

OL. 6 No. 1 : JUNE 1985



*Dr. A. K. Gupta,*

*Registration No. 533*

# **The Indian Journal of Animal Reproduction**

JOURNAL OF THE  
INDIAN SOCIETY FOR THE  
STUDY OF  
ANIMAL REPRODUCTION

(Regd. No. Bom. 253/78)



**ANIMALS ARE THE ASSETS OF A WEALTHY NATION  
PROTECT THEM FROM ALL DISEASES USING RELIABLE  
INDIGENOUS MEDICINES**

**Some of the efficacious Ayurvedic Products manufactured by Bhartiya  
Bootee Bhawan (Regd), 21 Mangal Nagar, Saharanpur-247 001 (U.P.)**

**Gram: Herminsa**

**Phones: Off. 4392 Res. 5433**

- |              |                                 |
|--------------|---------------------------------|
| 1. HERMINSA  | — Stomachic & Tonic powder.     |
| 2. DIADISCO  | — Astringent powder.            |
| 3. COFGO     | — Cough Powder & Electuary.     |
| 4. KRIMOS    | — Anthelmintic Powder.          |
| 5. BANJHNA   | — Heat Inducing capsules.       |
| 6. AFRON     | — For tympanitis.               |
| 7. HERWEX    | — Healing antiseptic ointment.  |
| 8. HEREWIDE  | — Dusting powder.               |
| 9. RATRAJ    | — Aphrodisiac.                  |
| 10. RASOL    | — Milk Increaser.               |
| 11. FLUHEREX | — Anti cold & Cattarrah.        |
| 12. UROL     | — Diuretic and Lithontryptic.   |
| 13. HEPACIN  | — Liver stimulant Tonic powder. |
| 14. CLINOSOL | — Expulsion of placenta powder. |
| 15. NANCO    | — Eye lotion.                   |
| 16. TAPHEREX | — Antipyretic, Antifevrefuge.   |
| 17. HEMATOL  | — Haematinic powder.            |

*Branch Office:*

**P.B. No. 18, Goriatoli, Near Chiraiyatar Bridge,  
PATNA-800001.**

**Gram: HERMINSA**

**Phones: Off. 24865 Res: 62270**



# THE INDIAN JOURNAL OF ANIMAL REPRODUCTION

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

Vol. 6

No. 1

JUNE 1985

## EDITORIAL BOARD

**Dr. B. R. Deshpande**  
Ph.D., F.R.V.C.S.

**Dr. D. P. Velhankar**  
Ph.D., F.R.V.C.S.

**Dr. C. R. Sane**  
G.B.V.C., F.R.V.C.S.

**Dr. S. N. Luktuke**  
G.B.V.C., F.R.V.C.S.

**Dr. A. S. Kaikini**  
Ph.D., F.R.V.C.S.

**Dr. A. Ramamohan Rao**  
Ph.D., F.R.V.C.S.

**Dr. B. R. Benjamin**  
Ph.D.

**Dr. M. L. Madan**  
Ph.D.(USA)

**Dr. R. C. Gupta**  
Ph.D., (USA), F.R.V.C.S.

**Dr. S. K. Gupta**  
Ph.D. (U. K.)

**Dr. C. P. N. Iyer**  
M.V.Sc., F.R.V.C.S.

**Dr. V. L. Deopurkar**  
M.V.Sc.

**Dr. K. Janakiraman**  
Ph.D.

## EDITOR

**Dr. S. B. Kodagali**  
Ph.D., F.R.V.C.S.

*For Particulars Contact*

**Editor, The Indian Journal of Animal Reproduction**

C/o. Department of Gynaecology and Obstetrics,  
Gujarat Veterinary College, Anand-388 001.



# The Indian Society For The Study Of Animal Reproduction

(Regd. No. : Bom. 253/78)

*Patron :* Dr. C. R. Sane  
G.B.V.C., F.R.V.C.S.

*Jt. Hon. Secretary :* Dr. M. L. Madan  
Ph. D. (U.S.A.)

