Luteum

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Body Weight And Pelvic Dimensions During Pregnancy And Puerperium In Kankrej Heifers

S.K. PANDEY[1], K.P. SHUKLA[2], B.V. GUJAR[3], J.P. PATEL[4] and Y.G. DUGWEKAR[5]

College of Veterinary Science and Animal Husbandry, Gujarat Agricultural University, Sardar Krushinagar-385 506.

ABSTRACT

Studies on 25 pregnant Kankrej heifers revealed that their body weight during pregnancy was positively correlated with pelvic area. The body weight and pelvic area increased gradually during gestation. An abrupt decline in body weight was observed on the day of parturition. The body weights at 6, 7, 8 and 9 months of gestation, and one month post-partum were 355.8, 371.96, 388.56, 404.44 and 372.64 kg respectively. The pelvic inlet and outlet during the corresponding periods were 287.05, 300.18, 314.79, 378.44 and 347.7 and 184.08, 191.81, 209.19, 245.54 and 218.35 cm^2, respectively. These results indicate that the pelvic area is dependant on body weight during later stages of gestation, and is significantly influenced by the body weight at conception.

* * *

Inadequate pelvic area either due to immaturity or retarded pelvic development is a frequent cause of dystocia in cattle. Wiltbank (1981), Derivaux *et al* (1964) and Young (1970) observed that the maternal pelvic size was an important factor in bovine dystocia. Ward (1972) observed that 30% of heifers had pelvic area less than 225 cm^2 and 50% of these had calving difficulty. Dhaliwal *et al* (1982) reported a positive correlation between body weight and pelvic area during gestation in buffaloes. However, such data is not available on Kankrej cattle. The present study is aimed to study the body weight and

1, 3 Ph.D. Scholar, Department of Livestock Production.

2 Professor and Head, Department of Livestock Production.

4 Associate Research Scientist, Livestock Research Station.

5 Professor & Head, Department of Gynaecology & Obstetrics.

pelvic area changes in Kankrej heifers during pregnancy and puerperium.

Materials and Methods

Twenty five Kankrej heifers used in the present study conceived at an average age of 914.8 ± 27 days and weighed 302.56 ± 5.58 Kg. The animals were maintained under standard managemental and nutritional conditions at the University Livestock Research Station, Dantiwada. The body weights were recorded on the weighing bridge. The pelvic dimensions were measured as per Dhaliwal (1981) using external pelvimeter. The external and internal pelvic dimensions were calculated as per Arloing (1891). Statistical analysis was conducted as per the methods described by Snedecor and Cochran (1967).

Results and Discussions

The body weights of heifers at 6, 7, 8 and 9 months of gestation, on the day of parturition and one month post-partum were 355.8 ± 6.13, 371.96 ± 6.06, 388.56 ± 6.13, 404.44 ± 6.29, 375.96 ± 6.65 and 372.64 ± 6.72 Kg respectively (Table 1).

The body weights during 7th month of gestation and one month post-partum were comparable, whereas during 9th month of gestation, the body weight was significantly higher ($P < 0.05$) over rest of the stages under study. The body weight at conception was 302.56 ± 5.85 kg which increased to 355.88 ± 6.13 kg at sixth month of pregnancy. The increase in weight upto 9 month's gestation was gradual. There was an abrupt fall in body weight to 375.96 ± 6.65 kg on the day of parturition and then gradually fell to 372.64 ± 6.72 kg, one month post-partum.

Patil and Deshpande (1981) reported an increase in body weight from eighth week to second week prepartum by 18.63 kg. On the day of parturition there was an abrupt fall of 26.63 kg and then the body weight increased from second week post-partum in Gir cows. Pradhan (1987) indicated that even the well nourished cows lost body weight after calving as the daily milk yield increased.

The pelvic inlet areas during 6, 7, 8 9 month of gestation and one month post-partum were 287.05 ± 4.24, 300.18 ± 5.43, 314.79 ± 7.15, 378.44 ± 8.62 and 347.70 ± 8.86 cm^2 respectively. The increase in pelvic area was gradual upto 8th month of gestation and thereafter it increased rapidly during 9th month of gestation. Later on the pelvic dimensions showed a marked decline at one month post-partum.

The growth rate of pelvic inlet and outlet per day were estimated to be 0.46 and 0.42 cm^2, from 6th month of gestation to 8th month of gestation. The corresponding values from 8th month of gestation to 9th month of gestation were estimated to be 2.12 cm^2 and 1.21 cm^2, respectively. Dhaliwal *et al* (1982) reported that the pelvic outlet area in buffaloes grew in a linear fashion from breeding to calving at the rate of 0.57 cm^2 per day. Similar pattern of growth was reported in beef heifers (Price and Wiltbank, 1978). Verma (1981) reported that pelvic outlet area increased by 21.88 cm^2 and 16.37 cm^2 from 4th to 8th month of pregnancy in 1/2 HF x 1/2 Gir and 1/2 J x 1/2 Gir cows respectively and thereafter showed a sudden increase. On the day of calving, the pelvic area was 327.43 ± 4.75 cm^2 and 289.05 ± 4.99 cm^2, respectively. Then there was a decline and remained almost constant after eighth week post-partum.

All the estimates of correlation value between body weight at various stages of gestation ranged between 0.942 at 6 month to 0.817 at one month post-partum. The correlation coefficients were positive and highly significant ($P < 0.01$). This indicated that the weight during gestation and

puerperium significantly depended upon the weight at conception. Price and Wiltbank (1978) also reported that the pelvic area at the time of breeding can be used as an aid in the prevention of dystocia.

The regression analysis indicated that the per unit change in body weight at conception significantly ($P<0.01$) increased the weight at 6, 7, 8 and 9th month of gestation and after one month post-partum by 0.936, 0.939, 0.919, 0.927 and 1.086 kg, respectively.

It is further revealed that the estimated pelvic inlet area had significant ($P < 0.05$) association with weight at conception from 6 month of gestation to one month post-partum except at 9th month of gestation. At 7th 8th and 9th month of gestation, the pelvic outlet area was significantly influenced by weight at conception. The correlations were 0.477 ± 0.183, 0.610 ± 0.165 and 0.533 ± 0.176 at 7th, 8th and 9th month of gestation.

The body weight during various stages of gestation and puerperium had positive correlation with pelvic inlet and outlet during the corresponding stage of gestation. The correlation values ranged from 0.531 to 0.892. In comparison, the correlation between weight and pelvic inlet and also between pelvic inlet and outlet were on the lower side. But all the 'r' values were highly significant ($P < 0.01$). This indicated that the pelvic inlet and outlet during any month of gestation depended on body weight at the corresponding stage of gestation.

The correlation values of the body weight and pelvic area at 9th month of gestation and at one month post-partum ranged between 0.475 to 0.883 (Table 2). The pelvic inlet at one month post-partum had highly significant ($P < 0.01$) correlation with body weight at one month post-partum. The body weight at 9th month of gestation also had significant ($P < 0.05$) correlation with pelvic outlet at one month post-partum. The correlation between pelvic outlet at one month post-partum and pelvic area at 9th month of gestation was highly significant ($P < 0.01$). The regression analysis indicated that the pelvic outlet was not influenced by weight at 9th month of gestation. However, pelvic inlet and pelvic outlet at one month post-partum was influenced by body weight and pelvic area at 9th month of gestation.

These results indicated that the pelvic area was dependent on body weight during later stages of gestation, and was significantly influenced by the body weight at conception. During post-partum period, the pelvic area at one month post-partum depended upon body weight at 9th month of gestation and at one month post-partum.

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Table 1: Average body weight and pelvic dimensions during pregnancy and puerperium in Kankrej heifers. (n = 25)

Stages of pregnancy (months)	Body weight (Kg)	Pelvic Area (cm^2)	
		Inlet	Outlet
6	355.80 ± 6.13	237.05 ± 4.24	184.08 ± 2.77
7	371.96 ± 6.06	300.18 ± 5.43	191.81 ± 3.51
8	388.56 ± 6.13	314.79 ± 7.15	209.19 ± 4.47
9	404.44 ± 6.29	378.44 ± 8.62	245.54 ± 5.31
Day of Parturition	375.96 ± 6.65	--	--
One month Post-Partum	372.64 ± 6.72	347.70 ± 8.86	218.35 ± 5.60
F Values.	8.40**	29.72**	27.45**

Note: Values bearing different superscripts within a column differ significantly ($P < 0.05$).
** Significant ($P < 0.01$).

Table 2: Relationship between body weight, pelvic inlet and outlet at 9th month of gestation and one month post-partum.

		Body weight at 9th month	Pelvic inlet at 9 month	Pelvic outlet at 9 month	Weight at + 1 M.
Pelvic inlet + 1	r	0.591**±0.168	0.883**±0.098	0.760**±0.136	0.613**±0.165
	b	0.837**±0.238	0.907**±0.101	0.456**±0.081	0.699**±0.188
Pelvic outlet + 1	r	0.475* ±0.183	0.747* ±0.139	0.831**±0.116	0.570**±0.171
	b	0.426 ± 0.164	0.486**±0.090	0.875**±0.122	0.411**±0.124

** Significant ($P < 0.01$).
* Significant ($P < 0.05$).

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Incidence Of Split Oestrus Among Ongole, Swiss Brown And Crossbred Cows

A.V. NARASIMHA RAO and A. NARASIMHA RAO
Indo-Swiss Project, Visakhapatnam-530 040 (Andhra Pradesh)

Fertility may be impaired due to occurrence of aberrant types of oestrus and ovulation. Mistimed rupture of the ovarian follicle was reported to occur at a frequency of 5.5% (Pittler, 1961) to 20% (Van Rensburg, 1962) in exotic cows.

The present report places on record the occurrence of split oestrus among Ongole, Swiss Brown and their crosses at the base farm of the Indo-Swiss Project, Visakhapatnam.

A retrospective analysis of oestrous periods of 1.384 Ongole, 117 Swiss Brown and 185 Swiss Brown x Ongole cows over a period of 7 years revealed incidence of split oestrus of 3.18, 1.71 and 0.84 percent respectively ($P < 0.01$).

In split oestrus the animals showed behavioural oestrus twice within a period of 3 to 6 days. The first oestrus was, however, not accompanied by ovulation, while the second oestrus was ovulatory and followed the first oestrus only after cessation of initial oestrous signs. Among Ongole cows, the frequency of occurrence on 3rd, 4th, 5th and 6th day after first oestrus (Day 0) was 59.1, 18.2, 9.1 and 13.6 percent respectively ($P < 0.01$). It was significantly higher ($P < 0.01$) in young animals of first (27.5%), second (22.7%) and third (18.2%), than in fourth (6.8%), fifth (6.8%) and sixth (13.6%) parity groups. For Swiss Brown and crossbred cows, it was observed in second para. 36% of the total split oestrous periods in Ongole cows occurred in the first post-partum standing oestrus. Further, 9% of these were seen twice in the same cows. The preceding oestrus cycle length was less than 20 days in 13 (46%) out of 28 repeat heats manifesting split oestrus, whereas the succeeding cycle length of less than 20 days was in 3 (12%) cases only.

The distribution of intervals of 21 to 24 days, 25 to 45 days and above 46 days were 7, 15 and 32 percent in the preceding and 20. 36 and 32 percent in the succeeding cycles respectively. Split oestrus was more common during winter (41%), compared to summer (27%) and rainy (32%) seasons ($P < 0.05$).

None of the Ongole cows conceived to inseminations in the first oestrus and 43.2% conceived in the second oestrus. Further 5 (26.3%) of the conceptions terminated between 2 to 4 months of pregnancy.

Although incidence of delayed ovulation as a cause of lowered fertility was recorded (Hancock, 1948), the aberrant type of oestrus described in this study does not seem to have been reported earlier. L.H. plays the primary role in follicular rupture and ovulation. Both F.S.H. and L.H. usually act synergistically and any imbalance due to deficiency of L.H. might result in aberrations of oestrus.

Glencross *et al* (1981) showed a steady rise in plasma oestradiol-17β levels during 4 days to a peak at about the time of onset of behavioural oestrus in cows, when progesterone levels were low. A second peak of oestradiol occurred 5 days after oestrus, when progesterone was about one third peak luteal phase levels. It is probable that in the absence of ovulation due to initial L.H. deficiency, and the resultant low progesterone level, the second peak of oestradiol might initiate a second behavioural oestrus and ovulation as observed in split oestrus. Another interesting feature is that 26.3% of the cows conceived at split oestrus aborted between 2 to 4 months which might involve ageing of the gametes or hormonal disturbances.

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Incidence Of Certain Gestational Disorders In Crossbred Cows

A.J. WAGH[1], K.M. KALE[2] and V.S. NARAWADE[3]
Department of Animal Science and Dairy Science, Mahatma Phule Agricultural University, Rahuri-413 722 (M.S.)

The records maintained at the All India Co-ordinated Research Project on Cattle, Rahuri, during the six year period (1982 to 1989) were studied. The foundation stock of Gir (G) cows was inseminated with frozen semen of Holstein friesian (F) and Jersey (J) to generate FG and JG halfbreds. The FG halfbred females were inseminated with frozen semen of Brown Swiss (B) and Jersey to generate BFG and JFG second generation crosses. The JG halfbreds were inseminated with frozen semen of Friesian to generate FJG second generation crosses. The halfbreds and second generation crosses thus obtained were mated inter-se.

The incidence of abortion was lowest (Table 1) in FG (1.08%) followed by JFG (3.90%), BFG (4.89%) and highest in FJG

1. Assistant Professor of Veterinary Science.
2. Senior Scientist, Cattle Project.
3. Head, Dept. of Animal Science and Dairy Science.

group (5.26%). The overall incidence of abortion was found to be 3.97%. This is within the normally accepted limits of 2 to 5 percent (Roberts, 1971). The incidence of still births was 0.86, 0.87, 0.68 and 0.94 percent in FG, FJG, JFG and BFG crosses, respectively with the overall incidence of 0.85%. Kaikini *et al* (1981) recorded 0.49% incidence of still births in HF x Gir F_1 crosses and 0.84% in Jersey crosses. The premature births were 0.14% and 0.94% respectively, in FJG and BFG genetic groups with overall incidence of 0.28%. Higher incidence of premature births was reported by others in crossbreds (Rao, 1982; Jain and Pachlag, 1986).

Early embryonic deaths were classified as those which expressed heat symptoms between 60 to 90 days after pregnancy diagnosis. Early embryonic deaths were observed among the FG, FJG, JFG and BFG groups as 1.95, 1.75, 7.35 and 2.07 percent, respectively with an overall incidence 3.03%. Kaikini *et al* (1981) observed 1.68% and 2.48% embryonic losses in Jersey x Gir and HF x Gir F_1 crosses, respectively.

Table 1: Groupwise incidence of gestational disorders in crossbred cows.

Genetic group of cow	Total No. of Pregnancies studied	Abortions		Still births		Premature births		Early embryonic deaths	
		No. of observations	Percent incidence	No. of observations	Percent incidence	No. of observations	Percent incidence	No. of observations	Percent incidence
FG	461	5	1.08	4	0.86	-	0.00	9	1.95
FJG	684	36	5.26	6	0.87	1	0.14	12	1.75
JFG	435	17	3.90	3	0.68	-	0.00	32	7.35
BFG	531	26	4.89	5	0.94	5	0.94	11	2.07
Overall incidence	2111	84	3.97	18	0.85	6	0.28	64	3.03

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Changes In Biochemical Constituents Of Allantoic And Amniotic Fluids With The Increase In Gestation Period In Buffaloes*

R.C. RAJASUNDARAM[1], D. KATHIRESAN and S.R. PATTABIRAMAN[2]
Department of Obstetrics and Gynaecology, Madras Veterinary College, Vepery, Madras-600 007.

ABSTRACT

The mean concentration of urea nitrogen, creatinine, protein, sodium and potassium in allantoic fluid was 47.41±3.60 mg/100 ml, 0.22±0.05 mg/100 ml, 0.77±0.02 gm/100 ml, 80.25±5.80 mEq/L, and 22.66±3.34 mEq/L respectively. The corresponding values in amniotic fluid were 24.12±2.60 mg/100 ml, 0.04±0.001 mg/100 ml, 0.67±0.01 g/100 ml, 117.5±2.70 mEq/L and 15.25±1.33 mEq/L. The mean concentration of urea nitrogen, creatinine, protein and potassium were significantly more in allantoic fluid, whereas the level of sodium was significantly more in amniotic fluid. The biochemical constituents particularly sodium and potassium in allantoic and amniotic fluid varied significantly as the gestation period increased from 55 to 165 days.

* * *

The concentration of different constituents of the foetal fluid are influenced by metabolic products of foetus, flow of foetal urine through urachus or urethra and foetal secretion from lung and salivary gland. Baetz *et al* (1976) observed the constituents to vary with increasing gestational age. The dynamic changes in the constituents of foetal fluid has been studied in detail in sheep (Wales and Murdock, 1973), in bovines (Kleftin *et al.*, 1979) and in buffaloes (Hafez and Kamal, 1955; Soliman, 1975). In the present investigation, changes in biochemical constituents on allantoic and amniotic fluids during 55 to 165 days of gestation in buffaloes are recorded.

Materials and Methods

Gravid genitalia of non-descript buffaloes of different parity were collected from Madras Corporation Slaughter House and brought to the laboratory in ice box for detailed investigation. The gravid genitalia was washed and cut open along the dorsal curvature without damaging the foetal membranes. Amniotic and allantoic fluids were aspirated separately and collected in 15 ml specimen tubes and stored in deep freezer for biochemical analysis.

Curved crown rump (CVR) length of the foetus was measured and the stage of gestation was calculated based on the formula described by Soliman (1975). In all 29 genitalia were utilised for the study. To facilitate analysis based on CVR length measurement they were divided into four groups (Table 1).

The amniotic and allantoic fluids were analysed for urea nitrogen in mg/100 ml (Natelson, 1957) and Creatinine in mg/100 ml (Bauer *et al*, 1974). Adopting Biuret method total protein (gm/100 ml) was estimated with bovine serum albumin as control (Allen *et al*,

* Part of M.V.Sc. thesis submitted by the first author to Tamil Nadu Agricultural University.

Present Address:
1. Assistant Professor, Unit of Control of Abortion, Erode.
2. Professor and Head, Department of Clinics, Madras Veterinary College, Madras.

1977). Employing flame photometer concentration of Sodium and Potassium (mEq/Lit) was estimated (Oser, 1965). Biochemical values were subjected to completely randomised design and non paired t-test (Snedecor and Cochran, 1967).

Results and Discussion

Urea Nitrogen: Concentration of urea nitrogen was observed to be 47.41±3.60 mg/100 ml in the allantoic fluid and differed significantly ($P<0.01$) from 24.12±2.60 mg/100 ml of amniotic fluid (Table 2). As the mean gestation period increased from 65 to 155 days, the urea nitrogen concentration showed an increase from 40.00±2.43 to 62.50±9.16 mg/100 ml in allantoic fluid (Table 3) whereas, in the amniotic fluid the level remained almost stationary upto 130 days and then showed an increase from 20.55±6.40 to 35.83±9.17 mg/100 ml by about 155 days of gestation. However, the increase noticed in both fluids was not significant.

The increased concentration of urea nitrogen in allantoic fluid than in amniotic fluid was also reported by earlier workers in sheep (Alexander *et al*, 1958) in cattle (Lupke *et al*, 1967) and in buffaloe (Soliman, 1975). Hafez (1980) noted that the urea concentration was similar in both fluids except that its level increased with foetal maturity.

Changes in the concentration of urea nitrogen with the increase in the gestation period has been recorded in sheep (Alexander *et al*, 1958) and in buffaloes (Soliman, 1975). Baetz *et al* (1976) also reported the urea nitrogen concentration to be 24.5±0.9 mg/100 ml and 22.2 mg/100 ml in allantoic fluid and amniotic fluid respectively in cows. They observed increase in urea nitrogen level only in amniotic fluid with the increase in foetal age.

The differential rate of increase of urea nitrogen among the foetal fluids observed in the present study may be due to the foetal urine entering into the allantoic cavity through the urachus and allantoic duct upto 130 days of gestation period and then into the amniotic cavity through the urethra. Reeves *et al* (1972) concluded that the urine preferentially entered the amniotic fluid in bovine foetus despite the persistent patency of the urachus.

Creatinine: Concentration of creatinine was observed to be 0.22±0.05 mg/100 ml in allantoic fluid and did not differ significantly from 0.04±0.001 mg/100 ml in amniotic fluid (Table 2). The level increased from 0.08±0.01 to 0.33±0.07 mg/100 ml in allantoic fluid as the gestation period increased from 65 to 95 days, subsequently the level decreased to 0.15±0.18 mg/100 ml by 155 days of gestation (Table 3). In the amniotic fluid on the otherhand, the creatinine level varied from 0.03±0.005 to 0.07±0.002 mg/100 ml only.

High levels of creatinine noticed in allantoic fluid compared to amniotic fluid agree well with the reports of Alexander *et al* (1958), Lupke *et al* (1967) and Hafez and Kamal (1955). Stainer (1965) considered that the lack of exchange of solutes from the allantoic fluid may be the cause for the increased level of creatinine in allantoic fluid.

Several workers have reported different levels of creatinine in foetal fluids (Soliman, 1975; Baetz *et al*, 1976). In the present study the difference in the level of creatinine between allantoic and amniotic fluid and the trend of change in its concentration with the stage of gestation confirmed with earlier reports. However, the level of creatinine recorded in the present work was low contrary to the values reported by other workers.

Total protein: The mean concentration of total protein in allantoic and amniotic fluid

was 0.77±0.02 gm/100 ml and 0.67±0.01 gm/100 ml respectively (Table 2) and difference was statistically significant ($P<0.01$). As the gestation advanced from 65 to 155 days, the mean total protein increased from 0.72±0.02 to 0.82±0.01 gm/100 ml in allantoic fluid whereas in amniotic fluid the level insignificantly varied from 0.66±0.09 to 0.69±0.04 gm/100 ml only (Table 3).

The levels of total protein recorded in the study agree favourably with reports of Reeves *et al* (1972). Baetz *et al* (1976) and Soliman (1975). Wales and Murdoch (1973) reported increase of total protein concentration in allantoic fluid while a relatively constant level in amniotic fluid of sheep. On the contrary, Klenov (1972) and Reeves *et al* (1972) in cattle and Soliman (1975) in buffaloes reported increase in the protein concentration both in allantoic and amniotic fluid with the increase in gestation.

Sodium: Sodium concentration in allantoic fluid was 80.25±5.80 and in amniotic fluid 117.5±2.70 mEq/L (Table 2). The difference was highly significant ($P<0.01$). As the stage of gestation increased from 65 to 130 days the sodium concentration declined highly significantly ($P<0.01$) from 100.8±3.1 to 44.67±2.6 mEq/L (Table 3). However, the level tended to increase to 61.5±18.5 mEq/L by 155 days of gestation. In amniotic fluid the sodium concentration showed similar decline upto 130 days and subsequent increase by 155 days.

The mean values of sodium noticed in the study agree well with the values recorded by Baetz *et al* (1976). Alexander *et al* (1958) and Frerking (1979) also reported significantly lower sodium content in allantoic fluid than in amniotic fluid. The decline in sodium level noticed with the increase in stage of gestation confirms the earlier report made by Soliman (1975) in buffaloe, Klenov (1972) and Kleflin *et al* (1979) in cow.

Potassium: The potassium level was 22.65±3.34 mEq/L in allantoic fluid and significantly differed ($P<0.05$) from 15.25±1.33 mEq/L of amniotic fluid (Table 2). As the stage of gestation increased from 65 to 155 days the potassium level in allantoic fluid increased highly significantly ($P<0.01$) from 10.57±0.96 to 42.0±11.0 mEq/L (Table 3). On the contrary, the potassium level in amniotic fluid showed no significant variation.

The increased amount of potassium noticed in the allantoic fluid than the amniotic fluid in the present study agree with the reports of Baetz *et al* (1976) and Frerking (1979). Regarding the stage of gestation similar to the observation made in the present study, Alexander *et al* (1958) in sheep, and Kleflin *et al* (1979) in cow reported increase in potassium level with the increase in gestation period. Contrary to the present result Soliman (1975) reported the potassium level in both allantoic and amniotic fluid to be constant as the gestation advances in buffaloes. Mellor and Slater (1971) observed that the changes in the sodium and potassium level in allantoic fluid during the course of pregnancy was correlated with increase in the level of mineralo corticoids.

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Table 1: Curved crown rump length and stage of gestation

Group	Number of Genitalia studied	Curved crown rump length in cm (range and mean)	Stage of gestation in days (range and mean)
I	7	6.0 to 9.5 (7.7 cm)	55 to 71 (65)
II	12	10.7 to 18.5 (14.3 cm)	77 to 112 (95)
III	6	21.9 to 27.8 (25.7 cm)	123 to 136 (130)
IV	4	30.3 to 39.5 (34.5 cm)	141 to 165 (155)

Table 2: Overall Mean ± S.E. concentration of Biochemical constituents in allantoic and amniotic fluid.

Constituents	Allantoic fluid	Amniotic fluid
Urea Nitrogen (mg/100 ml)	47.41±3.60	24.12±2.60**
Creatinine (mg/100 ml)	0.22±0.05	0.04±0.001 N.S.
Total Protein (mg/100 ml)	0.77±0.02	0.67±0.01**
Sodium (mEq/L)	80.25±5.80	117,50±2.70**
Potassium (mEq/L)	22.65±3.34	15.25±1.33**

N.S. = Not significant; ** Significant at $P < 0.01$.

Table 3: Bio-chemical constituents of the allantoic fluid and amniotic fluid at different stages at gestation.

Constituents	Allantoic fluid				Amniotic fluid			
	Stage I	Stage II	Stage III	Stage IV	Stage I	Stage II	Stage III	Stage IV
Urea Nitrogen (mg/100 ml)	40.00± 2.43	47.59± 5.87	51.66± 7.51	62.50± 9.16	23.61± 4.29	22.05± 4.19	20.55± 6.40	35.83± 9.17
Creatinine (mg/100 ml)	0.08± 0.01	0.33± 0.07	0.20± 0.08	0.15± 0.18	0.03± 0.005	0.05± 0.007	0.04± 0.001	0.07± 0.002
Total Protein (gm/100 ml)	0.72± 0.02	0.78± 0.04	0.79± 0.02	0.82± 0.01	0.66± 0.09	0.67± 0.06	0.65± 0.04	0.69± 0.05
Sodium (mEq/L)	100.80± 3.1	82.56± 7.9	44.67± 2.6	61.50± 8.5	123.17± 1.60	117.78± 3.15	101.66± 12.54	123.00± 3.00
Potassium (mEq/L)	10.57± 0.96	19.11± 3.34	44.33± 3.20*	42.00± 11.0	16.67± 0.61	13.56± 1.13	20.67± 8.17	10.50± 1.50

** Values differ significantly ($P < 0.01$) from Group I.

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Histological Changes In The Corpus Luteum Of Buffaloes From 30 to 150 Days Of Pregnancy

U.B. SINGH, S. SULOCHANA and G.P. SHARMA
College of Veterinary Science, Rajendranagar, Hyderabad-500 030.

ABSTRACT

Corpora lutea (C.L.) were collected from 50 buffaloes during their pregnancy from 30 to 150 days obtained from the local abattoirs The corpora lutea appeared brownish in colour due to lack of any pigments. The size and weight of C.L. increased upto 4 months of gestation and then remained unchanged upto

150 days. The cellular component of the C.L. chiefly comprised of large and small lutein cells. The large polyhedral lutein cells measured 30 to 50μ as maximal size, while smaller lutein cells ranged from 20 to 25μ. Larger cells were thickly populated in the central portion whereas the smalle cells were found at the peripheral portion of the glands. Cytoplasm of the large cells was highly acidophilic with dark granules in few of them and contained lipid droplets. A few large cells showed moderate PAS reaction. Their spherical nuclei were 10 to 20μ in diameter. The small lutein cells were usually irregularly elongated and showed more resemblance to immature fibroblasts. During early days of pregnancy, these cells demonstrated light basophilic cytoplasm but later had tendency to become acidophilic. These cells had small lipid droplets.

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Histological and a few histochemical observations in the corpus luteum (C.L.) of pregnant cows have been reported (McNutt, 1927; Foley and Greenstein, 1958; Gier and Marion, 1961; Soresen and Singh, 1972; Singh, 1975 and Field *et al*, 1985). Except a lone brief histological report on C.L. of pregnant buffaloes by Singh *et al* (1988) the literature pertaining to it seems to be lacking. The present investigation was planned to study the gross and microscopic changes occurring in the corpus luteum of buffaloes in their early to mid-pregnancies.

Materials and Methods

The Ovaries having corpus luteum were collected from fifty buffaloes between 30 and 150 days of pregnancy from the local abattoirs. About 10 corpora lutea were collected for each month upto 5 months. The probable days of pregnancy were determined by measuring the foetal crown-rump length (Benesch and Wright, 1957). The small pieces of C.L. were preserved in neutral buffered formalin 10 percent, Bouin's fluid, Helley's fluid, and formal-alcohol for different histological and histochemical procedures. The paraffin sections 5-6μ thick, were stained with H.E. stain, Trichrome stain and Wilder reticulum stain for routine histological observations. The paraffin seetions from the formal-alcohol fixed tissures were stained for PAS and PAS- Alcian blue reactions. The frozen sections were stained with lipid stains as per standard methods (Luna, 1968).

Results

The spherical or ôvoid corpora lutea were brownish in colour in the 30 to 150 days pregnant buffaloes. Their maximum diameter ranged from 2 to 2.5 cm and weight varied from 6.2 to 9.4 gms. The size and weight of corpora lutea remained unchanged after 120 days of pregnancy in buffaloes. As the pregnancy advanced, the corpora lutea were found to protrude over the surface of the ovaries.

The young C.L. from 30 to 50 days of pregnant buffaloes were composed chiefly of large polyhedral, few small lutein cells in addition to fibroblasts and blood sinusoids. The large granulosa lutein cells constituted the bulk of the C.L. Their maximum width ranged from 30 to 50μ. The nuclei of large granulosa cells were spherical with the diameter of 10-20μ and had lighter stained chromatin. The cytoplasm of the large cells was usually acidophilic which was more abundant in the corpora lutea of 120 to 150 days of pregnancy. Few large cells showed mild PAS reaction whereas most of the large cells were loaded with lipid globules.

The small lutein cells of C.L. during pregnancy upto 150 days were elongated, with poorly marked cell boundary. The dense stained nuclei of these cells were oval which were surrounded by a basophilic cytoplasm in early pregnancy. These cells were usually

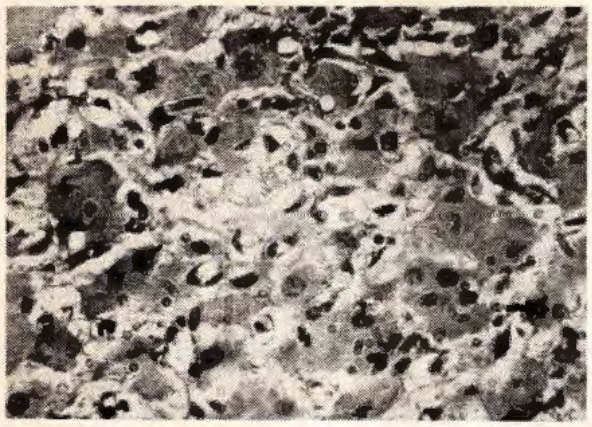

Fig. 1: Photomicrograph of Buffalo C.h. showing large (L) and small (S) luteal cells. H & E×500.

located in the peripheral portion of the glands but were also distributed among the large cells (Fig. 1). Commonly the peripheral cytoplasm of the small lutein cells contained small lipid droplets. The small lutein cells had maximum width of 15 to 20μ The amount of lipid distribution in the granulosa as well as the small lutein cells was found to be increasing with the advancement of pregnancy in the buffaloes studied.

Discussion

The general histological picture of C.L. in the pregnant buffaloes resembled to that of sheep and other ruminants. The Size and weight of the Corpus Luteum in the pregnant buffaloes increased upto 4 months of gestation and then remained unchanged upto 150 days, contrary to the findings of Hafez (1980) who recorded increase in size for 2 to 3 months and then decline. This contrary observation may be due to environmental differences influencing physiological phenomena in buffaloes.

C.L. in the pregnant buffaloes was brownish in colour due to the absence of the lipochromic pigment which is normally present in C.L. of cows, as the term 'Luteu' means yellow (Mc Donald, 1980).

The size and shape of the granulosa lutein cells in the buffaloes were not much different than those in the cow (Singh 1975; Fields *et al*, 1985). The distribution of lipids and carbohydrate in lutein cells in the C.L. of pregnant buffaloes was on the same pattern as earlier reported in cows by Singh (1975) and Fields *et al*, (1985).

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Oestrous Behaviour And Annual Pattern Of Peripheral Progesterone In Crossbred Cows At Two Levels Of Nutrition

S.C. JUNEJA and S.P. ARORA
Division of Dairy Cattle Nutrition, National Dairy Research Institute, Karnal-132 001.

ABSTRACT

Twelve non-lactating normal cycling crossbred cows distributed into 2 groups of 6 each were fed on maintenance ration and sub-maintenance ration respectively for a period of one year divided into two seasons; summer (April to September) and winter (October to March). Average anoestrous periods in groups 1 and 2 were 36.33 and 170.33 days respectively. Three cows of group 1 showed normal cyclicity throughout the year, whereas all the six cows in group 2 showed prolonged anoestrous periods more in winter than in summer months. The pattern of plasma progesterone showed regular cyclicity during the detected oestrous cycles with peak level from day 10 onwards depending on the length of the cycle. Low level of nutrition triggered by low ambient temperature during winter led to long anoestrous periods in group 2 cows.

* * *

Heat stress is one of the factors which affect reproductive efficiency in livestock (Ingraham, 1973; Monty and Wolff, 1974; Thatcher, 1974). Low level of nutrition may also result in infertility in terms of low oestrual intensity, prolonged anoestrus, embryonic loss or poor foetal development (Allison, 1977; Oyedipe *et al*, 1982). Impairment of ovarian function has been reported in cows arising from inadequate supply of certain dietary nutrients (Rakha and Igboeli, 1971). In tropics, ambient temperature and condition of herbage differ to a great extent than the temperate zones. This study was initiated to elucidate information regarding the influence of level of nutrition and ambient temperature on the reproductive performance of crossbred cows.

Materials and Methods

Twelve non-lectating healthy crossbred cows with normal reproductive systems, were randomly distributed into two groups of six each. The cows of group 1 were kept on NRC (1971) maintenance ration. The intake of DM, CP, DCP and TDN was 5.9, 0.468, 0.239 and 3.18 kg respectively in group 1, whereas animals in group 2 received 5.0 kg, DM, 0.284 kg CP, 0.093 kg DCP and 2.45 kg TDN. Thus, group 2 cows received 61.09% less DCP and 22.64% less TDN. All the cows were well-managed in separate individual stalls and allowed water *ad libitum* twice daily. Heat detection was carried out throughout the experimental period with the help of a teaser bull and by behavioural symptoms. Blood samples were collected from both the groups on alternate days, starting from day 0 (of estrus) through the duration of complete oestrus cycle for full one year. Plasma was separated by centrifugation and stored at -150^{0}C for progesterone determination by RIA technique (Abraham *et al*, 1971). Radioactive progesterone (1α, 2α, (N)-H^3 progesterone) was obtained from the Radiochemical Centre, Amarshan, UK. Progesterone antisera No. 465/7 was obtained from NIRD,, Reading, UK, raised in goats from 11α-hydroxy-progesterone, succinyl-BSA. The sensitivity of the assay was 20 pg per assay tube. The within-assay and between assay coefficients of variation using pooled plasma samples were 8.79 and 13.27 respectively. The year was

divided into two seasons: April to September (Summer) and October to March (Winter). Ambient temperature and relative humidity (RH) were recorded, throughout the experimental period of one year (1981). Statistical analysis of the data was done as per Amble (1975).

Results and Discussion

In Group 1 cows, 100 (winter 45; summer 55) oestrus cycles were detected, as against the expected number of 112. In Group 2 cows, 95 oestrus cycles in winter and 30 in summer were detected as against the total expected number of 103. In both the seasons, oestrus duration and intensity of symptoms were similar. In Group 1 cows, oestrus cycle length varied from 18 to 23 days in winter and 17 to 23 days in summer, whereas in Group 2 cows it varied from 18 to 26 days in both winter and summer months. Monthly observations of the number of animals in oestrus showed that oestrus cyclicity in the cows of group 2 was disturbed more between January to March (Tables 1, 2). In the group 1 cows also, the number of oestrus detection was relatively low in January and February months. Oestrous detection was 81.81% in winter and 96.49% in summer in Group 1 cows, as compared to 48.07% in winter and 58.82% in summer in Group 2 cows. All the six cows of Group 2 showed anoestrus period varying from 55 to 291 (average 170.33) days as against 36.33 days in Group 1 cows. Some of the cows under low level of nutrition were regular in their oestrus cycles from June to December. It seemed that winter was the triggering factor to inhibit cyclicity in cows.

Data analysis revealed that low level of nutrition and its interaction with ambient temperature led to prolonged anoestrus periods in Group 2 cows ($P < 0.05$). Ambient temperature alone did not affect this parameter. The plasma progesterone changes were plotted considering 20-22 days as the normal oestrus cycle period (Table 1). The peak plasma progesterone concentration was recorded mostly on day 12 irrespective of season or level of nutrition. In oestrus cycle period of 26 days, the progesterone peak drifted to day 18. Quantitatively, progesterone peaks both in Group 1 and 2 were similar with an overall average of 3.25 ng/ml plasma. Between seasons, however, the progesterone levels were higher in winter months than summer months, particularly so, in Group 2 cows (Table 2). In fact the cows are likely to show such an effect depending upon the ambient temperature variations (Mills *et al*, 1972; Roussel *et al*, 1977). In the present study, the changes in temperature varied from 4.4-34.7°C with 26-98% R.H. during winter months, whereas 15.2-40.8°C temperature and 19-93% R.H. during summer months was gradual which might have resulated in this particular pattern of progesterone concentration. Low level of nutrition led to prolonged oestrus cycle and longer anoestrus period perhaps due to ovarian dysfunction as reported in ewes and buffaloes (Lamond *et al*, 1972; Kaur and Arora, 1982) resulting thereafter in absence of gonadotrophic surge during anoestrus periods. Seasons alone had little inhibitory effect on oestrus in well-fed cows or even in well-fed buffaloes as reported earlier (Kaur and Arora, 1982), but its synergism with low level of nutrition leads to appreciably lower percentage of oestrus detection. The changes in the peripheral plasma progesterone concentration during the oestrus cycle reported in this study are comparable and its decline was rapid at the end of the oestrus cycle indicating secretion from rapidly terminating C.L. (Gomes *et al*, 1963, Pope *et al*, 1969).

Table 1: Plasma progesterone concentration (ng/ml*) during oestrous cycle of 20 days length.

Days	Group 1 n	Winter	n	Summer	Days	Group 2 n	Winter	n	Summer
0	22	0.40±0.03	15	0.47±0.04	0	7	0.26±0.03	10	0.39±0.05
2	21	0.45±0.04	15	0.47±0.05	2	6	0.41±0.05	10	0.47±0.010
4	22	0.85±0.09	15	0.67±0.08	4	7	0.44±0.08	10	0.80±0.20
6	22	1.46±0.23	14	1.29±0.21	6	7	1.96±0.23	10	1.31±0.51
8	22	1.89±0.31	15	1.75±0.25	8	7	1.38±0.24	10	1.60±0.39
10	22	1.60±0.15	15	2.21±0.40	10	7	2.12±0.41	9	2.34±0.82
12	22	2.64±0.30	12	2.45±0.30	12	7	2.52±0.56	10	2.87±0.71
14	22	2.46±0.39	15	2.21±0.32	14	7	1.50±0.51	10	2.21±0.58
16	21	1.57±0.29	15	1.52±0.27	16	7	0.85±0.25	10	1.34±0.29
18	22	0.71±0.10	14	0.52±0.05	18	7	0.35±0.07	10	0.60±0.08
20	22	0.42±0.03	15	0.40±0.04	20	7	0.36±0.02	10	0.37±0.03

* Peak Value Day 0 = Day of oestrus.

Table 2: Mean luteal peak progesterone concentration (ng/ml) and mean luteal peak day of oestrus cycle.

Attribute	Group I			Group 2		
	Winter	Summer	Overall	Winter	Summer	Overall
Peak progesterone concentrations (ng/ml)	3.58± 0.28	3.08± 0.21	3.32± 0.18	3.77± 0.40	2.64± 0.28	3.18± 0.25
Day of luteal peak	12.52± 0.26	12.59± 0.28	12.56± 0.19	13.59± 0.49	13.73± 0.52	13.67± 0.36

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Preliminary Study On Certain Anatomical Features And Functional Activity Of Scrotum In Nali, Corriedale And Crossbred Rams

DAS KORNEL and SURINDRA KUMAR
Central Sheep Breeding Farm, Hissar (Haryana)

It is an established fact that high temperature is harmful to spermatogenesis in rams (Phillips and Mc Kenzie, 1934; Gunn *et al*, 1942). Sahni and Roy (1972) had shown that high temperature had no effect on spermatogenesis in crossbred Bikaneri rams but Romney Marsh rams were highly susceptible than the Corriedale rams under Indian conditions. Tiwari and Sahni (1974) had shown 75% reproductive wastages in Rambouillet rams in India. Obviously this has serious implications in developing tropical and sub-tropical countries which are importing rams from temperature zones (Moule, 1970). The scrotum of the ram is known to play an important part in determining the amount of heat that reaches the testis and thereby the level of fertility (Waites and Setchell, 1964).

A study on these lines was undertaken on a group of local Nali, imported and farm born Corriedale and Crossbred rams maintained at Central Sheep Breeding Farm (C.S.B.F.), Hissar. The rams in one flock were maintained on lucerne, Oats and Cowpea pastures during summer. The scrotal length was measured with tape in centrimeters and scrotal diameter measured by firmly holding the testes at their proximal end. The distance from ground level to distal end of scrotum was measured during April and May months at 31°C, 41°C, 43.5°C and 45°C environmental temperatures under field conditions of direct sun exposure. The soil and ground level radiation heat was measured by a thermocouple thermometer and the climatic records of the farm were utilized for the study.

The scrotal length of the imported Corriedale rams and scrotal width of the Nali rams (Table 1) were significantly higher than other groups ($P < 0.05$). The farm born Corriedale rams had shorter but more wide scrotum than the imported Corriedales.

The distance between the scrotum and ground level (Table 2) was significantly ($P < 0.01$) different among breeds. The scrotum of all groups rams showed relaxation during environmental temperature range of 41°C to 43.5°C, whereas with increase in temperature to 45°C, the scrotum contracted instead of further relaxing. This was concurrently associated with increase in ground level radiation temperature. Phillips and Mc Kenzie (1934) concluded that as the ambient temperature increased from 6°C to 24°C, the dartos muscles in rams increasingly relaxed, but there was no further relaxation above 24°C.