*President :* Dr. B. R. Deshpande  
Ph.D., F.R.V.C.S.

*Hon. Treasurer* Dr. V. L. Deopurkar  
M.V.Sc.

*Vice-President :* Dr. A. S. Kaikini  
Ph.D., F.R.V.C.S.

*Hon Secretary :* Dr. D. P. Velhankar  
Ph.D., F.R.V.C.S.

*Publication Editor :* Dr. S. B. Kodagali  
Ph.D., F.R.V.C.S.

## EXECUTIVE COMMITTEE MEMBERS

Dr. B. L. Bishnoi  
M.V.Sc. (Rajasthan)

Dr. R. V. Patil  
M.Sc., F.R.V.C.S. (Karnataka)

Dr. S. R. Chinchkar  
M.V.Sc. (Bombay)

Dr. C. K. Rajkonwar  
Ph.D. (Assam)

Dr. B. N. DE  
Ph.D., F.R.V.C.S. (West Bengal)

Dr. R. Roy Choudhary  
Ph.D. (West Bengal)

Dr. C. P. N. Iyer  
M.V.Sc., F.R.V.C.S. (Kerala)

Dr. I. M. Shah  
M.V.Sc. (Gujarat)

Dr. K. G. Kharche  
M.V.Sc. (Madhya Pradesh)

Dr. R. D. Sharma  
Ph.D. (Punjab)

Dr. L. D. Mohanty  
M.V.Sc. (Orissa)

Dr. S. K. Varma  
Ph.D. (Haryana)

Dr. D. R. Pargaonkar  
Ph.D., F.R.V.C.S. (Maharashtra)

Dr. S. Y. Vadnere  
Ph.D. (U.P.)



# THE INDIAN JOURNAL OF ANIMAL REPRODUCTION

Vol. 6

No. 1

JUNE 1985

## CONTENTS

### EDITORIAL

#### 1. GYNAECOLOGY & OBSTETRICS

- \* Histological changes in male gonads from birth to sexual maturity in buffaloes.  
— Lalita V. Deshpande and K. Janakiraman 1
- \* Cytological Changes in male gonads from birth to sexual maturity in buffaloes.  
— Lalita V. Deshpande and K. Janakiraman 5
- \* Antigenic analysis of spermatozoa and seminal plasma of exotic and indigenous Rains by gel diffusion and immunoelectrophoresis.  
— G.C. Jain and K.K. Vyas 10
- \* Plasma testosterone during oestrous cycle and postpartum period among buffaloes.  
— Mahendra Singh and M.L. Madan 13
- \* Serum FSH levels during and after synchronized oestrus of Murrah buffaloes (*Bubalus bubalis*).  
— M.L. Kaker, M.N. Razdan and M.M. Galhotra 17
- \* Studies on some factors affecting gestation period in cattle.  
— R.K. Pandit, R.G. Agrawal and S.P. Shukla 21
- \* Induction of parturition in cattle.  
— E. Madhavan and M.O. Kurien 25
- \* Biochemical polymorphic effect on reproductive status in crossbred cattle.  
— A. Venkatamuni Chetty, A. Ramamohan Rao and B.T. Jairam 29
- \* Effect of forced exercise on seminal characteristics and sexual behaviour of buffalo bulls.  
— J.S. Matharoo, Mehar Singh and M.S. Tiwana 32
- \* Non-specific genital infections in repeat breeder buffaloes.  
— F.S. Kavani, P.M. Dholakia and S.B. Kodagali 36
- \* Mycoflora of the genital tract of Surti buffaloes.  
— N.M. Shah and P.M. Dholakia 41
- \* Studies on Mycotic abortion caused by *Aspergillus fumigatus fresenius*.  
— M. Pal, B.S. Mehrotra and S.M. Dahiya 43
- \* Neoplasms in the genital system of cows.  
— M.K. Bhowmik 49
- \* Uterine torsion in buffaloes. I - Incidence.  
— T.S. Manju and S.K. Verma 54
- \* Profiles of some plasma biochemical constituents associated with uterine torsion and following its correction by laparohysterotomy in buffaloes.  
— T.S. Manju, S.K. Verma, R.C. Gupta, V.M. Mandakhot and A. Krishnaswamy 57