The breed groups showed significant differences in rectal temperatures in high ambient temperatures ($P < 0.05$). The local Nali rams showed increased thermo-regulation by keeping low rectal temperature ingradient, whereas it showed a linear increase in Corriedale rams. During rest, the scrotum of Nali rams remained fully over the medial thigh but in Corriedale rams it was directly over the ground, which may explain the deterimental effct of direct ground heat to their testes.

The shape and size variations of scrotum in the farm born vis-a-vis imported Corriedale rams may be due to natural selection operating through semen fertility traits.

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Table 1: Scrotal length and width of rams.

S. No.	Breeds	No. of observations	Scrotum	
			length (cms)	width (cms)
1.	Corriedale (Farm born)	71	18.79 ± 4.19	10.67 ± 1.41
2.	Corroiedale (Imported)	37	23.62 ± 4.80	8.11 ± 1.47
3.	Nali	4	18.41 ± 2.18	15.37 ± 2.28
4.	Crossbred (Nali × Corriedale)	16	14.22 ± 2.99	10.40 ± 0.73

Table 2: Average distance from ground level to scrotum and rectal temperature in Aust. Corriedale, Nali and Crossbred rams at different environmental and soil temperatures.

Soil temperature(°C) at 2.30 P.M.			Distance from ground level to distal end of scrotum (Cms)			Rectal temperature (°C)		
7.5 cm above	7.5 cm deep	Ambient temp.	Aust. corridale (Imported)	Nali	Crossbreds	Corriedale (Imported	Nali	Crossbred
20.5	29.5	31°	18.389±6.578 (4)	39.039±5.791 (4)	25.755±5.156* (7)	39.0	38.95	39.98*
46.7	39.8	41°	13.639±2.159 (4)	32.359±3.775 (4)	26.035±5.943* (5)	40.0	39.25	39.0*
51.7	43.1	43.5°	14.274±2.79 (4)	32.156±3.860 (4)	27.94±4.622* (4)	40.2	39.1	39.4*
55.0	46.7	45°	16.256±2.260 (5)	33.528±2.108 (5)	26.416±1.854* (5)	40.1	39.1	39.8*

Figures in the parentheses indicate the number of rams. * Significant at $P < 0.05$.

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Studies On Biochemistry Of Osmanabadi Buck Semen*

N.M. MARKANDEYA[1] and D.R. PARAGAONKAR[2]

Department of Gynaecology and Obstetrics, College of Veterinary and Animal Sciences, M.A.U. Parbhani-431 402

ABSTRACT

Estimation of various biochemical constituents of Osmanabadi buck semen showed no effect of these constituents on first and second ejaculates. Non-significant correlation amongst biochemical constituents from semen and blood was observed. Interrelationship of various biochemical constituents from semen showed positive and highly significant correlation of calcium with sodium and potassium.

* * *

Studies on biochemistry of buck semen have not been carried out in details. Greater attention has been paid to physical aspects of semen.

Present study is an attempt to make available the information in respect of first and second ejaculates of buck semen and also to ascertain simple correlation if any, between biochemical constituents of blood and semen.

Materials and Methods

Studies were undertaken at the 'Goat unit', College of Agriculture, and the University Department of Gynaecology and Obstetrics, Parbhani. From the available lot of mature Osmanabadi males, bucks with better body weight and libido were selected for study. Successive two ejaculates were collected from each buck by 'Artificial Vagina' method. Blood was collected immediately after semen collection.

Fructose estimation was carried out as per Mann (1964). Glucose estimation was carried out by Folin-Wu method (1920). Protein content was estimated by Biuret method. Sodium and potassium content were estimated by flame photometry (Woottom, 1974). Chloride content was estimated by Schales and Schales method (1941) with slight modifications. Calcium content was

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1. Asstt. Professor.

2. Professor and Head of Department.

estimated by Trinder's method (1960) and inorganic phosphorus by Gomorn's method (1942). Data was statistically analysed as per Snedecor and Cochran (1967).

Results and Discussion

It is observed that the estimated values of biochemical constituents of semen (Table 1) are in close approximation with ealier studies (Markandeya, 1987). Biochemical constituents of semen from first and second ejaculates showed nonsignificant effect on each other. The values of fructose, potassium and calcium increased in second ejaculates, whereas the values of protein, sodium chloride and inorganic phosphorus were lowered in second ejaculate. On scanning the available literature it was found that biochemical studies on first and second semen ejaculates in bucks have not been reported so far. However, Rothschild and Barnes (1954) carried out similar study in bulls and Charanjit Singh and Gangwar (1977) in buffalo bulls.

Biochemical constituents of blood and semen had no correlation with each other. Rama Rao (1988) opined that seminal fructose levels fluctuate parallel to blood glucose levels. However, in the present study no such correlation was found.

It was observed that the concentration of sodium and chlorides was more in blood than semen, whereas reverse was the case with potassium, calcium and inorganic phosphorus. The ratio of potassium:sodium concentration in semen and blood was 1:1.038 and 1:13.43 respectively, whereas the ratio of calcium: inorganic phosphorus: chlorides was found to be 1: 1.554 : 16.425 and 1: 0.84: 46.18 in semen and blood respectively. Varshney *et al* (1977) recorded 1:1 ratio of potassium to sodium in seminal plasma of Barbari bucks which is in agreement with the present findings.

There was a positive and highly significant correlation of calcium with sodium and potassium, whereas interrelationship amongst all other biochemical constituents of semen was found to be nonsignificant (Table 2). Varshney *et al* (1977) noted significantly positive correlation between sodium and potassium levels in Barbari buck seminal plasma, which is contrary to the present findings whereas their observation of potassium and chloride levels having no correlation is in agreement with our findings.

Table 1: Comparison and correlation of biochemical constituents of first and second semen ejaculates and blood in Osmanabadi bucks.

Sr. No.	Constituents	Pair 't' test (n = 14)			Simple correlation (n = 17)		
		First ejaculate (Mean)	Second ejaculate (Mean)	't' value	Semen (Mean)	Blood (Mean)	Correlation coefficient
1.	Fructose (Mg/100 ml)	454.30	513.84	1.032	482.42	44.89*	0.035
2.	Protein (gm/100 ml)	5.32	5.13	0.729	-	-	-
3.	Sodim (mEq/Litre)	79.08	76.83	0.309	77.47	128.23	-0.210
4.	Potassium (mEq/Litre)	72.79	82.20	-1.441	74.58	9.55	-0.121
5.	Chloride (mg/100 ml)	126.73	118.54	0.829	138.14	349.57	-0.007
6.	Calcium (mg/100 ml)	8.43	8.85	-0.981	8.41	7.57	-0.197
7.	Inorganic Phosphorus (mg/100 ml)	10.67	11.18	-0.482	13.07	6.34	-0.376

* = Blood glucose value.

Table 2: Correlation coefficients amongst different biochemical constituents of Osmanabadi buck semen.

Biochemical constituents	Potassium	Chloride	Calcium	Inorganic phosphorus
Sodium	-0.028	-0.128	0.807**	-0.219
Potassium	-	0.278	0.827**	-0.110
Chloride	-	-	0.215	0.031
Calcium	-	-	-	0.276

Number of observations = 17
** = < 0.01.

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Influence Of Blue Tongue Disease On Semen Quality Of Exotic Rams

A.K. MATHUR, R.S. SRIVASTAVA and D.B. KALRA
Division of Physiology, Central Sheep & Wool Research Institute, Avikanagar-304 501 Rajasthan

Incidence of Blue tongue disease (BT) in India is recently reviewed by Dubey *et al* (1987). The outbreak of BT in sheep under semi-arid conditions has been reported by various workers (Mathur and Lonkar, 1982; Sharma *et al*, 1985). Perusal of available literature did not reveal any information of Blue tongue virus on the semen quality of rams, although its presence has been reported in cattle semen by Luedke *et al* (1975) and Foster *et al* (1980). The present investigation was carried out to ascertain the effect of this disease on the semen quality of adult breeding rams.

The breeding at CSWRI started during autumn, 1983 employing thoroughly screened

and selected adult rams having good quality semen: volume 0.66-1.0 ml; mass motility 4.6-4.9 and sperm concentration 1901-3449 $\times 10^6$ per ml. On 20th day of breeding, semen quality of all the rams showed abrupt deterioration and within 4 days the semen of 17 adult rams (Soviet Merino, Rambouillet, Dorset and Suffolk breeds) was rendered unbreedable (volume 0.61-0.88 ml; mass motility 0.33-1.0 and sperm concentration 138-434 $\times$ 10^6 per ml). Ejaculates were obtained from these animals at weekly intervals and they were followed till recovery. During B.T., sperm motility and sperm concentration dropped sharply and the semen became watery with progressive oligospermia, and finally aspermia within a short period (Table 1). Morphological studies of affected semen smears revealed sperm head abnormalities including detached heads, swollen mid-pieces and coiled tails, along with some epithelial cells in the ejaculates. Foster *et al* (1980) have reported abnormality of spermatozoal head in BT affected bulls including cavity formation between the acrosome and nucleus with involvement of nucleus to an enlargement of cavity, accompanied by vesiculation that could affect the entire acrosome.

The diagnostic laboratory of NDDB confirmed the blood samples of these rams to be positive for BT virus. The presence of BT virus in the semen has also been reported in cattle by Luedke *et al* (1975). A high incidence of BT has been reported in Merino and Rambouillet breeds reared under semi-arid tract of Rajasthan by Mathur and Lonkar (1982) and Sharma *et al* (1985). The semen picture of these rams improved gradually (Table 1) and all the affected rams started donating semen of breedable quality within 67 days (six rams within 11.32 days, Group A; 5 rams in 31-49 days, Group B; and 5 rams in 49-67 days Group C), except one animal which recovered after 81 days. Although there was a depression in the values of mass motility and sperm concentration at post BT period but they were well within breedable limits. These observations indicate that infection of BT at subclinical level affected different stages of spermatogenesis without any adverse effect on the sexual behaviour and libido of rams.

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Table 1: Semen Picture of rams affected by Blue Tongue (B.T.) Virus.

S. No.	Observations	Group 'A' (11-31 days)			Group 'B' (31-49 days)			Group 'C' (49-67 days)		
		Pre B.T.	During B.T.	Post B.T.	Pre B.T.	During B.T.	Post B.T.	Pre B.T.	During B.T.	Post B.T.
1.	Volume (ml)	0.66 ±0.054 (18)	0.623 ±0.078 (17)	0.84 ±0.159 (9)	1.00 ±0.07 (23)	0.88 ±0.053 (45)	1.14 ±0.08 (16)	0.82 ±0.06 (10)	0.719 ±0.069 (21)	0.77 ±0.110 (7)
2.	Mass Motility	4.66 ±0.144 (18)	1.0 ±0.182 (16)	4.22 ±0.33 (9)	4.69 ±0.159 (23)	0.733 ±0.149 (45)	4.43 ±0.203 (16)	4.9 ±0.1 (10)	0.333 ±0.125 (21)	4.85 ±0.142 (7)
3.	Sperm Conc.$\times 10^6$	1901.9 ±377.4 (18)	434.58 ±262.35 (12)	1560.62 ±491.49 (8)	3120.95 ±182.64 (21)	138.07 ±0.162 (38)	2294.0 ±296.66 (15)	3449.0 ±199.1 (9)	936.66 ±422.38 (9)	2785.8 ±573.29 (6)

Figures in paranthesis indicate no. of observations. B.T. = Blue Tongue.

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Biometrics Of Genital Organs In Bannur Ewes And Surti Does

S.R. CHINCHKAR, D.P. VELHANKAR, B.R. DESHPANDE and V.L. DEOPURKAR
Department of Animal Reproduction, Bombay Veterinary College, Parel, Bombay-400 012.

ABSTRACT

10 Bannur Ewes and 5 Surti does of similar age and weight (18.52 and 17.3 Kg) were studied. Genital tracts were studied immediately after slaughter. The normal genitalia of both species resemble that of bovines. A distinct cul-de-sac was present on the dorsal aspect in fornix. The cervix was distinctly palpable with lip like structures.

The average weight of entire genitalia was 45.7±9.23 g in ewes and 79.0±4.56 g in does. The number of cervical folds in Bannur ewes were 4 to 5, while in Surti does they were only 4. Caruncular rows present in both the coruna in both the species were 4. The number of caruncles in right and left and both cornua together were 43.80±1.59, 45.80±1.91 and 89.6±3.11 respectively in ewes. The corresponding figures in does were 54.60±3.70, 61.60±2.13 and 116.20±5.67 respectively.

* * *

Knowledge of the biometry of female genital tract is imperative in breeding operations and for diagnosis, control and treatment of infertility. This study was undertaken to establish the norms of reproductive tract of Bannur ewes and Surti does.

Materials and Methods

Genital organs were obtained from 10 Bannur ewes and 5 Surti does slaughtered at the Bombay Veterinary College. All these animals were adult, healthy and non-pregnant

belonging to 3 to 4 years age group. The average body weight of ewes and does was 18.52 (16.00 to 26.50) and 17.3 (13.80 to 24.40) Kg respectively.

Immediately after slaughter, the entire genital tract from vulva to ovaries was removed, wrapped in wet towel and brought quickly to the laboratory for further studies. These organs were normal and free from gross pathological lesions. Extraneous tissues and ligaments were discarded and the weight of each entire genitalia recorded separately. The genital organs were laid flat in natureal position and the fallopian tubes straightened out.

The measurements of various componants of genital tract were taken following the conventional techniques used by De Lange (1950), Hadi, (1965) and Sharma (1978). The data was statistically analysed as per Snedecor and Cochran (1967).

Gross Observations of genitalia comprised:
(1) Weight of entire genitalia. (2) No. of cervical folds and nature of cervix (Kinked and or normal) (3) No. of caruncles in each horn. (4) No. of Caruncular rows in each horn. (5) Total no. of caruncles in both horns, and (6) Weight of ovary (Right and Left).

Results and Discussion

1. *Gross appearance of genitalia*: In general, the normal genitalia of both species resemble that of bovines. The cornua were slightly coiled and soft in nature. However, the cervix was hard on palpation. The fallopian tubes in does resemble those in cows but were flexuous in ewes. The external os gave a thicker and tougher feel with two lip like structures, dorsal and ventral lips. Fornix gave a distinct feel of cul-de-sac on dorsal aspect, whereas the ventral wall of vagina was almost in continuation with the os. Externally, the os could be located easily being slightly longer in width.

2. *Weight of genitalia* in Bannur ewes was 45.70±9.22 g. and in Surti does 79.00±4.46 g with significant difference ($P < 0.05$) between the species (Table 1). The weight of genitalia in Bannur ewes is much lower than that (71.64±3.93 g) reported by Sharma (1978) in Bikaneri ewes. The difference is possibly due to the variation in size of these two breeds. Similar figures for does are lacking.

3. *Biometrical observations* (Table 2):
(i) Vulva and Vagina: The length of vagina was 6.88±0.23 and 8.06±0.20 cm in Bannur ewes and Surti does respectively. The present values in ewes are much lower than those reported by other workers (Cloete, 1939; Roberts 1971; Sisson and Grossman, 1975 and Hafez 1975) in exotic breeds. However, Sharma (1978) reported comparable figure (7.68±0.11 cm) in Bikaneri ewes. The length of vagina in does is comparable with that reported by Basu *et al* (1961) and Singh *et al* (1974).

(ii) Cervix: The cervix in Bannur ewes measured 3.16±0.40 cm in length, 1.05±0.06 cm in width and 0.38±0.03 cm in thickness. The corresponding values in Surti does were: 3.58±0.25, 1.56±0.12 and 0.43±0.01 cm respectively. Cervix of Surti does is longer than that of Bannur ewes. The cervix of does compares favourably with the observations of Puranik and Kaikini (1966) and Singh *et al* (1974) but they are greater than that reported by Hadi (1965) and are smaller than that reported by Basu *et al* (1961) and Singh *et al* (1974) who reported higher values. The number of annular folds in ewes (4.3±0.15) and in does (4.00) compare favourably with those reported by other workers. However, the number of observations in the present study are too small to indicate the normal values for either breed.

(iii) Uterine Cornua: The mean greater curvature of the right and left uterine cornua was 9.92±1.18 and 9.80±1.33 cm respectively in Bannur ewes. The corresponding figures in Surti does were 15.30±0.36 and 17.12±0.90 cm respectively. Left cornua is longer in both the species. The width of right and left cornua in Bannur ewes was 1.33±0.13 and 1.33±0.14 cm respectively. However, these values in does were larger. This does not compare with the observations made by Hadi (1965) and Puranik and Kaikini (1966) who reported lower values. The number of caruncles in right and left uterine cornua were 43.80±1.59 and 45.80±1.91 (Total 89.60±3.11) in Bannur ewes and 54.60±3.70 and 61.60±2.13 (Total 116.20±5.67) in Surti does respectively. This indicates higher number of caruncles in does. The total number of caruncles (89.6±3.11) fall within the range reported by Ellenberger and Baum (1921) for ewes (88 to 96), whereas Hadi (1965) reported a much lower value (64.84±9.90) in does.

(iv) Fallopian tube: The width of fallopian tube at three different levels: utero-tubal junction (W 1), middle of the fallopian tube (W 2) and osteum tubo-abdominale differed significantly ($P < 0.01$) between the species. However, there was no significant difference in the width of right and left fallopian tubes of ewes. The widths W 1 and W3 of right and left fallopian tubes in Surti does were statistically significant ($P < 0.05$). This is in contrast to the observations made by Singh *et al* (1974). However, the number of observations in the present study is not enough to derive any conclusion.

(v) Ovaries: There were considerable similarities in the size and shape of ovaries in ewes and does. The measurements in the present study compare favourably with those reported in ewes by Roberts (1971) and in does by Hadi (1965), Puranik and Kaikini (1966) and Singh *et al* (1974). The right and left ovary weighed 0.34±0.07 g and 0.34±0.08 g in Bannur ewes and 0.6±0.04 and 1.32±0.99 g in Surti does. The weights of ovaries in does were greater and the differences between right and left ovaries in ewes were non significant. The present study revealed significant difference between the right and the left ovary of does which is contrary to the reports of Puranik and Kaikini (1966). However, it is difficult to substantiate the variation on account of small number of observations.

Table 1: Gross observations of genital organs in Bannur ewes and Surti does.

Sr. No.	Observations	Bannur ewes (N = 10)	Surti does (N = 5)
1.	Wt. of genitalia including ovaries (gm)	45.70±9.22	79.00±4.46
2.	No. of cervical folds	4 to 5	4
3.	Nature of cervix	Normal	Normal
4.	No. of caruncles		
	a) Right horn	43.80±1.59	54.60±3.70
	b) Left horn	43.80±1.91	61.60±2.13
5.	Total No. of caruncles	89.60+3.11 (72 to 105)	116.20+5.67 (101 to 129)
6.	Wt. of ovary (gm)		
	a) Right	0.34±0.07	0.60±0.50
	b) Left	0.34±0.08	1.32±0.91

Table 2: Biometrics of Genital Organs in Bannur Ewes and Surti Does.

Component part of the genitalia	Bannur ewes (n=10) cm	Surti does (n=5) cm
VULVA		
Length	3.54±0.25	4.08±0.16
Width	2.59±0.19	2.88±0.05
Thickness	0.56±0.04	0.60±0.02
VAGINA		
Length	6.88±0.23	8.06±0.20
Width	1.60±0.13	1.78±0.01
Thickness	0.25±0.02	0.33±0.03
CERVIX		
Length	3.16±0.40	3.58±0.25
Width	1.05±0.06	1.56±0.12
Thickness	0.38±0.03	0.43±0.01
No. of cervical folds	4.30±0.15	4.00
CORPUS UTERUS		
Length	1.16±0.16	1.44±0.13
Width	1.14±0.15	1.84±0.04
Thickness	0.29±0.03	0.43±0.04
RIGHT UTERINE CORNUA		
Length of greater curvature	9.92±1.18	15.30±0.36
Length of lesser curvature	7.53±0.71	9.88±0.27
Circumference	3.71±0.64	6.30±0.09
Width	1.33±0.13	1.79±0.07
Thickness	0.22±0.03	0.23±0.01
No. of caruncular rows	4.00	4.00
No. of caruncles	43.80±1.59	54.60±3.70
LEFT UTERINE CORNUA		
Length of greater curvature	9.80±1.33	17.12±0.90
Length of lesser curvature	7.72±0.66	10.46±0.05
Circumference	3.75±0.61	5.60±0.07
Width	1.33±0.14	1.70±0.05
Thickness	0.22±0.02	0.22±0.07
No. of caruncular rows	4.00	4.00
No. of caruncles	45.80±1.91	61.60±2.13
TOTAL NO OF CARUNCLES	89.60±3.11	116.20±5.67
RIGHT FALLOPIAN TUBE		
Length	10.05±0.55	13.16±0.56
Width W_1	0.23±0.01	0.32±0.00
Width W_2	0.14±0.01	0.20±0.00
Width W_3	0.21±0.01	0.28±0.01
LEFT FALLOPIAN TUBE		
Length	11.00±0.71	12.82±0.96
Width W_1	0.23±0.01	0.30±0.00
Width W_2	0.12±0.01	0.20±0.00
Width W_3	0.20±0.01	0.25±0.00
RIGHT OVARY		
Length	1.12±0.92	1.52±0.11
Width	0.52±0.04	0.68±0.01
Thickness (height)	0.98±0.04	1.12±0.03
LEFT OVARY		
Length	1.18±0.08	1.74±0.01
Width	0.51±0.05	0.94±0.07
Thickness (height)	0.99±0.09	1.30±0.07

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Serum Triiodothyronine And Thyroxine Levels During Oestrous Cycle In Goat

K.K. BARUAH (Jr.), R.N. BARUAH, ANUBHA BARUAH and S.C. TALUKDAR

Department of Animal Physiology, College of Veterinary Science, Assam Agricultural University, Guwahati-781 022.

ABSTRACT

The serum triiodothyronine (T_3) and thyroxine (T_4) concentration of 9 regularly cyclic indigenous goats of Assam was estimated by RIA. The mean levels of T_3 and T_4 showed the peak value of 1.65±0.04 ng/ml and 7.98±0.16 μg/100 ml on day '0' (day of oestrus). The average concentration of T_3 and T_4 on 4th, 8th, 12th, 16th and 20th day after oestrus were found to be 0.57±0.03, 0.60±0.06, 0.68±0.10, 0.70±0.04, 1.41±0.08 ng/ml and 4.91±0.14, 4.98±0.16, 5.10±0.20, 5.23±0.18, 7.63±0.17 μg/100 ml respectively. The lowest value of T_3 was observed on day 8th and for T_4 it was day 4th of the cycle.

* * *

Thyroid hormones maintain the basal body metabolism. Thyroid dysfunction can disturb several body functions including reproduction in animals. Emphasis is given to establish a correlation between endocrine functions and reproductive efficiency of the female animal (Maqsood, 1952; Feldman, 1956 and Vanzyl, 1957). Many workers have reported the hormonal profile of thyroid gland during different reproductive stages (Robertson and Falconer, 1961 and Vadodaria *et al*, 1980). With the availability of RIA technique (as per protocol of RIA kits, supplied by BARC, Bombay), it is now possible to obtain a more precise information with respect to the status of thyroid hormone under different stages of reproduction. There is a paucity of information ragarding the levels of thyroid hormones during oestrous cycle in indigenous goat (Capra hircus L.) of

Assam. The present investigation was therefore conducted.

Materials and Methods

Experimental animals: 9 regularly cyclic indigenous goats of Assam were taken for the present study. The animals were 1-2 years of age with 15-20 kg body weight.

Nutrition and Management: During the experimental period, the ambient temperature and relative humidity (RH) were 25.1°C and 81.9% (Autumn season). The animals were maintained under semi-intensive system of rearing. They were allowed to graze during morning hours and in the evening 250 gm of concentrate mixture (Baruah, 1983) fed to each animal. Water was available ad-lib.

RIA technique: Blood samples were collected from each of the 9 experimental animals on day '0' of oestrus and 4, 8, 12, 16 and 20th days post-oestrus. The serum was separated from blood samples and stored at -20°C till the assay was carried out. All serum samples were assayed for T_3 and T_4 using RIA kit supplied by BARC, Bombay as per protocol supplied with the kit. All samples were assayed in duplicate and were critically evaluated.

Statistical analysis: Critical difference (C.D.) test was done to see the significant difference of T_3 and T_4 values in different days of oestrous cycle.

Results and Discussion

The triiodothyronine (T_3) and thyroxine (T_4) concentrations in the blood of goat varied significantly ($P < 0.01$) between different days of the oestrous cycle. As revealed in the C.D. test (at 5% level), concentrations of T_3 and T_4 were found to be higher on the day of oestrus than other days, except 20th day of the oestrous cycle. The intra and inter assay co-efficients of variation for the T_3 and T_4 assays were 5% and 11% and 6% and 12% respectively. Higher values of T_3 and T_4 observed in this investigation during oestrus are similar to those reported by Abdo *et al* (1969) in she camel; Sharma and Sharma (1976) and Agarwal *et al* (1985) in cyclic goats.

The higher values of T_3 and T_4 during oestrus and day 20, just before the next oestrus may possibly be associated with the increase of oestrogenic activity during those periods of the cycle. Ingbar and Woeber (1974) opined that T_3 and T_4 concentrations appear to be closely associated with increase in concentration of circulating oestrogen. Williams (1974) also reported that administration of oestrogen or androgen caused alteration in the binding of thyroid hormones in plasma and elevation of T_3 and T_4 concentration in blood might be due to the increased concentration of TBG as a result of high oestrogen level.

Soliman and Reineke (1954), Feldman (1956) also suggested that increase in thyroid activity at oestrus in ewes may either be due to action of an increase in oestrogen level at oestrus or due to direct release of TSH from pituitary coincident with release of FSH and LH which has been shown to occur in the ewe at ovulation (Santolucito *et al*, 1960; Robertson and Hutchinson, 1960). The present study indicates that ovarian function can be maintained by estimating the peripheral serum T_3 and T_4 levels in indigenous goats of Assam.

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Table 1: Serum Triiodothyronine (T3) (ng/ml) and Thyroxine (T4)(μg/100 ml) levels in goat.

Days of oestrous cycle	T_3	T_4
0 day	$1.65^{a}\pm0.04$	$7.98^{a}\pm0.16$
4th day	$0.57^{b}\pm0.03$	$4.91^{b}\pm0.14$
8th day	$0.60^{b}\pm0.06$	$4.98^{b}\pm0.16$
12th day	$0.68^{b}\pm0.10$	$5.10^{b}\pm0.20$
16th day	$0.70^{b}\pm0.04$	$5.23^{b}\pm0.18$
20th day	$1.41^{a}\pm0.08$	$7.63^{a}\pm0.17$

Means bearing different superscript differed significantly.

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Pregnancy And Parturition Behaviour Of Surti And Marwari Goats

V.M. MEHTA[1], S.B. DESHPANDE[2], JAYSHREE PAI[3], S. TIWARI[4] and A.V. PATEL[5]
Reproductive Biology Research Unit, Gujarat Agricultural University Anand Campus, Anand 388 110.

The informations on pregnancy and parturition behaviour are important for providing better management to farm animals. An attempt has been made to study some aspects of pregnnancy and parturition behaviour in Surti and Marwari goats of Gujarat State.

Total 42 and 61 parous Surti and Marwari goats at R.B.R.U., Anand were maintained under optimal stallfed conditions. The data on their conception, weight gain during pregnancy, weight loss due to parturition, placental characteristics and parturition time were regularly collected and compiled. The

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1 Research Scientist, Head and Project Incharge

2 Senior Research Assistant

3 and 4 Research Fellow

5 Assistant Research Scientist

satistical analysis was done as per Steel and Torrie (1960).

Gestation length: The gestation lengths of Surti and Marwari goats were 143.67 to 145.89 days and 144.89 to 146.80 days respectively. The parity had no significant effect on the length of gestation period in both the breeds (Table 1).

Weight Gain during Pregnancy: Surti goats gained mean weight of 6.63 kg in single and 9.15 kg in twin pregnancy (Table 2). The Marwari goats gained body weight of 5.68 kg in single and 8.25 kg in twin pregnancy. The difference in body weight gain in single and twin pregnancy in Surti and Marwari breed were significant ($P < 0.01$ and $P < 0.05$). The weight gain of twin prgnancy in Surti and Marwari goats were found to be nonsigniricant.

Weight loss due to parturition: The total weight loss was significantly higher ($P < 0.01$) in twin pregnancies of Surti and Marwari goats compared to singleton (Table 2). However kids wt. was significantly higher ($P < 0.01$) in twin pregnancies of both breeds as well as Marwari kids ($P < 0.01$) compared to Surti kids in Singleton pregnancy. Placental weight was significantly higher ($P < 0.01$) in twin pregnancies of only Surti breed compared to singleton pregnancy.

The placental weights and kid weight reported for single and twin pregnancy of Surti and Marwari goats are similar to those reported for other Indian breeds :Jamnapari and Barbari (Singh and Sengar, 1979). Twin pregnancy demands greater physiological changes than singleton pregnancy and hence the body weight gain and loss are significantly higher in present study. The metabolic needs/ nutritional care, for twin pregnancy are significantly greater than that of singleton in both the breeds.

Time and season of kidding: 75% kidding in both the breeds occurred in day time (6.0 a.m. and 6.0 p.m.). The maximum percentage of kidding in both the breeds of goats occurred in winter season (Table 3). The kidding percentages for Surti goats in summer and monsoon were almost equal, whereas kidding in monsoon season was greater than summer for Marwari goats. Winter season is showing more number of kidding in goats because of greater frequency of estrus observed in June and July months. Winter season of kidding is more favourable for kid growth due to better feed intake in cold climate. The studies reported for other Indian breeds of goats such as Jamnapari and Barbari confirm the present findings (Singh and Sengar, 1979).

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Table 1: Effect of Parity on Gestation Length in Surti and Marwari Goats (in days)

Sr. No.	Breed		PARITY I	II	III	IV	Overall Mean
1.	Surti	Mean	145.89	145.82	143.67	144.00	145.08
		S.E.	0.95	1.22	1.07	0.86	0.55
		n	16	11	9	6	42
2.	Marwari	Mean	146.15	144.89	146.53	146.80	145.93
		S.E.	0.98	1.01	1.56	1.07	0.63
		n	20	18	16	7	61

Note: Statistical design used - 't' test Level of significance - 5% and 1% level.

Table 2: Effect of pregnancy on body weight gain and parturition on weight loss in Surti and Marwari goats.

Breed	Nature of Births		Wt. before service (Kg)	Wt. before kidding (Kg)	Wt. after kidding (Kg)	Total wt. gain (Kg)	Total wt. loss (Kg)	Kid wt. (Kg)	Wt. of placenta (Kg)	Wt. of fluids and others (Kg)
Surti	Single	$\bar{X}$	25.83	32.46	27.54	6.63	4.92	2.43	0.304	1.59
		SE	1.79	1.35	1.06	0.45	0.40	0.027	0.015	0.28
		n	22	22	22	22	22	22	22	22
	Twin	$\bar{X}$	26.95	36.12	29.62	9.15	6.50	3.81	0.383	2.30
		SE	1.17	0.85	0.91	0.62	0.29	0.32	0.022	0.40
		n	13	13	13	13	13	13	13	13
Marwari	Single	$\bar{X}$	28.98	34.66	30.29	5.68	4.37	2.63	0.306	1.45
		SE	2.16	1.84	2.40	0.33	0.22	0.024	0.017	0.22
		n	31	31	31	31	31	31	31	31
	Twin	$\bar{X}$	31.12	39.37	33.11	8.25	6.26	4.54	0.402	1.38
		SE	1.17	1.02	0.96	1.15	0.38	0.20	0.020	0.40
		n	17	17	17	17	17	17	17	17

Table 3: Time and season of kidding in Surti and Marwari goats.

S. No.	Breed	TIME Day 6.00 a.m. to 6.00 p.m.	Night 6.00 p.m.to 6.00 a.m.	Total	SEASON Winter (Nov. to Feb.)	Summer (Mar. to June).	Monsoon (July to Oct.)	Total
1.	Surti	35 (83.33%)	7 (16.67%)	42	21 (50.0%)	9 (29.43%)	12 (28.57%)	42
2.	Marwari	42 (68.85%)	19 (31.15%)	61	30 (49.18%)	11 (18.03%)	20 32.79%	61
3.	Total	77 (74.76%)	26 (25.24%)	103	51 (49.51%)	20 (19.42%)	32 (31.07%)	103

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A Note On Placental Characteristics In Local Non-Descript Goats*

A.K. VERMA, R.K. PANDIT and S.P. NEMA
Department of Oestetrics & Gynaecology, College of Veterinary Science and Animal Husbandry, Mhow-453 446 (M.P.).

The placenta provides nutrients to the foetus from the dam during pregnancy. Information on the placental characteristics of the local non-descript goats is meagre. The present communication embodies the effect of twinning and sex of the kids on the placental weight and number of cotyledons.

The placental characteristics in 85 local non-descript goats were studied. The placenta was weighed immediately after its discharge. The cotyledons were exposed and classified arbitrarily according to their diameter as large ($\geq$ 3.00 cm), medium (1.00 cm to 3.00 cm) and small ($<$ 1.00 cm). Statistical analysis was done to study the variance in the cotyledon numbers due to the sex, type of kidding and cornua as per Snedecor and Cochran (1967).

The placental weight in male born kids (269.17±9.28) was significantly higher ($P < 0.05$) than the female kids (240.67±9.39 g). Similarly, the weight of the placenta in the twin born kids (321.43±182.23 g) was higher ($P < 0.01$) than the placenta of single born kids (258.21±6.90 g). A similar trend in the value of placental weight as influenced by sex and number of kids born has been reported by other workers (Bhattacharya *et al*, 1983; Verma and Singh, 1985).

The number of cotyledons in the placenta of female born kids (120.77±2.85) were greater than the male born kids (113.10±3.77). However, this difference was insignificant. Similarly, the number of cotyledons in the placenta of single born kids (116.05±2.59) were higher ($P< 0.01$) than the placenta of twin born kids (99.14±8.50). More number of cotyledons in the placenta of single kids may be attributed to the presence of more number of medium sized cotyledons in this group (80.25±3.62) than the twin group (44.43±6.35). The large sized cotyledons were more in twin group (53.14±8.38) than the single group (29.62±1.98). This is in close agreement with Verma and Singh (1985) in Black Bengal goats. Pregnant horn had more cotyledons than the non-pregnant horns (65.95±1.72 vs 50.10±1.11).

Effect of sex and type of kidding on gestation length and birth weight was studied in 85 local goats. The mean gestation length and birth weight for male and single born kid was more than the female and twin born kid.

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A Study On The Histological Intimacy Between Cotyledons And Caruncles Of Ovine Placenta

S. DURGA PRASADA RAO, V. SUDHIR CHANDRA REDDY, M.P. IYYANGAR and G.P. SHARMA

Preliminary works on histomorphological studies were traceable (Srivastava, 1972; Srivastava *et al* 1981; Roy and Saigal 1986). Placentomes from ten gravid uteri of Deccani ewes were colected randomly from basal, middle and apical portions of uterine horns at different stages of pregnancy to establish the histological intimacy between foetal cotyledons and maternal caruncles and these structures were correlated with the crown rump length. The specimens collected were fixed in 10% buffered formaline. Sections of 5 to 6μ thickness were cut and studied by using the stains: (a) Haematoxyline and eosin for the routine histological studies (Luna, 1968). (b) Van Giesons Picro-fuschin and Masson's trichrome for connective tissue fibres (Singh and Sulochana, 1978).

Results and Discussion

In the present investigation the placenta of Deccani ewe was classified as syndesmochorial type in the cotyledonary area throughout the period of pregnancy. The observations recorded are in accordance with Shrivastava (1972) and Jainudeen and Hafez (1987). However, Shrivastava *et al* (1981) reported the presence of epitheliochorial type of placentation in the intercotyledonary area after day 70 of gestation in sheep.

There was not much difference in the histology of placenta taken from three sites of the uterus. The present investigation revealed the presence of broad chorionic villi, abundant mesenchymal tissue with a few blood vessels during the early stages of pregnancy in the ewe (Fig. 1). The lining epithelium consisted of two main types of cells viz. simple cuboidal and binucleated giant cells during the various stages of gestation. These findings are in agreement with those reported by Shrivastava (1972) and Johnson and Everitt (1980).

It was further observed that during the later stages of pregnancy the villi became progressively slender and narrower with a gradual decrease in its thickness at term and more vascular with intra-epithelial and sub-epithelial capillaries. The connective tissue was mostly collagen fibres and was seen around the blood vessels and also in the core

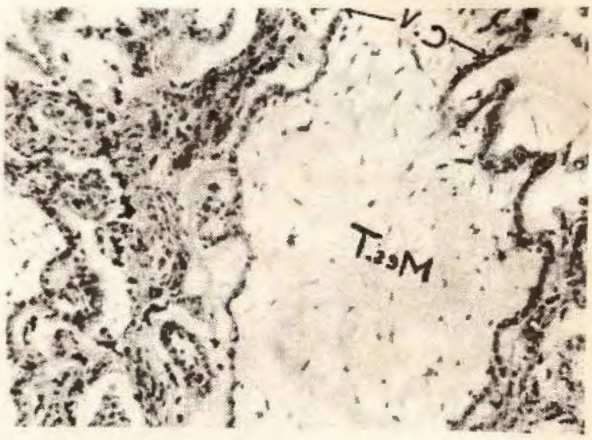

Fig. 1: Photomicrograph of sheep placentoma showing broad chorionic villi, abundant mesenchymal tissue during early stages of pregnancy. Van Gieson's Picro-fuchsin stain 250X.
CV = Chorionic Villi.
Mes. T: Mesenchymal tissue.

of the foetal villi. These observations are in accordance with the findings of Shrivastava *et al* (1981). Contrary to the present findings, Groser (1927) recorded no decrease in the thickness of the placental barrier. The decrease in the thickness of the placental barrier in the present study appeared to reflect a structural modification of the villi for the efficient absorption of the nutrients from the dam to the developing foetus.

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Semen Characteristics Of Native Boars*

B. VENUMANOHARA RAO[1], A. VENKATAMUNI CHETTY[2], S.V. RAMACHANDRAIAH[3] and P.K. SREERAMAN[4]

College of Veterinary Science, Tirupati 517 502 (A.P.).

ABSTRACT

A total of 64 ejaculates were collected at weekly intervals with the help of A.V. from eight native boars of 14-24 months age to study the service behaviour and semen quality. The mean values for different semen characteristics were: Reaction time 2.83±0.18 minutes; duration of ejaculation 2.95±0.17 minutes; total volume of ejaculate 138.9±3.67 ml; strained volume 108.94±3.23 ml; gel volume 30.0±1.66 ml; initial motility 83.31±1.52 per cent; pH 7.44±0.05; sperm concentration 283.01±12.76 millions per ml and live sperm count 81.70±1.43 per cent.

* * *

Pig industry is gaining importance day by day. For a profitable livestock industry the reproductive performance is important.

On perusal of the available literature it was found that much information is available on the semen characteristics of the exotic boars

* Part of the M.V.Sc. thesis submitted by the first author to the Andhra Pradesh Agricultural University, Hyderabad-500 030.

1. Post-graduate student
2. & 3. Associate Professors, Dept. of Animal Reproduction and Gynaecology.
4. Veterinary Officer, AICRP on Pigs.

(Aamdal, 1971; Roberts, 1971; and Murthy 1974), whereas it is scanty or meagre in the native boars. Hence, it was decided to study the semen characteristics of the native boars.

Materials and Methods

Eight native boars aged between 14-24 months belonging to the A.I.C.R.P. on Pigs, Veterinary College, Tirupati were used for this study. All the boars were kept under similar conditions of housing, management and feeding. The boars were accustomed to mount on estrus gilts or sows. A total of 64 collections were taken from all the eight boars at weekly intervals, with artificial vagina. Reaction time (R.T.) and duration of ejaculation was recorded.

Total volume of ejaculate was determined with the help of a measuring cylinder. The gel was separated from liquid portion by allowing the ejaculated semen to pass through four layers of muslin cloth. The volume of the gel was estimated by substracting the strained volume from the total volume of ejaculate.

Initial motility was assessed immediately after collection by examining a drop of diluted semen on a glass slide under a coverslip at 37^0C, at a magnification of 450X. It was expressed as percentage of progressively motile sperms on the basis of visual observation. Live sperm count was done soon after colection. The pH of the semen was recorded by digital pH meter. Sperm concentration was estimated by using Haemocytometer.

Appropriate statistical methods were used to interprete the results (Snedecor and Cochran, 1967).

Results and Discussion

The mean reaction time was found to be 2.83±0.18 minutes. Similar reaction time was recorded in crossbred boars by Ugwv *et al* (1984). However, Murthy (1974) recorded a higher value (3.6 minutes) in Large White Yorkshire boars. No significant difference in reaction time between the boars was found in the present study, whereas Murthy (1974) recorded significant difference among Large White Yorkshire boars.

The mean duration of ejaculation was 2.95±0.17 minutes. Murthy (1974), Ugwv *et al* (1984) and Fedarov (1985) reported a longer duration. Though there is no signnificant difference in the ejaculation time among native boars, a significant difference was observed by Murthy (1974) among Yorkshire boars.

The mean total volume of ejaculate recorded in native boars was 138.9±3.67 ml, with a significant difference between the boars. Similar values were reported by Ugwv *et al* (1984) in crossbred boars. However, the total volume of ejaculate was found to be more and varied in the Large White Yorkshire boars (Murthy, 1974; Tamuli *et al*, 1984 and Fedarov, 1985).

The strained volume of semen varied from 92.5 ml to 130.62 ml with a mean value of 108.94±3.23 ml. The present value is in close agreement with that reported by Sreekumaran and Raja (1976), but much lower than that recorded (189.3 ml) by Murthy (1974) in Large White Yorkshire boars. Similar to the observations of Murthy (1974), a significant variation in the strained volume was found in the present study.

The average Gel fraction of native boar semen was 30.00±1.16 ml (Range 22.37 to 37.5 ml). Ugwv *et al* (1984) reported similar values in crossbred boars. Higher values were recorded by Murthy (1974) and Sreekumaran and Raja (1976), in Large White Yorkshire boars. A high significant difference in the gel volume between the individual boars was observed ($P < 0.01$).

The percentage of progressively motile sperms ranged from 76.87 to 86.25 with an average of 83.31±1.52 with no significant difference between individual boars. Similar values were reported by earlier workers (Murthy, 1974; Ill'inskaya and Bezlyudnikov, 1980). However, Natornita and Totaru (1977) and Ugwv *et al* (1984) reported lower values.

The mean pH value of native boar semen was 7.44±0.05, which is in agreement with the values reported by earlier workers (Roberts, 1971; Sreekumaran and Raja, 1976 and Tamuli *et al*, 1984). The pH of semen did not vary significantly between individual boars.

The average concentration of spermatozoa in native boar semen was 283.01±12.76 millions/ml. These values were lower than those recorded by Murthy (1974) and Natornita and Totaru (1977) in Large White Yorkshire boars. However, Il'Inskaya and Bezlyudnikov (1980) and Tamuli *et al* (1984) recorded much lower values of 138 millions per ml, in Large White Yorkshire boars and 226×10^6/ml in crossbred boars, respectively. The sperm concentration decreased as the total volume of ejaculate increased. Similar negative correlation between the volume of the ejaculate and sperm concentration was also reported by Murthy (1974) in Large White Yorkshire boars.