✓ Studies on the general characteristics of Caprine foetal fluids. — R.A. Luthra, R.C. Gupta, S.K. Khar and P. Baru	62
* Studies on heteroplasmic preservation of buck semen. — M.A. Malik, Balraj Singh, C.S.P. Singh and B.K. Singh	65
* Studies on inter-lambing period in Indian breeds of sheep. — C.V.S. Rawal, R.C. Garg and S.N. Luktuke	69
* Studies on the regeneration in <i>Macrostomum orthostylum</i> (BRAUN) (Turbellaria: Macrostomida). — B.S. Ingole and G.A. Shirgur	73
2. SHORT COMMUNICATIONS	
* Phosphatases in seminal plasma of buffalo bulls. — R.S. Dhanotiya and R.K. Srivastava	79
* Anoestrus in buffaloes — Treatment with "Estrona". — I.M. Shah and H.J. Derashri	81
* Reproductive performance of $F_1$ & $F_2$ crossbred buffaloes (Swamp $\times$ Murrah) in Vietnam. — R.P. Verma, C.V. Trieu, N.V. Duc and D.V. Cai	84
* Gynaeco-clinical investigation of repeat breeder cows and buffaloes. — F.S. Kavani, H.J. Derashri and S.B. Kodagali	86
3. CASE REPORTS	
* Persistent hymen in a Camel. — A.K. Sharma, A. Krishnaswamy, S.K. Khar and S.K. Verma	89
* A cephalothoracopagus monster in an Indian water buffalo ( <i>Bubalus bubalis</i> ) — M.A. Nowshahri, K.S. Bedi and R.D. Sharma	91
* Uterine prolapse in a mare. — A. Krishnaswamy, S.K. Khar and A.K. Sharma	93
* Fibro-adenoma of cervix in a Kankrej cow — A case report. — H.J. Derashri, K.S. Prajapati, F.S. Kavani, A.J. Dhami and S.B. Kodagali	95
* <u>Campylorachis Scoliosa — A fetal monster causing dystocia in buffalo — A case report.</u> — A.S. Nanda, R.D. Sharma and K.S. Roy	98
* Campylorachis Scoliosa monster and spontaneous vaginal rupture in a goat. — A.J. Dhami, S.B. Kodagali, K.N. Vyas and K. Sukumaran	101
* Duplication of right hind limb in a cross-bred Jersey calf. — M.R.K. Iyer	104
* Unilateral orchitis in bucks. — Joseph Mathew, E. Madhavan and C.P.N. Iyer	106
* A case of Bifid scrotum in a young Rathi bull. — I.S. Kohli	109
4. FARM NEWS	
* Timing of parturition in Surti buffalo. — Lalita V. Deshpande and K. Janakiraman	110
5. ISSAR NEWS	112



# Editorial

## Embryo Transfer in Bovines as a Potential Tool for Increased Milk Production by 2000 A.D.\*

Traditionally, the bull is said to be half the herd. In last few decades, there has been widespread use of artificial insemination, thereby exploiting the potential of available proven or good quality sires to increase the milk production. The great potential left to exploit the remaining half of the herd i.e. the female's participation in herd improvement and genetic conservation initiated the embryo transfer experiment in the cattle. The coming years will witness the embryo transfer technique as a routine. It is based on the principle of inducing superovulation in superior donor cows and buffaloes and later inseminating with pedigreed bull's semen. A donor animal can be subjected for embryo transfer five to six times a year or till there are no abnormalities, lesions or adhesions in the uterus and fallopian tubes that may develop from constant or improper flushing. Once recovered, the embryos can be either transferred immediately into recipients or frozen or subjected to micro-manipulation before transfer. In case of immediate transfer the embryos are individually placed non-surgically into the uterus of suitably synchronised recipients to complete the term of pregnancy. The principal advantage of non-surgical method is that the elaborate facilities, costs, risks and postoperative adhesions associated with surgery are avoided. On the farm collections are possible, lactating cows that are bad surgical subjects can be used and most importantly collections can be repeated from the same donor.