The mean percentage of live sperms varied from 81.70±1.43 in native boars. This is allied to the values reported by Murthy (1974) in Large White Yorshire boars. However, Sreekumaran and Raja (1976), Tamuli *et al*, (1984) and Ugwv *et al* (1984) reported a higher percentage of live sperms in Large White Yorkshire boars.

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Blood Biochemical Profiles During Oestrus In Restricted Suckling And ad libitum Suckling sows*

SAIHLIRA, J.C. DUTTA and B.N. BORGOHAIN

Department of Gynaecology, Obstetrics and A.I., College of Veterinary Science, Assam Agril. University, Khanapara, Guwahati-781 022. Assam

ABSTRACT

Blood glucose, total serum protein, serum cholesterol, serum T_3 and T_4 levels showed no significant variation between restricted suckling and *ad libitum* suckling sows, during oestrus.

* * *

There are reports on blood biochemical profiles in pigs during various phases of reproduction (Nachreiner and Ginther, 1972; Reese *et al*, 1984; Kataki, 1985). The blood biochemical levels during oestrus in relation to the restricted suckling and *ad libitum* suckling in pigs are not yet known. An attempt has been made to ascertain the comparative blood biochemical profiles during oestrus in restricted suckling and *ad libitum* suckling sows.

Materials and Methods

A total of 16 post-partum Large White Yorkshire sows in apparently good health kept under standard feeding and managerial conditions at the Regional Pig Breeding Farm, Salesih, Aizawl, Mizoram, were included in this study. After farrowing, the animals were classified into two groups consisting of 8 sows each, thus:

Group I: *Restricted Suckling Group*: The piglets were not allowed to suckle their mother *ad libitum*. Restricted suckling was allowed by altering the suckling regime of the piglets from 30 days of age. This was achieved by separating the sows from their litters for withholding suckling for 6 hours from 9.00 A.M. to 3.00 P.M. daily, till the time of weaning.

Group II: *Control Group*: The piglets were allowed to suckle their mother *ad libitum* until they were weaned at 60 days of age.

The sows were observed for post partum oestrus daily after farrowing. Blood samples were collected from the ear vein when the sows were in estrus. The collection of blood was made in two fractions - one fraction was collected in a glass vial containing sodium flouride and the other fraction was collected in a test tube without anticoagulant and kept for separation of serum. The serum was separated from the clotted blood samples and kept at -20°C.

Blood glucose was estimated in the whole blood within 3 hours of collection, adopting the method of Folin and Wu (1920). The total serum protein, and serum cholesterol were estimated as per the methods of Varley (1967), and Zlatkis *et al*, (1953). Serum Triiodothyronine (T_3) and Serum Thyroxine (T_4) were estimated by RIA technique using Kits supplied by BARC, Trombay, Bombay.

Results and Discussion

The mean level of blood glucose during oestrus was found to be 82.58±7.52 mg/100 ml in the restricted suckling group, whereas in the *ad libitum* suckling group it was 80.86±5.27 mg/100 ml (Table 1). The difference was non-significant. The level of

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blood glucose observed was within the ranges reported by Yakimchuk (1978) and Swenson (1984) in sows. Pathak *et al*, (1982-83) reported the blood glucose level as 90.62±4.79 and 93.67±2.95 mg/100 ml in 6-7 months and 10-12 months old indigenous pigs of Assam, respectively. The variations might be due to the differences in age of the experimental animals.

The mean levels of total serum protein in restricted suckling group was 8.53±0.39 g/100 ml, whereas in the *ad libitum* suckling group it was found to be 8.25±0.49 g/100 ml. The difference was non-significant (Table 1). The results are in agreement with the findings of Gupta (1973), Yakimchuk (1978), Pathak *et al* (1982-83), Reese *et al*, (1984) and Kataki (1985).

The mean total serum cholesterol level during oestrus was found to be lower in restricted suckling sows than that in the *ad libitum* suckling sows, the difference being non-significant (Table 1). This finding is in general agreement with that of Swenson (1984) and Kataki (1985).

The mean values of serum T_3 in restricted suckling and *ad libitum* suckling groups during oestrus were found to be 1.34±0.02 and 1.36±0.02 ng/ml, respectively, the difference being non-significant (Table 1). Kataki (1985) also reported similar level of T_3 (1.38±0.05 ng/ml) during oestrus in pigs.

The mean T_4 level was found to be 3.85±0.23 and 3.80±0.22 μg/100 ml in restricted and *ad libitum* suckling groups, respectively. There was no significant difference between the two groups (Table 1). The T_4 values are comparable with those of earlier investigators (Scherzinger *et al*, 1972; Kataki, 1985).

Table 1: The blood biochemical profiles (Mean±SE) during estrus in ad libitum and restricted suckling sows and 't' value.

S. No.	Blood constituents	Group of sows		't' Value
		ad libitum suckling (n = 7)	Restricted suckling (n = 8)	
1.	Blood glucose (mg/100 ml)	80.86 ± 5.27 (63.95 - 99.00)	82.58 ± 7.25 (74.61 - 92.29)	0.31
2.	Total serum protein (g/100 ml)	8.25 ± 0.49 (6.74 - 9.65)	8.43 ± 0.39 (6.47 - 10.07)	0.33
3.	Serum cholesterol (mg/100 ml)	18.80 ± 3.45 (102.59 - 127.42)	118.36 ± 4.26 (102.52 - 136.13)	0.08
4.	Serum T_3 (ng/ml)	1.34 ± 0.02 (1.28 - 1.40)	1.36 ± 0.02 (1.26 - 1.50)	0.39
5.	Serum T_4 (μg/100 ml)	3.80 ± 0.22 (3.20 - 4.50)	3.58 ± 0.23 (2.90 - 5.10)	0.15

Figures in parantheses indicate the ranges.
n = No. of Observations.

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Histomorphochemical Changes In The Uterus Following Induction Of Oestrus With PMSG + HCG And Clomiphene Citrate In Bitches

S. PRABHAKAR[1], R.D. SHARMA[2], and K.S. ROY[3]

College of Veterinary Sciences, Punjab Agricultural University, Ludhiana-141 004.

ABSTRACT

Eight anoestrous bitches divided into two groups (group I and II) were treated with PMSG + HCG and clomiphene citrate, respectively for induction of oestrus. Identical histomorphological picture was observed in oestrus induced bitches of group I and the control bitch. In group I, endometrial and glandular epithelium was columnar and secretory, contrary to which low cuboidal epithelium was noticed in group II. Secretory material composed of neutral and acidic muco-polysaccharides and muco-proteins was abundant in group I bitches than those in group II, indicating good and poor response to PMSG + HCG and clomiphene citrate treatments, respectively.

* * *

The study was aimed to elucidate the histomorphochemical changes in the uterus following administration of pregnant mare serum gonadotropin (PMSG) + Human

1 Assistant Professor, Deptt. of Obstetrics & Gynaecology

2 Professor & Head, Deptt. of Obstetrics & Gynaecology

3 Associate Professor, Deptt. of Anatomy & Histology.

Chorionic gonadotropin (HCG) and clomiphene citrate in the treatment of anoestrous bitches for induction of oestrus.

Materials and Methods

Eight bitches were divided into two treatment groups. Group I comprised of four anoestrous bitches administered 350 IU PMSG (Chronogest: Intervet S.A., Angers Cedex, France) I.M. for seven days followed by 500 IU HCG (Chorulon: Intervet Int. B.V., Boxmeer, Holland) on eighth day to induce ovulation. Four bitches in group II were treated with 25 mg clomiphene citrate (Fertivet: Ar-Ex Lab. Pvt. Ltd., Bombay, India). The animals were daily examined for occurrence of oestrus and exfoliative vaginal cells to record the occurrence of oestrus. The onset of oestrus was observed in all the bitches of group I on the completion of treatment while in group II none of the animals showed oestrual signs on the completion of treatment schedule. Hence, ovario-hysterectomy was performed on 10th day from the start of treatment in both the groups i.e. 3 days and 5 days after the end of treatment in groups I and II, respectively. However, in control bitch, the operation was performed on 3rd day of oestrus to obtain the tissue samples from middle of the right and left uterine horns.

After standard histological processing, 5μ thick paraffin sections were stained by Haematoxylin and Eosin for routine examination, Masson's trichrome for connective tissue, periodic acid Schiff-Alcian blue (PAS-AB) for neutral and acidic mucopolysaccharides (Luna, 1968) and Bismark brown for water stable mucoproteins (Thompson and Hunt, 1966).

Results and Discussion

The histomorphological observation of PMSG + HCG treated uterus was almost identical to that of normally cycling bitch. The epithelium of uterine mucosa and uterine glands was columnar and secretory. The secretory material was more abundant in oestrus bitches of group I (Fig. 1) as also

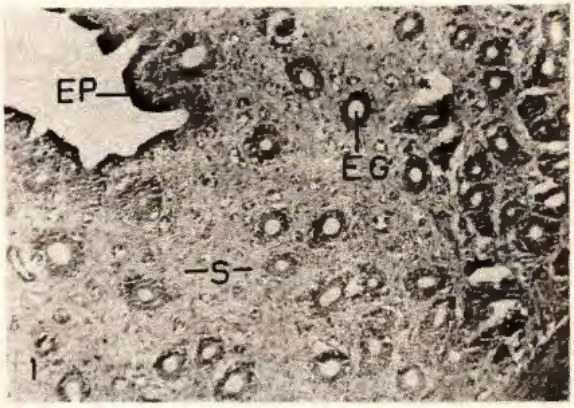

Fig. 1: Section of uterus from PMSG + HCG treated bitch showing varied reaction of mucoproteins in endometrial epithelium (EP), endometrial glands (EG) and endometrial stroma (S). Bismark brown × 100.

reported by Fabian and Preuss (1966), Andersen (1970) and Sokolowski *et al* (1973) in cats and bitches during oestrus. Contrary to this, clomiphene citrate treated bitches had low cuboidal epithelium without any secretory activity (Fig. 2). There was marked proliferation of the endometrial glands in the PMSG + HCG treated (Fig. 1) as well as in the

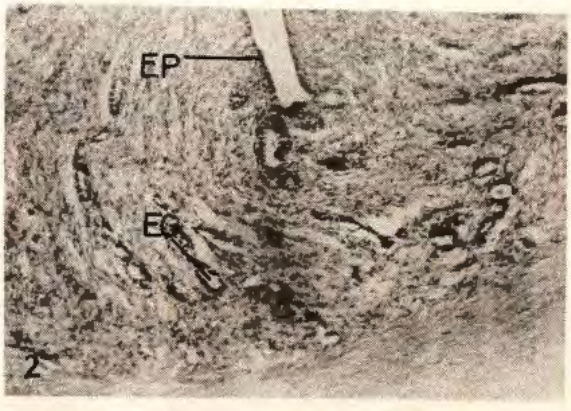

Fig. 2: Section of uterus from clomiphene citrate treated bitch showing lack of secretory activity in epithelium (EP) and endometrial glands (EG). Bismark brown × 100.

control bitch. In group I, the number of endometrial glands per unit area were 66.33±3.10 in the left and 56.50±2.04 in the right uterine horn, while the corresponding values in control bitch were 66.00±1.53 and 51.67±2.33 glands per unit area. In clomiphene citrate treated bitches, the endometrial glands were inactive and less in number in both the uterine horns (20.83±2.04 and 20.00±2.08, respectively). Stromal oedema and venous congestion as reported by Sokolowski *et al* (1973) was also noticed in oestrous bitches. These changes were absent in group II bitches.

The PMSG + HCG treated bitches showed increased scretory granules which were composed of neutral and acidic mucopolysaccharides. This supports earlier findings of Erichsen (1953) and Domitrovic and Morales (1982) in cycling bitches. These secretory granules were also strongly positive for mucoproteins, whereas, in the clomiphene citrate treated bitches only a weak reaction to PAS-AB and Bismark brown was noticed which indicated lesser physiological activity in the uterus. Identical histomorphochemical observations in PMSG + HCG treated bitches and the normally cycling bitch proved the efficacy of the drug for oestrus induction but clomiphene citrate failed to produce the desired effect in the given dose. Hence, increased dose of clomiphne citrate may be tried in future studies for induction of oestrus in bitches.

Acknowledgement

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Repair Of Recto-Vaginal Fistula In A Mare

B. RAMESHKUMAR, V. RAMASAMY[1], A.C. SUBRAMANIAN and R.C. RAJASUNDARAM
Livestock Research and Development Centre, Erode-638 003.

Pneumovagina is a condition occurring in mares after perineal injury, in which the affected animal sucks air into the vagina with an undesirable noise. Straub and Fowler (1961) reported that the violent expulsive efforts of the mare during parturition resulted in perineal lacerations in which the anal and vulvar sphincters were severed. There was a common opening (cloaca) through which the dung and urine were passed out. Aanes (1964) attributed that malposture of the foetus in the birth canal and forced expulsion by the mare resulted in passage of the hoof of the foetus through the roof of the vagina into the rectum, thereby creating a recto-vaginal fistula with perineal rupture. Roberts (1971) observed that due to constant dropping of the dung into the vaginal vault there was persistant irritation to the vaginal and vulvar mucous membranes. Hence the affected animal showed 'Wind Sucking' into the vagina (gill flirter) to relieve the irritation. Straub and Fowler (1961), Aanes (1964) and Roberts (1971) described various techniques for the repair of recto-vaginal fistula and perineal rupture in equines. In the present case modified Goetze's technique was adopted for the repair of pneumovagina arising out of perineal rupture in a mare.

Case history and Observations

A bay, Indian mare aged 6 years was brought with the symptoms of passage of dung and urine through the common opening in the vaginal vault. There was persistant 'Wind Sucking' noise. The mare gave birth to a foal 6 weeks earlier. The foetus was relieved by a quack after dystokia. Clinical examination of the animal revealed that there was a tear in the roof of the vagina communicating with the rectum. A 3rd degree laceration in the perineal body and anal sphincter forming a common opening for the rectum and vagina were noticed (Fig. 1).

Fig. 1: Recto-vaginal Fistula in a mare causing pneumovagina.

The mare was prepared for surgery after 12 hrs of fasting on the previous day. A prophylactic dose of Tetanus Toxoid 3000 I.U. was given parenterally. Sedation was done with chlorpromazine Hydrochloride (Largactil - M & B) at the rate of 1mg per kg body weight given parenterally for restraint. The operation was performed in standing position with the application of service hobbles. 8 ml of 2% Lignocaine Hydrochloride was injected in the first inter-coccygeal space for posterior epidural block. The animal was back racked and the anus was plugged with a cotton gauzed ball to prevent

1. Veterinary Assistant Surgeon, Erode-638 001.

contamination of the operation site. The mare's tail was covered with a protective bandage and tied upward. The perineal area was cleaned with soap and water and prepared for aseptic surgery.

Surgical Technique: The vulvar lips were drawn apart by placing a curved tonsil seizing forceps in either side. The vulvar mucosa along with the submucosal tissue was separated from peri-vaginal tissue by making an incision parallel to and 1/4 inch interior to the muco-cutaneous junction of the vulva. It was started at the dorsal border of the vulvar mucosa and extended ventrally as far as one half of the height of the vulva. The separated mucosa was made as a flap extended from the vulva diagonally to the area where the rectum and vagina were clearly separated (Fig. 2). The same procedure was followed for both sides. The flaps on both sides were made symmetrical and pulled posteriorly without undue tension for suturing.

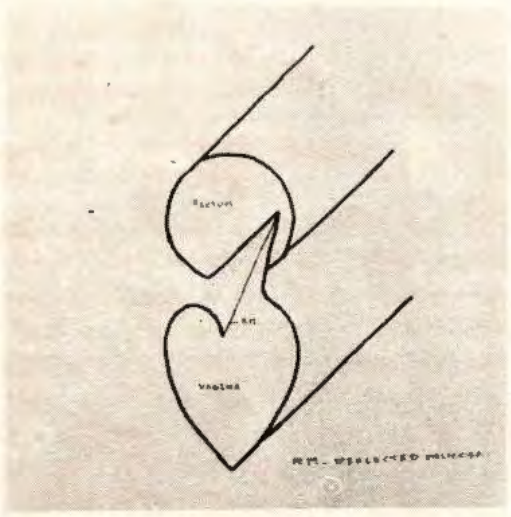

Fig. 2: Diagram showing Reflected vaginal mucosa.

Modified Goetze's method of suturing described by Straub and Fowler (1961) was adopted (Fig. 3) for the repair of recto-vaginal fistula. Chromic cat gut No. 1 threaded with

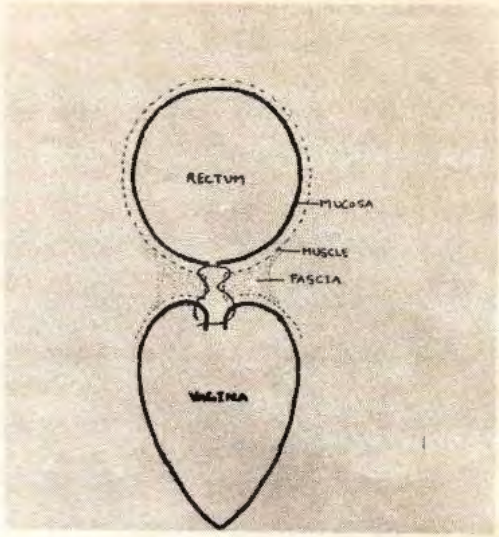

Fig. 3: Suture pattern for repairing pneumovagina.

an atraumatic half circle needle was used for suturing. First the suture went deeply through the vaginal mucosa to include the peri-vaginal tissue to the region of musculo-fascial defect. Then the suture penetrated deeply in the submucosal layer of the rectum on one side without penetrating into the lumen. The suture was then advanced to the other side penetrating the submucosal layer of the rectum. Later the suture was placed into the peri-vaginal tissue and then through the vaginal mucosa into the vaginal lumen. The suturing was completed by passing the suture through both the vaginal mucosal flaps back to the starting point where it was tied. These interrupted sutures were placed 3-4 cms apart without penetrating into the rectal mucosa. Now a new shelf was formed between the rectum and vagina. The sphincter ani was then connected with this shelf by deeply placing the single mattress sutures in the upper portion of vulva which was sutured by vertical mattress sutures.

Strepto-penicillin @2.5 gms per day was given I.M. for 5 days post-operative. The animal was fed with bran mash and grain for a week without hay for easy passage of dung.

The external vulvar sutures were cleaned and dressed with antibiotic dressing powder (Nebasulf Pfizer) avoiding dung contaminated infection. The animal made an uneventful recovery with satisfactory perineal wound healing and absence of 'Wind Sucking' after 20 days. The normal passage of dung and urine was also restored.

Discussion

Straub and Fowler (1961) compared many suturing techniques for the repair of perineal lacerations in mares and cows, then concluded that the modified Goetze's technique of suturing was best suited for the repair of recto-vaginal fistula. In the present case also same technique of suturing was found satisfactory. A thick, strong shelf was formed between the rectum and vagina which provided restoration of normal passage of the dung and urine through the respective openings. Aanes (1964) advised a two stage operation creating the shelf between vagina and rectum in first stage and later on repairing the ruptured perineum in mares. In the present case, a simple single stage operation was found quite satisfactory for the correction of pneumovagina after perineal laceration. Severe irritation caused by the suture material on rectal mucosa and reduction in the lumen of rectum due to suturing technique were observed by Aanes (1964). These caused presistant straining by the animal after operation resulting in snapping of the suture material used or tearing of the repaired tissues. But in the present case these complications were avoided by not penetrating the rectal mucosa while suturing and also creating a separate shelf between rectum and vagina which in turn did not reduce the lumen of the rectum. Various suture materials such as nylon by Straub and Fowler (1961), Chromic catgut by Aanes (1964) and steel sutures by Roberts (1971) were used for repair of perineal ruptures. In the present case chromic catgut provided good suturing material for recto-vaginal repair without much tissue reaction. Chromic catgut was absorbed normally after 14 days and did not require removal as in the case of non absorbable suture materials which may sometimes act as focus for secondary infection if they were allowed to remain in the tissues for longer periods, as the area was highly prone for contamination by dung and urine. Roberts (1971) opined that at the time of breeding of the mare or at the time of parturition, the vulvar opening might require to be enlarged by episiotomy incision and resuturing. Hence the owner was advised to watch the signs of estrum and seek the help of the qualified veterinarian.

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Study On Amylase Enzyme Of Cervical Mucus Of Crossbred Cows In Relation To Fertility*

A.J. WAGH[1] and V.B. HUKERI[2]
Department of Animal Reproduction, Bombay Veterinary College, Parel, Bombay-400 012.

ABSTRACT

The average concentration of amylase enzyme in cervical mucus at the time of insemination in normal and repeat breeding cows was estimated as 0.82±0.08 and 0.74±0.01 mg of maltose liberated/hr/ml of cervical mucus. The difference between these two groups was non-significant. Even the difference between pregnant and non-pregnant within normal and repeat breeding groups of crossbred cows was non-significant.

* * *

Assessment of fertility in females by studying genital tract fluid has been receiving considerable attention. The fluid of genital tract has been recognised as transport media for sperm and ova as well as metabolism and fertilization. The chemical composition of cervico-vaginal secretion is gaining more importance due to the fact that the sperms have to depend upon them for an alternate source of energy in the female genital tract. Considerable change in the biochemical composition of cervical vaginal mucus fatally affect the fertility (Salisbury and VanDemark, 1961). Some of the cervico-vaginal mucus enzymes seem to have attracted very little attention, particularly with reference to their concentration during fertile and infertile condition (Gentile *et al*, 1978).

Materials and Methods

The work was carried out on Gir x Jersey and Gir x Holstein cows at C.B.F., Kandivali, Bombay during 1981. The animals were managed under ideal conditions of feeding and management. Cervical mucus was collected from 24 normal cycling cows and 15 repeat breeders, prior to insemination by an apparatus consisting of 10 ml sterile glass pipette with 20 ml sterile record syringe attached to its tapering end by rubber junction. The cervical mucus was aspirated into the pipette and transferrred in glass vial for estimation of amylase enzyme on the same day on spectra 75 colorimeter as per the method of Bernfield (1955). Data was analysed statistically.

Results and Discussion

The average concentration of amylase enzyme in normal cows did not differ significantly from repeat breeding crossbred cows. The amylase concentration in pregnant and non-pregnant groups of normal and repeat breeding crossbreds also showed non-significant difference (Table 1).

Enzymes of cervical mucus have an important role to play in female genital tract. The cervical mucus contains several enzymes including amylase (Hafez, 1974). Amylase is an enzyme that hydrolyses the linkage of large polysaccharides composed of glycogen. Since amylase is involved in making reducing sugars available for cleavage of polysaccharide chain, it might therefore be implicated in the vailability of carbohydrate in cervical mucus. In follicular phase, amylase is involved in the degradation of glycogen but in luteal phase glycogen is predominantly catalyzed by amylase. Amylase was found to be capable of capacitating rabbit sperm in vitro. It may also

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1 Assistant Professor of Veterinary Science, Cattle Project, M.P.A.U., Rahuri-413 722 (M.S.).

2 Professor and Head of the Department.

play an important role in the capacitation of sperm in cattle. However, there are no such available references to correlate the present study in crossbred cows.

Amylase activity was high in the follicular phase and then it decreased. The amylase activity rises to peak which coincides with the peak of LH followed by a decrease in the late luteal phase (Sheth *et al*, 1975). It has also been noted that the mucus amylase level is inversely related to oestrogen output rather than water content of mucus (Maria *et al*, 1968).

Table 1: Concentration of Amylase enzyme in cervical mucus of crossbred cows.

Sr. No.	Group of cows	No. of cows	Av. mg of maltose liberated /hr/ml of cervical mucus	't' value
I	Normal	24	0.82±0.08 (0.21 - 1.89)	0.5100 NS
	Repeat breeding	15	0.74±0.01 (0.21 - 1.76)	
II	Normal-pregnant	19	0.87±0.09 (0.40 - 1.89)	1.1462 NS
	Normal-nonpregnant	5	0.06±0.17 (0.21 - 1.02)	
III	Repeat breeding pregnant	6	0.51±0.09 (0.21 - 0.85)	1.6132 NS
	Repeat breeding non-pregnant	9	0.89±0.18 (0.40 - 1.75)	

NS = Non-significant.

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Plasma Cortisol Levels During Pre And Post-Partum Period In Murrah Buffaloes (Bubalus bubalis)

M.L. KAKER, I.S. LOHAN and M.N. RAZDAN
Department of Animal Production Physiology, Haryana Agricultural University, Hisar-125 004.

ABSTRACT

Circulating cortisol levels of five Murrah buffaloes during pre and post-partum periods were quantified daily by RIA technique. Fluctuations in the levels were observed both between and within animals. Four of the five buffaloes had elevated cortisol levels approaching parturition.

* * *

Sequential endocrine events associated with the initiation of parturition in Murrah buffaloes are not documented. Only a few isolated reports on circulating levels of oestradiol, progesterone, $PGF_2\alpha$ and LH around parturition and during the post-partum period of buffaloes are available (Batra *et al*, 1982; Pahwa and Pandey, 1983; Prakash and Madan, 1983). Plasma cortisol levels have not been reported. Cortisol is one of the most important members of the steroids from the stress point of view and also because of its role in altering the enzymatic set up leading to increased placental oestradiol synthesis associated with the act of parturition. It was with this consideration that the circulating cortisol levels were studied daily in five Murrah buffaloes at late stage of pregnancy through parturition upto early post-partum period. The results obtained are presented in this communication.

Materials and Methods

Five Murrah buffaloes during different days of advanced pregnancy were selected for the present investigation. Blood samples were collected daily by jugular venipuncture in dried heparinised tubes. Plasma was separated by centrifugation (5^0C) and stored at -20^0C till further use. Buffaloes investigated were at different stages of advanced pregnancy when daily sampling was started before parturition and continued upto 8 to 10 days post-partum (Table 1).

Hormone assays: Plasma samples (in duplicate) were analysed in a single assay for cortisol concentration employing a specific cortisol RIA kit (Serono Diagnostics, Switzerland) with 125_I cortisol. The antiserum raised aganist cortisol-3 BSA in rabbits was used in the assay. Specificity of the RIA kit for cortisol had been thoroughly tested by Serono Laboratories. Cross reactivity with other steroids was to the tune of 6.7% for 11-deoxycortisol, 1.4% for corticosterone, 2.0% for 17α-OH progesterone, less than 0.001% for cortisone and other sex steroids. Plasma samples (0.5 ml) were extracted with 3.0 ml dichloromethane by vortexing for 1 minute. The lower organic phase was transferred to assay tubes and dried in water bath under nitrogen spray. Dried extract was dissolved in 100 μl assay buffer. Standard concentrations (0, 2.5, 5.0, 10.0, 25.0, 50.0, 100.0 ng) in 100 μl buffer were taken in duplicate in assay tubes already dried with 3 ml dichloromethane. Then 100 μl 125_I cortisol and 100 μl of cortisol antiserum was added to all assay tubes except non-specific binding tubes which had 100 μl carrier serum in place of antiserum. Total radioactivity tubes had 100 μl 125_I-cortisol. In addition quality control serotest sample was processed like plasma samples. Tubes were vortexed and incubated for 1 hour

at room temperature. One ml chilled polyethylenglycol 20% TW was added to all tubes except the total radioactivity tubes. Tubes were vortexed and centrifuged for 10 minutes at 3000 x g rpm (5°C). Supernatant was decanted and the tubes were counted in a Auto RIA Gamma Counter (LKB Wallac, Finland), pre-programmed to calculate concentration using a logit-log linear regression plot of binding per cent against concentration. The minimum detection level of the assay was 1 ng. The intra-assay coefficient of variation was within 4%. Recovery of the added standards to the hormone free pool ranged between 95.7% and 102.3% for different standards.

The data was analysed statistically using student's t-test to find out the effect of reporductive status on cortisol concentration.

Results and Discussion

Cortisol levels showed a lot of variation among different animals. The buffalo Nos. 180 and 217 had basically low cortisol profile as compared to the other three buffaloes. Four out of the five buffaloes had elevated level of cortisol on the day of parturition, followed by a marked decline on the day after parturition. Thereafter, cortisol level fluctuated, showing elevation on some day or the other.

The mean values of cortisol concentration showed little change from day 8 to day 2 pre-partum and levels were within a narrow range of 2.39±1.25 and 3.55±1.28 ng/ml. The mean level increased to 5.71±1.13 ng/ml on the day of parturition. However, this increase was found to be non-significant. The cortisol concentration declined markedly (2.17±0.37 ng/ml) on the day after parturition ($P<0.05$). Thereafter, there were variations in mean cortisol levels on different days post-partum with elevations on some day or the other. These variations are due to large differences in cortisol levels among individual animals. However, the variations were found to be non-significant when compared to the mean level observed on the day after parturition. Elevated cortisol level observed around parturition indicated the involvement of this steroid in the events with parturition in initiating the metabolic changes in the placenta leading to increased oestradiol synthesis required for the onset of parturition. Our results are in agreement with the observations of Smith *et al* (1973) who also recorded increased gluco-corticoids at parturition in cows. Variations in cortisol levels observed by us during early post-partum period also support the findings of Smith *et al* (1973).

Table 1: Blood plasma sampling details.

S.	Buffalo No.	Commencement of Sampling (in days prior to parturition)	Termination of Sampling (in days after parturition)
1.	S-180	12	10
2.	S-33	11	8
3.	S-26	8	8
4.	373	4	10
5.	217	1	10

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IJAR 11:1:66-67:1990

A Modified Surgical Technique For The Collection Of Uterine Stage Rabbit Embryos*

M. TANEJA[1], A.K. GUPTA, A.K. GHOSAL[2], B.L. BISHNOI and P.K. PAREEK

Department of Obstetrics and Gynaecology, College of Veterinary and Animal Science, Rajasthan Agricultural University, Bikaner-334 001.

In an experiment on albino rabbits to study the superovulation and its effect on ovum transportation (Taneja *et al* 1990), a modified technique was evolved to recover the uterine stage embryos. Six healthy virgin albino rabbit does weighing 2.0 Kg (1.7-2.3 Kg) and a fertile rabbit buck were used for the study. Does were caged individually for 18 days before they were mated to a fertile rabbit buck. Embryos were recovered surgically from the uteri of does, 96 hours post coitum.

The fasting animals (for 24 hrs) were subjected to laparotomy under a deep sedation with Diazepam (Calmpose, Ranbaxy, India) 5-10 mg per kg body wt. given i.m. (Bevin and Timmons, 1974). Lignocaine HCl 2% (Gesicain, S.G. Pharm., India) was used for local infiltration. Simple laparotomy was performed under aseptic precautions. The abdomen was opened 2" along linea alba between the posterior pair of nipples. After recording the ovarian response through the surgically made abdominal opening, a small 3/4" midline incision was made on the dorsal vaginal wall, just behind the cervical tips to make an opening sufficient to expose the cervices. 10 ml of sterile Modified Dulbecco's phosphate buffered saline (Whittingham, 1971) with 0.1% bovine serum albumin fraction V was introduced into the uterus at the utero-tubal junction with the help of a sterile glass syringe. The medium was then milked out of the uterus into a sterile siliconized glass petridish while holding the respective cervix with the thumb and forefinger. The procedure was repeated thrice on both uteri. The vaginal wound, the peritoneal edges and the abdominal muscles were sutured with chromic catgut (single "O"). Silk was used to close the skin edges.

The collected medium was then searched for embryos under a stereoscopic microscope at X20 magnification. Morphological evaluation of the isolated embryos was carried

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1. Embryo Biotechnology Lab., National Institute of Immunology, New Delhi-110 067.

2. Department of Physiology and Biochemistry.

out at X40 magnification. The mean values of ovulation points and the embryos recovered are 5.66±0.56 and 4.83±0.48 respectively. A total of 29 embryos were recovered (26 blastocysts, 1 early blastocyst and 2 degenerated) from six animals. Mean embryo recovery percentage was 85.55±4.75% and mean viable embryo recovery was 91.67%. It seems to be a better result and can primarily be attributed to an almost complete recovery of the flushing medium from the uterine horns, while a hindrance is produced in cannulation method which leads to a low embryo recovery rate (Agrawal *et al*, 1979).

Acknowledgements

The authors are thankful to Dr. P.R. Jatkar, Dean, C.V.A.S., Bikaner for providing the necessary facilities.

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Madras Veterinary College, Vepery,
Madras–600007

SHORT COMMUNICATIONS

IJAR 11:1:68:1990

A Note On Foetal Ascites With Mild Anasarca In Buffalo

T.G. DEVANATHAN, S.A. ASOKAN, C. VEERAPANDIAN and V.N. SESHAGIRI
Department of Obstetrics and Gynaecology, Madras Veterinary College, Madras-600 007.

A pluriparous buffalo with the history of vaginal bleeding since one week with restlessness was admitted as inpatient in Madras Veterinary College Hospital. The general condition of the animal was fair. Body temperature was slightly elevated. Vaginal examination revealed fully dilated cervix with the foetus impacted against the pelvic inlet and digital manipulation revealed highly oedematous foetus with mild anasarca (Fig. 1). The foetus was in posterior longitudinal presentation, dorso-sacral position and the hind legs wedged against the pelvic inlet.

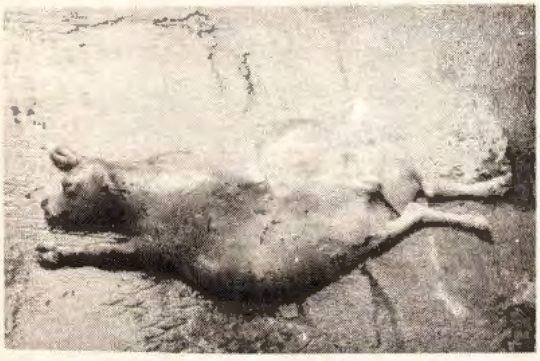

Fig. 1: Ascites Foetus with mild Anasarca in Buffalo.

The animal was given epidural anaesthesia with 2% Lignocaine and taking all aseptic measures, foetal hind legs were brought out of the vaginal passage. The size and shape of the legs confirmed premature condition of the foetus. Obstruction was felt on traction. On further manipulation foetal ascites was encountered and an opening was made through the medial aspect of the left thigh till it reached abdomen. Through this opening the ascitic fluid was evacuated by combining digital manipulation and pressure. After evacuating about ten litres of fluid, the foetal mass was relieved by forced traction. Subcutaneous oedema observed in foetal shoulder and thoracic region confirmed mild anasarca. The dam was treated for retained placenta with antibiotics and Oxytocin and the recovery was uneventful.

According to Sloss and Dufty (1980), the factor causing foetal ascites was obstruction of the lymphatics which prevents the circulation of peritoneal fluid. Jubb and Kennedy (1970) reported that foetal ascites may be due to diminished urinary excretion. Foetal anasarcus condition is attributed to the gene received from the sire (Roberts, 1971). In the present case, placental status could not be studied due to its retention. Dropsy of foetal membrane was also not observed as reported by Iyengar (1943), Sahasrabudhe (1948) and Sastry *et al* (1975).

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IJAR 11:1:69-70:1990

A Note On The Biometry Of Genitalia Of Exotic, Crossbred And Indigenous Pigs

P.K. DAS, B.K. SINGH and M.P. SINGH
Department of Gynaecology and Obstetrics, Ranchi Veterinary College, Ranchi-834 007.

Due to rapid increase in world population, scarcity of protein rich food has become a global phenomenon. Pigs can meet the protein requirement due to their highly prolific and fast growth rate. But the pigs are most neglected animals. Apart from improvement of genetic make up, efficient reproduction is equally important for economic livestock production. To acquire knowledge about reproduction in pigs biometrical study on genitalia is important. Therefore, an attempt was made to study the biometry of genitaliaof Exotic, Crossbred and Indigenous pigs.

The study was conducted on 241 normal genital organs. The genital organs were collected from Government Bacon Factory, Ranchi, immediately after slaughter and brought to the laboratory for study. As per the procedure of De Lange, (1950) and Sisson and Grossman (1956), the weight, length, width and thickness of right and left ovaries and the length of fallopian tubes, uterine horns, uterine body, cervix, vagina and vulva were measured. Analysis of data was carried out as per the methods of Snedecor and Cochran (1967).

The measurements of ovaries and different parts of tubular genitalia of different breeds are presented in Table 1 and 2 respectively. Maximum ovarian weight was recorded in Yorkshire (7.61 ± 0.557 gm for right ovary and 7.19 ± 0.461 gm for left ovary), whereas it was minimum in the case of crossbred pigs (5.44 ± 0.523 gm for right ovary and 5.07 ± 0.54 gm for left ovary). The effect of breed was found to be nonsignificant on the weight, length, width and thickness of right and left ovaries except the thickness of right ovaries. Longest uterine horn was observed in Yorkshire and shortest in indigenous pigs. Left and Right uterine horns of Yorkshire and Landrace pigs were significantly longer ($P < 0.05$) than those of indigenous pigs. The uterine horns of exotic pigs were longer than the horns of crossbreds but the difference was not significant. A highly significant effect of breed was noted on the length of uterine body, cervix, vagina and vulva ($P < 0.01$).

Acknowledgement

Authors are thankful to Dr. H.R. Mishra, the then Dean, Ranchi Veterinary College, Ranchi for providing necessary facilities and to the members of Government Bacon Factory, Ranchi for providing pig genitalia.

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Table 1: Biometry of pig ovaries (Mean ± S.E.)

Parameters	Landrace	Yorkshire	Crossbred	Indigenous
RIGHT OVARY				
Weight (gm)	7.19 ± 0.398 (118)	7.61 ± 0.557 (41)	5.44 ± 0.523 (38)	6.81 ± 0.457 (38)
Width (cm)	1.42 ± 0.054 (118)	1.47 ± 0.092 (41)	1.43 ± 0.076 (38)	1.31 ± 0.052 (38)
Length (cm)	2.35 ± 0.055 (118)	2.35 ± 0.137 (41)	2.22 ± 0.105 (38)	2.25 ± 0.072 (38)
Thickness (cm)	1.07 ± 0.029^{b} (118)	1.25 ± 0.086^{a} (41)	1.13 ± 0.039^{ab} (38)	1.11 ± 0.057^{ab} (38)
LEFT OVARY				
Weight (gm)	7.06 ± 0.390 (116)	7.19 ± 0.461 (42)	5.07 ± 0.544 (38)	6.95 ± 0.567 (42)
Width (cm)	1.40 ± 0.045 (116)	7.48 ± 0.062 (42)	1.37 ± 0.077 (38)	1.33 ± 0.036 (42)
Length (cm)	2.36 ± 0.050 (116)	2.30 ± 0.091 (42)	2.40 ± 0.086 (38)	2.22 ± 0.075 (42)
Thickness (cm)	1.07 ± 0.031 (116)	1.19 ± 0.066 (42)	1.07 ± 0.059 (38)	1.15 ± 0.056 (42)

Means bearing different superscripts differ significantly ($P < 0.05$).
Figures in parenthesis are observations.

Table 2: Length of different parts of tubular genitalia of pigs (Mean ± S.E.)

Length (cm)	Landrace	Yorkshire	Crossbred	Indigenous
Right oviduct	20.10±0.329^{a} (117)	20.04±0.452^{ab} (42)	18.78±0.424^{bc} (38)	17.61±0.767^{c} (40)
Left oviduct	20.04±0.271^{a} (119)	19.96±0.451^{a} (42)	18.97±0.448^{ab} (38)	18.14±0.35 (42)
Right horn	101.78±2.578^{ab} (110)	108.82±4.494^{b} (39)	98.46±5.086^{a} (36)	88.47±5.521^{c} (40)
Left horn	101.59±2.471^{a} (110)	108.66±5.087^{ab} (39)	88.58±5.089^{ab} (36)	88.50±4.409 (40)
Uterine body	6.01±0.138 (119)	6.18±0.045 (42)	5.80±0.194 (38)	5.38±0.124 (42)
Cervix	7.18±0.096^{ab} (119)	7.47±0.136^{b} (42)	6.85±0.222^{a} (38)	6.42±0.033^{c} (42)
Vagina	8.31±0.146^{a} (119)	8.63±0.208^{ab} (42)	7.70±0.206^{c} (38)	7.28±0.245^{c} (42)
Vulva	6.51±0.097^{a} (119)	6.73±0.183^{a} (42)	5.86±0.189^{b} (38)	5.79±0.065^{b} (42)

Means bearing the same superscript in a row do not differ significantly.
Figures in parentheses are observations.

IJAR 11:1:71-72:1990

A Note On The Semen Characteristics And Fertility Of A Doberman Pincher Dog

K. AHMED, M.K. TAMULI and B.N. BORGOHAIN

Department of Gynaecology, Obst. & A.I. College of Veterinary Science Guwahati-781 022.

The growing need of artificial insemination in dogs necessitated extensive study of semen in respect of physical and preservational characterisitics. In India, literature on this aspect is scarce (Deshpande *et al* 1970). Hence the present study was undertaken to record some aspects of semen characteristics of a Doberman Pincher dog aged 3 years.

Semen was collected on alternate day on 6 occasions in a prewarmed (37°C) thermosflask as per technique of Deshpande *et al* (1970). The ejaculation time, volume, initial motility, sperm concentration, live sperm count and sperm abnormalities were recorded. The biometry was carried out in 40 nos. of straight live spermatozoa in Nigrosin Eosin smears as per the method followed by Deka and Rao (1987). The semen was diluted in the ratio of 1:3 in Tris egg yolk fructose extender (Foote, 1970). The Doberman× Alsatian bitch of two years age in oestrus was inseminated on three occasions on 1st, 2nd and 3rd day of estrus using 5 ml of diluted semen.

The average ejaculation time, ejaculate volume, initial motility, sperm concentration and live sperm count was recorded to be 13.01±0.37 minutes, 14.67±1.2 ml, 82.3±0.31%, 258±37.31 million/ml and 91.67±0.62 per cent respectively. The colour of the ejaculates was thin milky. The percentage of various sperm abnormalities were recorded as free head 0.8, distal droplet 0.4, mid piece defect 0.6, bent tail 1.4, terminally coiled 0.2, abnormal head 0.6, abnormal contour 0.4 and narrow at the base 0.2. The mean values of different biometrical characteristics were head length 6.05±0.06μ, head width 3.33±0.05μ head length : head width 1:0.55, middle piece length 10.5±0.14μ and tail length 40±0.3μ.

The inseminated bitch gave birth to 7 pups (4 male and 3 female) after 63 days of first insemination.

The ejaculation time and ejaculate volume were found within the range as reported by Deshpande *et al* (1982). Variation in the sperm concentration may be attributed to the method of collection, size and breed of the dog. The present study revealed a higher concentration of spermatozoa than the report of Harrop (1955) but this value was found well below the record of Hendrikse and Antonisse (1984).

Lower sperm motility (71.38 and 71±9%) and higher sperm abnormalities (14.07 and 11.2±7.7%) were reported by Hendrikse and Antonisse (1984) and Gunzel (1986) respectively.

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CASE REPORTS

IJAR 11:1:72-73:1990

Successful Treatment Of Cervical Fibroleiomyoma In A Crossbred Cow

R.K. PANDIT, S.P. NEMA and U.K. GARG

Department of Obstetrics & Gynaecology, College of Veterinary Science and Animal Husbandry, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Mhow (M.P.), Pin-453 446.

ABSTRACT

Successful treatment of cervical fibroleiomyoma in a 10 years old crossbred cow is reported. The tumour measured 7×5.5 cm in dimensions. The pedunculated stalk attaching the tumour to the cervix was 16.50 cm long and 1 cm wide. Following abortion, the tumour was removed surgically under posterior epidural anaesthesia and examined histopathologically under posterior epidural anaesthesia and examined histopathologically. The animal conceived normally after 2 1/2 months of the tumour removal and delivered a healthy female calf subsequently.

* * *

The incidence of pedunculated tumours in the genital system of cattle, especially the cervical tumours are very rare (Kohli and Bishnoi, 1980; Sidhaye, 1982 and Roesti, 1986). A long pedunculated cervical fibroleiomyoma in a crossbred cow and its successful treatment is presented in this paper.

Case report: A 4 Month pregnant crossbred cow (1/2 Red Dane × 1/2 Local), aged about 10 years and in its 5th parity was brought to the clinic for the treatment of a growth protruding out of the vulvar labiae. Gynaeco-clinical examination revealed the growth to be oval in shape and of hen's egg size. The growth was attached to ventral cervix through a long stalk. Since the animal was not showing any major discomfort and was pregnant, the owner was not prepared to take any surgical risk for the fear of abortion. Hence, the owner was advised to keep the animal under close observation and asked to present it in case any complication arose.

About 3 months after the preliminary checkup the owner again presented the animal with the complaint that the size of the growth had further increased and the cow had aborted at 7 months of pregnancy. Now the owner was prepared for the surgical removal of the growth because it was causing straining and discomfort to the animal.

Treatment: First, the animal was routinely treated for the abortion and then the surgical treatment was undertaken. The animal was restrained properly in a trevis. The hind portion of the animal including the exposed growth was thoroughly washed with 0.1% Potassium Permanganate solution. Epidural anaesthesia was induced by injecting 8 ml of 2% Procaine Hydrochloride solution epidurally. The relaxed cervix was then pulled upto the region of vulvar commissure (Fig. 1).

Fig. 1: The relaxed cervix with the pedunculated tumour.

Two artery forceps were clamped 0.5 cm apart at the base of the peduncle, through which the growth was attached to the cervix. The two major blood vessels of the cervix which were supplying to the growth were ligated above the first forcep with chromic catgut. Thereafter, the growth was removed by severing the peduncle from the base between the two forceps. The cervical wound was dressed with the Furacin water soluble ointment[1] and the cervix was reverted to its normal position. Then, 15 ml Nova!gin[2] and 2.5 g Munomycin Forte[3] were injected intramuscularly for 3 consecutive days.

The cervical wound healed within a week and the animal became absolutely normal. After missing 2 oestrus periods the animal was inseminated on the 3rd oestrus i.e. about 2 1/2 months after the operation. The animal delivered a healthy female calf after completing the normal gestation period.

Histopathological examination of the tissue revealed bundles of smooth muscle cells arranged in a concentric, intersecting and interweaving patterns, and were mixed with fairly large amount of fibrocollagenous connective tissue matrix. At some places the tissue presented hyalinization and degenerative changes leading to the cyst formation. The findings suggested that the growth was fibroleiomyoma as reported by Jubb *et al* (1985).

Acknowledgement

Thanks are due to Dr. G.C. Parasar, the Dean, College of Veterinary Science & A.H., Mhow, for providing the facilities.

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1. S.K. & F. Pharmaceuticals Limited, Bangalore.
2. Hoechst India Limited, Bombay.
3. Glaxo Laboratories (India) Limited, Bombay.

Cyclopia In A Kid

S.A. ASOKAN, T.G. DEVANATHAN and V.N. SESHAGIRI
Department of Obstetrics and Gynaecology, Madras Veterinary College, Madras 7.

A pluriparous nearing parturiant Doe was brought to the Obstetrics ward with a history of straining for more than 6 hours. Vaginal examination revealed dilated cervix with the fore-limbs of the foetus in the vaginal passage. On traction of the limb, a live cyclopia kid was delivered with the following anatomical features. The eye balls were fused and placed in the centre of the face (Fig. 1) . The

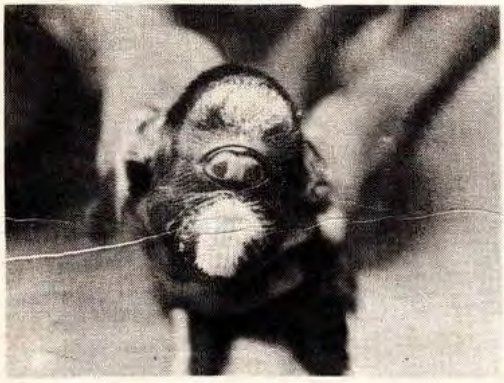

Fig. 1: Photograph showing fused eye balls with rudimentary eye lids and absence of upper jaw of the kid.

eyelids were rudimentary. The nasal bone was replaced with the connective tissue. Skiagram (Fig. 2) of the skull revealed absence of nasal, malar, premaxillary and lacrimal bones. A small piece of maxilla was present with few molar teeth. The development of mandible was complete. The tongue was

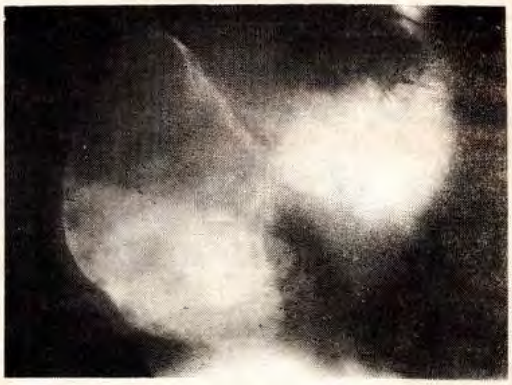

Fig. 2: Skiagram showing the absence of nasal, malar, premaxillary bone. A part of maxillary bone with few molar teeth was present.

protruded through the buccal cavity since the premaxillary bones were absent.

Roberts (1971) classified Cyclopia under Non-inherited teratologic defects of embryonic development with alteration in the tissue differentiation arisen from a single area of the embryonic disc. The skiagram of the foetal skull concurs with the true definition of a cyclopia. Binn and Co-workers (1959) reported 1 to 8 per cent of the new born lambs with cyclopia in flocks in south western Idaho. Roberts (1971) reported that cyclopia was observed in pig and sheep. On perusal of record such reports were found scanty in Indian conditions.

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CLINICAL ARTICLES

IJAR 11:1:75-76:1990

Effect Of "Clofert-Vet" Treatment In Post-Partum Anestrous Crossbred Cows And Murrah Buffaloes.

V. SUDHIR CHANDRA REDDY, G.P. SHARMA, M. SATYANARAYANA RAJU and C. ESWARA REDDY

Department of Animal Reproduction, College of Vety. Sciences, Hyderabad-500 030, A.P.

A suitable device to stimulate inactive ovaries is of immense importance in reducing the intercalving period to achieve desired calf crop and milk yield. A few reports on the response of clomiphene citrate are available in activating the inactive ovaries of cows and buffaloes (Deshpande *et al* 1976; Kaikini *et al* 1977 and Hukeri *et al* 1979). A study was undertaken to assess the effect of clofert-vet (Clomiphene citrate) on the anoestous crossbred cows and buffaloes.

Twenty each of crossbred cows and Murrah buffaloes were included in the study. Ten each of crossbred and Murrah buffaloes were kept as control animals. All the animals did not exhibit oestrus since 6 to 9 months after parturition. Each experimental animal was orally administered one tablet of Clofert-vet (Sigma Lab. Bombay) daily for five consecutive days. Administration consisted of drenching of 125 ml of 10% sodium bicarbonate solution, followed by one tablet of Clofert-vet dissolved in 500 ml of water. The control animals were given daily 125 ml of 10% sodium bicarbonate solution only for 5 days. All the animals were subjected to gynaeco-clinical examination daily and observations were recorded.

About 60% of 20 anestrous crossbred cows treated with Clofert-vet exhibited ovulatory oestrus at an average interval of 8.42±0.98 days, while only 30% of 10 crossbred cows of control group evinced oestrus with a mean period of 30.33±3.39 days (Table 1). This variation was found to be significant ($P < 0.01$). In the case of treated buffaloes, ovulatory oestrus was observed in 17(85.0%) with a mean period of 6.01±0.41 days, while only 4 out of 10(40.0%) exhibited oestrus with a mean period of 26.00±2.35 days in the control group of buffaloes and this variation was also found to be significant ($P < 0.01$). Similar findings were reported by Deshpande *et al* (1976) and Pillai (1980). However, Chauhan and Singh (1979) reported poor response of this drug.

The overall conception rate in crossbred cows was 55.0% in treated group as against 30.0% in control group. Corresponding values in buffaloes were 80.0% and 40.0% in treated and control group, respectively.

It is interesting to note that in this study, the stimulatory effect of Clofert-vet was found to be more pronounced in buffaloes than in crossbred cows.

REFERENCES

Chauhan, F.S. and Singh, M. (1979): Anoestrus in buffaloes. Indian Vet. J. 56: 583-589.

Deshpande, B.R.; Hukeri, V.B.; Velhankar, D.P. and Sane, C.R. (1976): Preliminary observations on 'Fertivet' in induction of heat in anoestrous cows and buffaloes. Indian Vet. J. 53: 561-563.

IJAR 11:1:74:1990

Cyclopia In A Kid

S.A. ASOKAN, T.G. DEVANATHAN and V.N. SESHAGIRI
Department of Obstetrics and Gynaecology, Madras Veterinary College, Madras 7.

A pluriparous nearing parturiant Doe was brought to the Obstetrics ward with a history of straining for more than 6 hours. Vaginal examination revealed dilated cervix with the fore-limbs of the foetus in the vaginal passage. On traction of the limb, a live cyclopia kid was delivered with the following anatomical features. The eye balls were fused and placed in the centre of the face (Fig. 1) . The

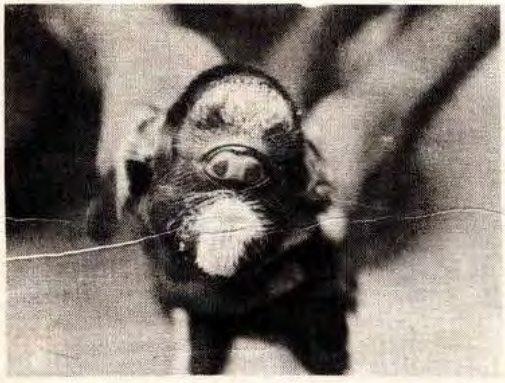

Fig. 1: Photograph showing fused eye balls with rudimentary eye lids and absence of upper jaw of the kid.

eyelids were rudimentary. The nasal bone was replaced with the connective tissue. Skiagram (Fig. 2) of the skull revealed absence of nasal, malar, premaxillary and lacrimal bones. A small piece of maxilla was present with few molar teeth. The development of mandible was complete. The tongue was

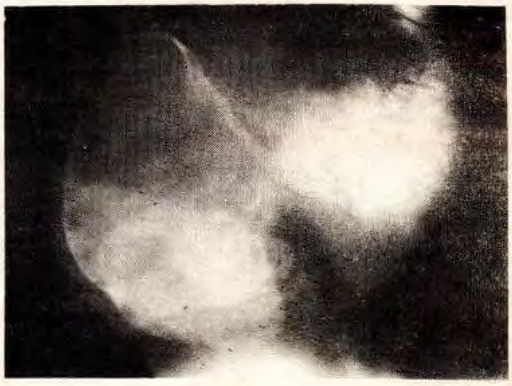

Fig. 2: Skiagram showing the absence of nasal, malar, premaxillary bone. A part of maxillary bone with few molar teeth was present.

protruded through the buccal cavity since the premaxillary bones were absent.

Roberts (1971) classified Cyclopia under Non-inherited teratologic defects of embryonic development with alteration in the tissue differentiation arisen from a single area of the embryonic disc. The skiagram of the foetal skull concurs with the true definition of a cyclopia. Binn and Co-workers (1959) reported 1 to 8 per cent of the new born lambs with cyclopia in flocks in south western Idaho. Roberts (1971) reported that cyclopia was observed in pig and sheep. On perusal of record such reports were found scanty in Indian conditions.

REFERENCES

Binn, W.; Thacker, E.J.; James, L.F. and Huffman, W.T. (1959): A congenital Cyclopian - Type Malformation of Lambs. J. Am. Vet. Med. Asso. 134: 180.

Robert, S.J. (1971): Veterinary Obstetrics and Genital Diseases. Second Indian Edition. Scientific Book Agency, Calcutta.

CLINICAL ARTICLES

IJAR 11:1:75-76:1990

Effect Of "Clofert-Vet" Treatment In Post-Partum Anestrous Crossbred Cows And Murrah Buffaloes.

V. SUDHIR CHANDRA REDDY, G.P. SHARMA, M. SATYANARAYANA RAJU and C. ESWARA REDDY

Department of Animal Reproduction, College of Vety. Sciences, Hyderabad-500 030, A.P.

A suitable device to stimulate inactive ovaries is of immense importance in reducing the intercalving period to achieve desired calf crop and milk yield. A few reports on the response of clomiphene citrate are available in activating the inactive ovaries of cows and buffaloes (Deshpande *et al* 1976; Kaikini *et al* 1977 and Hukeri *et al* 1979). A study was undertaken to assess the effect of clofert-vet (Clomiphene citrate) on the anoestous crossbred cows and buffaloes.

Twenty each of crossbred cows and Murrah buffaloes were included in the study. Ten each of crossbred and Murrah buffaloes were kept as control animals. All the animals did not exhibit oestrus since 6 to 9 months after parturition. Each experimental animal was orally administered one tablet of Clofert-vet (Sigma Lab. Bombay) daily for five consecutive days. Administration consisted of drenching of 125 ml of 10% sodium bicarbonate solution, followed by one tablet of Clofert-vet dissolved in 500 ml of water. The control animals were given daily 125 ml of 10% sodium bicarbonate solution only for 5 days. All the animals were subjected to gynaeco-clinical examination daily and observations were recorded.

About 60% of 20 anestrous crossbred cows treated with Clofert-vet exhibited ovulatory oestrus at an average interval of 8.42±0.98 days, while only 30% of 10 crossbred cows of control group evinced oestrus with a mean period of 30.33±3.39 days (Table 1). This variation was found to be significant ($P < 0.01$). In the case of treated buffaloes, ovulatory oestrus was observed in 17(85.0%) with a mean period of 6.01±0.41 days, while only 4 out of 10(40.0%) exhibited oestrus with a mean period of 26.00±2.35 days in the control group of buffaloes and this variation was also found to be significant ($P < 0.01$). Similar findings were reported by Deshpande *et al* (1976) and Pillai (1980). However, Chauhan and Singh (1979) reported poor response of this drug.

The overall conception rate in crossbred cows was 55.0% in treated group as against 30.0% in control group. Corresponding values in buffaloes were 80.0% and 40.0% in treated and control group, respectively.

It is interesting to note that in this study, the stimulatory effect of Clofert-vet was found to be more pronounced in buffaloes than in crossbred cows.

REFERENCES

Chauhan, F.S. and Singh, M. (1979): Anoestrus in buffaloes. Indian Vet. J. 56: 583-589.

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Hukerri, V.B.; Ansari, N.N. and Deshpande, B.R. (1979): 'Fertivet' trials on oestrous induction and conception in anoestrous lactating buffaloes. Indian Vet. J. 56: 958-961.

Kaikini, A.S.; Pargaonkar, D.R.; Patil, R.K. and Dindorkar, C.V. (1977): Break through therapy for anoestrum in cattle. Indian Vet. J. 54: 667-672.

Pillai, G.P.V. (1980): Studies on anoestrum in crossbred cattle. M.V.Sc. Thesis submitted to the Kerala Agricultural University.

Table 1: Effect of "Clofert-Vet" treatment in post-partum anestrous crossbred cows and Murrah Buffaloes.

Group treatment	No. of animals		Post-Partum anestrous period (days)		Days required to induce estrus		Animals exhibited estrus				Pregnant at first A.I.				Conception rate with subsequent A.I.			
	Cows	Buffaloes	Cows	Buffaloes	Cows	Buffaloes	Cows		Buffaloes		Cows		Buffaloes		Cows		Buffaloes	
							No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Clofert-vet. (300 mg/day)	20	20	224.45 ±6.13	217.1 ±5.21	8.41 ±0.98	6.01 ±0.41	12	60	17	85	9	45	15	75	11	55	16	80
Control	10	10	225.7 ±9.14	228.6 ±8.07	30.33 ±3.39	26.00 ±2.35	3	30	4	40	2	20	3	30	3	30	4	40

IJAR 11:1:76-77:1990

Dystokia Caused By Severe Foetal Hydroperitoneum In A Local Cow

R.K. PANDIT and VARUNA SINGH

College of Veterinary Science and Animal Husbandary, Mhow-453 446 (M.P.)

The incidence of foetal dystokia due to hydroperitoneum or ascitis has been reported in Ayrshire, Friesian and Swedish low land cattle. However, such report is lacking in the indigenous cattle.

A local, non-descript, primipara cow, aged about three years was brought to the clinic from a distant village for the treatment of dystokia on 13th October, 1989. The animal had completed the gestation period. It had expressd symptoms of initiation of parturition about 14 hours back. Thereafter, it was followed by strong straining which resulted into rupture of the water bags. The two limbs of the foetus were noticed protruding out of the vulva. When the foetus could not be delivered normally the help of the local Veterinary Field Assistant was sought without any fruitful results.

The general condition of the animal was satisfactory, though it was recumbent and appeared exhausted. The pulse and temperature were within the normal limits. Abdominal enlargement appeared to be more than normal for the animal due for calving. The hooves of foetal forelimbs were protruding out of vulva and were dry. The vulva appeared oedematous. The colour of vulvar mucus membrane was normal and udder appeared shrunken.

On vaginal examination only part of the limbs and head could be palpated. The foetus was dead and could not be repelled for detailed examination since no space was available. Vaginal delivery through traction or foetotomy was not possible. Hence, it was decided to relieve the animal by caesarean section.

Treatment: The uterus was incised following posterior epidural anaesthesia (2% Procaine Hydrochloride solution) with local infiltration at left ventral paramedian approach. The foetus appeared very voluminous due to the great enlargement of the abdomen with fluids. The abdomen was punctured and about 10 lit. fluid was drained off. This reduced the foetal diameter considerably and enabled its removal from the incision site along with foetal membranes. Caesarean section and post-operative care of the dam was undertaken as per Frank and Roberts (1940). The animal was discharged from the clinic after eight days of operation following recovery.

Fig. 1: The foetal abdomen greatly distended due to accumulation of transudate in peritoneal cavity.

Foetal Examination: The foetus was examined immediately after the operation. It was still distended with fluid (Fig. 1). After dissecting the foetus, about nine lit. of fluid was removed from its peritoneal cavity. The total weight of the foetus prior to dissction, was 39 kg. with no signs of inflammatory swelling. Laboratory examination of the straw coloured fluid revealed that it was low in proteins with minimum inflammatory cells. Hence, it was diagnosed as transudate. The foetal testes were abdominal and scrotal sac inconspicuous. Liver was remarkably large and mandible was distorted.

Acknowledgement

Thanks are due to Dr. G.C. Parashar, Dean, College, of Veterinary Science and Animal Husbandary, Mhow, for providing the facilities.

REFERENCE

Frank, E.R. and Roberts, S.J. (1940): Caesarean section in the bovines. N.A. Vet. 21: 546.

INDIAN JOURNAL OF ANIMAL REPRODUCTION

ATTENTION

All Authors/ Contributors should note that:—

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ISSAR News

Dr. Borje Danell, D.V.M., Ph.D., Director, Swedish International Programme on Animal Reproduction, (SIPAR), Uppsala Sweden visited India in February 1990. He visited Post-Graduate Department of Animal Reproduction and Gynaecology PKV, Akola and Nagpur Veterinary College, Nagpur and delivered Lectures on Recent Advances in Animal Reproduction Research and Embryo Transfer Technology in Sweden. Dr. A. S. Kaikini, Emeritus Scientist (ICAR) accompanied him and participated in the discussions.

Dr. Danell visited IJAR Office at Nagpur and appreciated its high standard. He readily became IJAR Subscriber by paying US $ 100. Subsequently he visited NDDB and Bombay Veterinary College and addressed ISSAR Maharashtra Chapter headed by Dr. V. B. Hukeri.

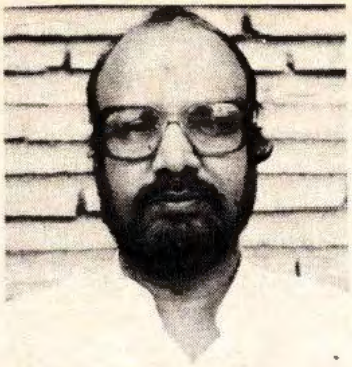
Dr. Borje Danells discussing with Dr. A. S. Kaikini
With him are Dr. R. K. Patil, Dr. A. W. Deshmukh and Dr. S. S. Ambalkar.

Dr. A. L. Chaudhry, Ph.D., Director CSWRI, Avikanagar is appointed Vice Chancellor Haryana Agricultural University, Hissar.

Dr. Chaudhry is a renowned Veterinary and Animal Scientist and a very able administrator known for his quick positive decisions. He has readily consented to host the next ISSAR Conference at HAU, Hissar for which we are very much thankful to him.

We congratulate Dr. A. L. Chaudhry and wish him and HAU all success.

Dr. A. L. Chaudhry



Dr. P. W. Amin

Dr. P. W. Amin, Ph.D., Senior Entomologist at the International Crop Research Institute of the Semi-Arid Tropics (ICRISAT), Patancheru, Hyderabad (A.P.) is appointed Vice-Chancellor, Punjabrao Agricultural University (PKV), Akola w.e.f. April 30, 1990.

Dr. Amin is an Eminent Crop Scientist and was earlier Head Entomology Division, Kerala Forest Research Institute.

We congratulate Dr. P. W. Amin and wish him and PKV all success.

* * *

Dr. A. Venkatamuni Chetty, Ph.D., Associate Professor is appointed Professor and Head, Department of Animal Reproduction and Gynaecology, College of Veterinary Science, Tirupati (A.P.).

We congratulate Dr. A. V. Chetty and wish him best of luck.

* * *

Dr. M. K. Tamuli, MVSc Secretary Assam Chapter of ISSAR is awarded Scholarship by the Association of Commonwealth Universities for Ph.D., studies in Cryo-preservation of Boar Semen at the Royal Veterinary College, London.

We congratulate Dr. Tamuli and wish him best of luck.

* * *

Dr. Bharat Chandra Deka is Secretary, Assam Chapter of ISSAR in place of Dr. M. K. Tamuli, deputed overseas.

* * *

Maharashtra Goat and Sheep Research and Development Institute has recently been established at Phaltan. Details are available with Shri B. V. Nimbkar, Secretary, Maharashtra Goat & Sheep Research & Development Institute, Near Jinti bridge, Lonand-Phaltan Road, Phaltan (Satara)-415 523 Maharashtra.

* * *

ANNOUNCEMENT

The Indian Society for Study of Animal Reproduction (ISSAR) has instituted following Awards for the year 1989.

(1) Professor Lagerlof Memorial Award

(2) Dr. G. B. Singh Memorial Award

(3) ISSAR Fellowship Award.

Professor Lagerlof Memorial Award is for the best clinical/research article related to Animal Reproduction published in any Journal during the year 1989.

Dr. G. B. Singh Memorial Award (Young Scientist Award) is for the best article on Animal Reproduction by the young Veterinarian Scientist (below 35 years of age). The scientist should be the first author of the article and should forward his age certificate along with the copies of article.

Nominations for ISSAR Fellowship Award be submitted along with details of significant contribution made for the development of Animal Reproduction as well as our Society.

Reprints/xerox copies (four each) are invited for consideration for the said three Awards and should reach the undersigned on or before **31st July 1990** (as the last dates have been extended).

Dr. D. R. Pargaonkar
Secretary, ISSAR

Audit Report

The Indian Society for the Study of Animal Reproduction, Madras
Audit for the period ended on 31st March 1990.

With referenee to the audited accounts enclosed herewith we have to report as under :—

We have obtained all the information and explanation which to the best of our knowledge and belief were necessary for the purposes of our audit.

(b) In our opinion, proper books of accounts have been kept by the society so far as it appears from our examination of these books for the period 1-1-89 to 31-3-90.

(c) The Balance Sheet and Income and Expenditure Account under report are in agreemeat with the books of accounts and

(d) In our opiaion and to the best of our information and according to the explanations given to us, the accounts disclose a true and fair view;

(i) In the case of Balance Sheet of the Society's Assets and Liabilities as at 31st March 90 and

(ii) In the case of Income and Expenditure Account of its surplus for the period ended on that date.

MADRAS 18
DATED 27-4-90

RAMANAN & CO.
CHARTERED ACCOUNTANTS.

The Indian Society for the Study of Animal Reproduction, Madras
Balance Sheet as at 31 st March 1990

LIABILITIES			ASSETS		
General Fund :			Cash and Bank Balances :		
As per last balance sheet	93693-84		Cash on hand		2474-05
Add : Excess of Income for the year	18097-51	111791-35	Cash with SBI Madras in SB a/c		17112-05
G. B. Singh Memorial Fund :			Investments :		
As per last balance sheet		11006-00	With SBI, Madras. Magnum certificate at cost	20000-00	
NILS Lagerlof Memorial Fund :			With SBI Bombay in FD a/c towards NILS Lagerlof Memorial Fund	13500-00	
As per last balance sheet	10000-00		G. B. Singh Memorial Fund Deposit	10000-00	
Add : Contribution during the year	3450-00	13450-00	With TTDFC	60000-00	
Prof. C. R. Sane Oration Fund :			Unit Trust of India 1000 Units	13400-00	116900-00
As per last balance sheet	200-00		Amounts Receivables :		
Add : during the year	2040-00	2240-00	Interest accrued on FD with SBI Bombay		2501-25
Audit Fee Payable		500-00			
		138987-35			138987-35

MADRAS Dated- 27-4-90

Vide our report of even date

A. R. Ramamohana Rao	D. R. Pargaonkar	S. R. Pattabi Raman	Ramanan & Co.
President	Secretary	Treasurer	Chartered Accountants

The Indian Society for the Study of Animal Reproduction, Madras
Income and Expenditure Account for the Period 1-1-1989 to 31-3-1990

EXPENDITURE		INCOME			
To,		By,			
Advance for Journal Printing	30000-00	Annual Membership Fee			602-00
Bank Charges	158-75	Life Membership Fee			34556-46
Conveyance	257-10	Interest Earned			8958-05
Postage	1197-10	ICAR Grant :			21000-00
Printing and Stationery	3716-05	For Symposiums	10000		
Prizes Articles & Mementoes for Symposium	8490-00	Less : Arrears	5000	5000-00	
Advance for Secretary Office Expenses	1500-00	For Journal Printing		16000-00	
Advance for President Office Expenses	1000-00			21000-00	
Miscellaneous Expenses	200-00				
Audit Fees	500-00				
Excess of Income over expenditures transferred to general fund	18097-51				
	65116-51				65116-51

MADRAS Dated- 27-4-90

Vide our report of even date

A. R. Ramamohana Rao	D. R. Pargaonkar	S. R. Pattabi Raman	Ramanan & Co.
President	Secretary	Treasurer	Chartered Accountants

First Mule Foal Born of A.I. in Asia

Mare with Mule foal born of A. I.

An Austrian Haflinger mare gave birth by artificial insemination to a mule foal in Remount Depot at Saharanpur (U.P.) on 31 st March 1990. The Sire is a Donkey Stallion from France.

This is the first mule foal produced by A I. in India and Asia.

Lt. Col. N. M. Singhvi

DECLARATION

Statement about ownership and other particulars about THE INDIAN JOURNAL OF ANIMAL REPRODUCTION as required under Rule No 8 of the Registration of Newspapers (Central) Rules. 1956.

FORM No. IV (Rule No. 8)

1. Place of Publication	Editorial Office : B-306, Ujwal Flats, Rahate Colony, Jail Road, Nagpur-440 022.
2. Periodicity of Publication	Bi-annual (June & December).
3. Printer's Name	Majestic Printing Press.
Nationality	Indian
Address	Near Tilak Statue, Mahal, Nagpur-440 002
4. Publisher's Name	Dr. D. R. Pargaonkar, Secretary, ISSAR.
Nationality	Indian
Address	Parbhani Veterinary College, Parbhani-431 402.
5. Editor's Name	Dr A. S. Kaikini, Ex-Dean. Faculty of Veterinary Science, PKV, Akola.
Nationality	Indian
Address	B-306, Ujwal Flats, Rahate Colony, Jail Road, Nagpur-440 022.
Names and addresses of individuals who own the newspaper and partners, share holders holding more than 1 per cent of the total Capital	Official Organ of THE INDIAN SOCIETY FOR THE STUDY OF ANIMAL REPRODUCTION (ISSAR) Regd. No. Bom. 253/78. Office : Department of Gynaecology & Animal Reproduction, MAU, Parbhani-431 402.

I, Dr. A. S. Kaikini, Editor of THE INDIAN JOURNAL OF ANIMAL REPRODUCTION, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Dr. A. S. Kaikini
Editor, The Indian Journal of Animal Reproduction
The Indian Society for the Study of Animal Reproduction

INDIAN JOURNAL OF ANIMAL REPRODUCTION
GUIDE LINES TO AUTHORS

1. The Journal is published twice a year as a Volume comprising of June and December issues.
2. Paper should be TYPE-WRITTEN and double spaced all throughout (including references and tables) on white, durable bond paper of size 22 cm × 28 cm, with a 4 cm margin at the top, bottom and left hand side. Articles including illustrations, should be sent in duplicate after a careful check-up of typographical errors.
3. Articles should not exceed Six typed pages. Short Communications/Research notes and clinical articles should be limited to two typed pages.
4. A recent issue of the Journal be consulted for the format of articles and methods of citation of references in the text as well as at the end of the article.
5. The Abstract and Introduction should be brief. Review of Literature should be crisp and pertinent to the problem. The main emphasis in the text should be on the actual work done by the author(s). Details of Materials and Methods including experimental design and techniques used should be given. Where the methods are well known, the citation of standard work is sufficient. References should be reduced to the barest minimum.
6. Mean results with the relevant standard errors should be presented rather than detailed data. The statistical methods used should be clearly stated. Tables should be minimum and fit in the normal layout of the page. All weights and measures should be in Metric units.
7. The Results and Discussion should be combined to avoid repetition. The Discussion should relate to the limitations or advantages of the author's actual work in comparison with that of others.
8. All articles are sent to Referees for scrutiny and author(s) should meet criticism by suitably revising, the article. Block-making charges of Photographs, Tables, Graphs, Histograms and Line drawings appearing in the accepted articles shall have to be paid by the concerned author(s) in advance on receipt of the Bill from the Editor, I.J.A.R.
9. All efforts are made to acknowledge, process and accept the articles received for early publication. Authors are earnestly requested to become active paying subscribers of the Journal and help procure/book suitable advertisements for publication in the Journal to strengthen its financial resources.
10. Articles and all matters pertaining to the Journal be sent to the Editor, Indian Journal of Animal Reproduction, B-306, Ujwal Flats, Rahate Colony, Jail Road, Nagpur-440 022.

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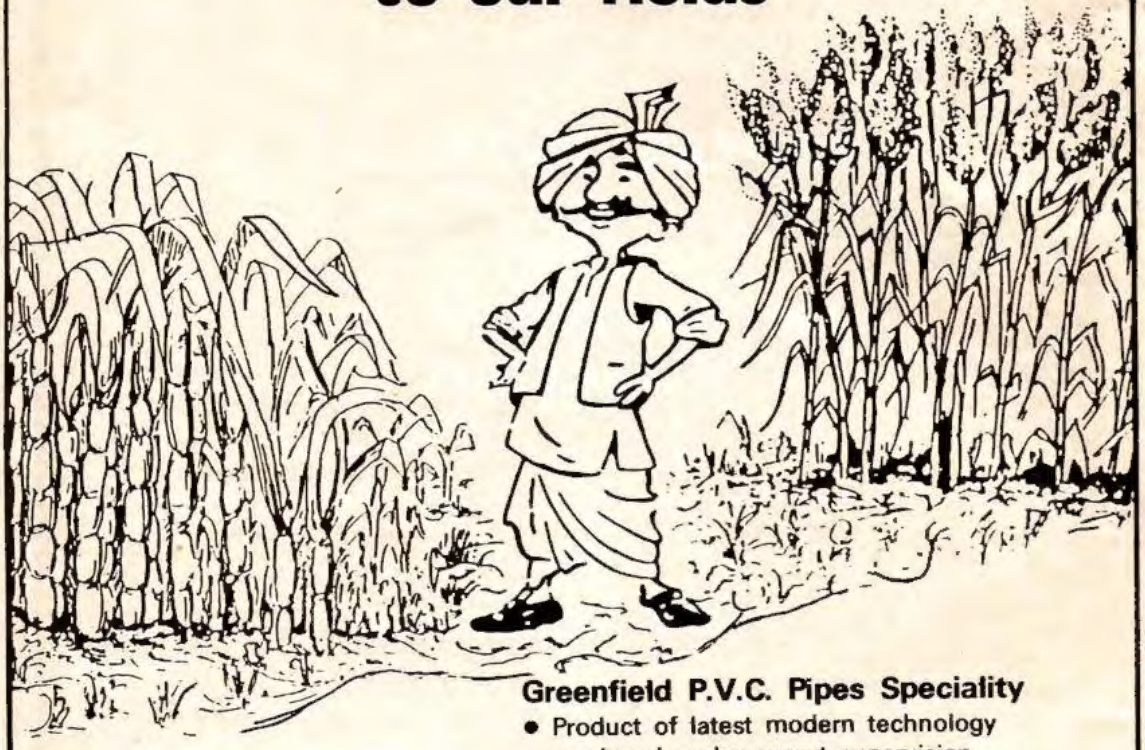

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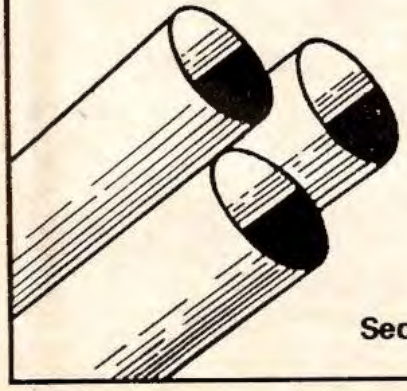

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THE INDIAN JOURNAL OF ANIMAL REPRODUCTION

(Official Organ of the Indian Society for the Study of Animal Reproduction)

Receipts and Payments Account for the year ended on 31-3-90

(1-4-89 to 31-3-90)

RECEIPTS			PAYMENTS		
To,			By,		
Opening Balance			Journal Printing		
Cash	345-85		Volume 10-1	22,975-00	
Bank balance with State Bank of India, Ramdaspeth Branch, S.B. A/c No. 61294	24,830-85	25,176-70	Volume 10-2	31,746-00	54,721-00
Receipts from Treasurer (ISSAR)		30,000-00	Printing & Stationery		1,928-10
Subscription		20,617-00	Postage		3,400-80
Advertisement		11,710-00	Dr. A S. Kaikini (Cheque received from Treasurer in personal name transferred to Journal account in April, 1990)		15,000-00
Block Making/Reprint		3,258-00	Bank Commission		212-25
Interest on Savings Bank A/c.		736-94	Office Maintenance Exp.		900-00
			Conveyance & Travelling Exp.		1,400-00
			Packing Charges of Journal		72-00
			Audit Fees		250-00
			Closing Balance		
			Cash in Hand	293-95	
			Cash with State Bank of India, Ramdaspeth Branch S.B. A/c. No. 61294	13 320-54	13,614-49
Total Rs.		91,498-64	Total Rs.		91,498-64

Certified that the figures shown in the above Receipts and Payments Account of "Indian Journal of Animal Reproduction" for the year ended on 31-3-1990 agree with the books and vouchers maintained which have been audited by us and are found to be correct.

NAGPUR
Dated : 24-5-1990

A. S. Kaikini
Editor I.J.A.R.

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ANNOUNCEMENT

The Indian Society for Study of Animal Reproduction (ISSAR) will be organising its National Conference in collaboration with the Indian Council of Agricultural Research. New Delhi and Haryana Agricultural University, Hissar from 6th to 8th February 1991 at H.A.U. Hissar. Theme for the National Conference is "Recent biotechnological advances in Animal Reproduction." Scientists/Officers/Members are requested to contribute their research papers/articles to Dr. S. K. Khar. Prof. and Head, Department of Gynaecology and Obstetrics, College of Veterinary and Animal Sciences, H.A.U. Hissar, so as to reach him **on or before 31 st Oct. 1990.**

D. R. Pargaonkar
Secretary, ISSAR

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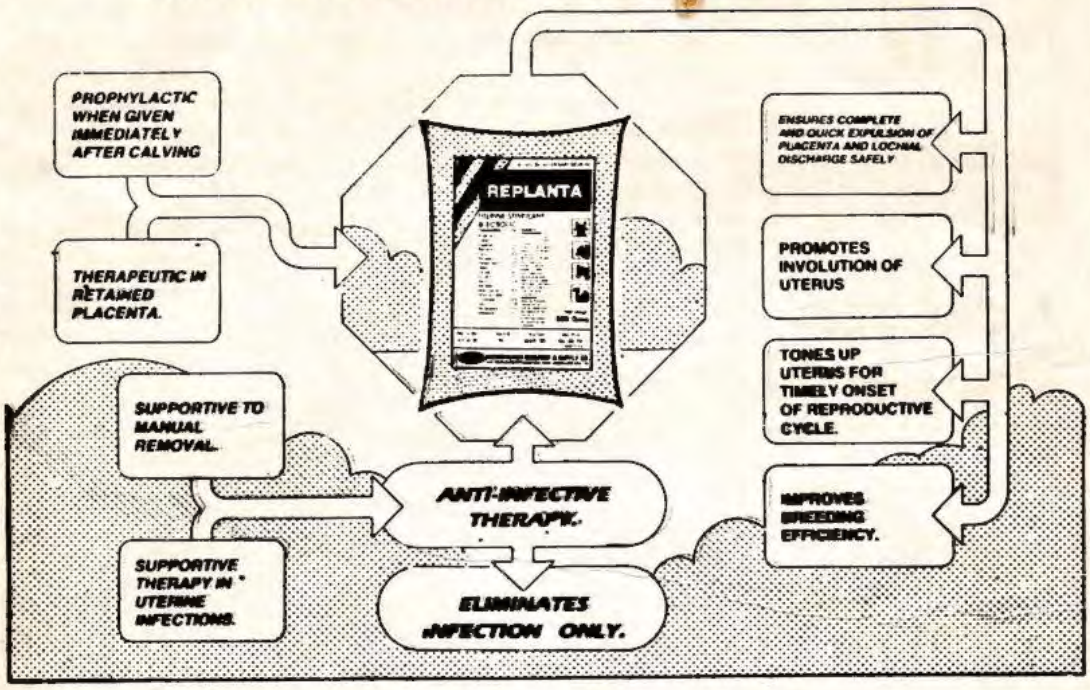

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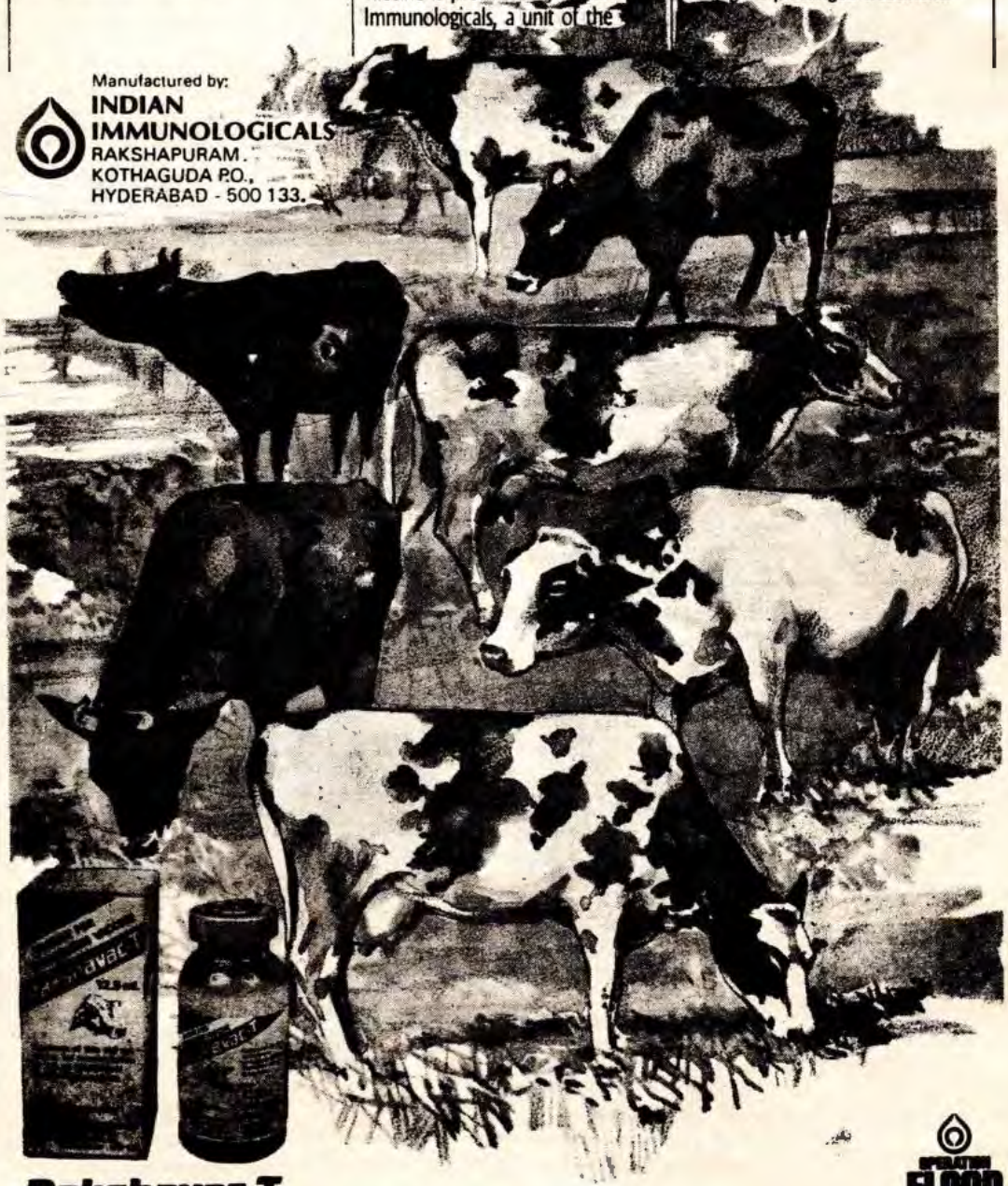

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