Although, the offspring born would be fostered by the recipient, its genetic make-up would still be the combination of traits from its original dam (donor) and sire. Embryos can be subjected to micro-manipulation such as splitting by micro-surgery (cloning) and sexing by identification of sex chromatin or karyotyping. A technique recently developed for sex determination looks more promising, with the use of H-Y antigen which is male determinant. Techniques similar to the production of frozen semen are now available for freezing embryos in liquid nitrogen for long term storage and transport.

Another major possibility is twin pregnancy, either 2 embryos of same sex can be transferred or a single embryo split into two, which will have same sex can be transferred. The other side of embryo transfer potential for increasing milk production is the increase in reproductive rate, increase in accuracy of progeny testing, increase in accuracy of selection procedures, better genetic control, establishing gene banks and effective utilisation of low valued poor germ plasm as recipient mothers. Even calves from good pedigreed prepuberal heifers can be obtained and age at maturity drastically reduced.

Embryo transfer has made a great impact on international livestock trade and movement of genetically superior germ plasm. This reduces high transportation costs. Quarantine requirements are met more easily. Neither transit mortality nor fatigue occurs nor difficulty in acclimatisation is faced. Embryo transfer will open avenues for contract mating especially at the metro politian city farms where still large number of good quality animals are brought for only one lactation and culled. The trend of these



animals which eventually end-up at slaughter houses instead of returning to their breeding tract can be brought to an end.

Success rate in non-surgical transfer of embryo varies with potency and response to superovulating agents, season, lactating stage of the donor, age of the donor, progesterone level during the stage of follicular stimulation, experience and knowledge of the performer, reproductive state of the recipient, individual variation, hygienic standards and various other factors. The uterine environmental changes at different stages of estrous cycle is essential for the development of the embryo and it is imperative to meet the environmental requirement of the embryo in the recipient. If the difference is large, embryo is often rejected by the recipient resulting in unsuccessful transfer. Hence controlling all the variable factors and synchronising the estrous of donor and recipient is a necessity, which is not difficult any more with the advent of prostaglandin  $F_{2\alpha}$  or its synthetic analogue cloprostenol.

ETT being an area of reproduction has excited the imagination of researcher and farmers alike by pointing towards near future in which cows of superior genetic merit would be effectively superovulated and embryo taken one by one and transferred for subsequent development in the uteri of foster mothers of promiscuous genetic merit.

Should AI technology be described as the first wave of revolution in dairy husbandry industry the second wave is indeed imminent with the development of ETT. With deep freezing of the male gametes (sperms) it is possible to widely use the genetically superior sire component. Similar use of genetically superior female gametes however, has been limited to life time production of ova, its normal in-vitro fertilization, its successful implementation and embryonic development thereafter. With rapid development of embryo transfer technology applicable to domestic animals, the new vista for greater utilisation of genetically superior female component has been opened up to make rapid strides in milk production.

Dr. Kurien, Chairman N.D.D.B. & Vice Chancellor, G.A.U. observed in his article that keeping in view the application of advanced technology to the dairy industry, tomorrow's professionals would have to possess knowledge or appreciation of computers and a system approach in addition to their skills in classical disciplines of dairy science; namely animal husbandry, dairy technology and engineering etc. Our teaching and research institutions shall have to be fine-tuned to these realities of tomorrow.

#### **Editorial Board**

- \* SOURCE: 1. Dairy India 1985, 2nd edition, published by P.R. Gupta, New Delhi.  
2. News item entitled "Milk Production to be doubled by 2000 AD" in Times of India, Ahmedabad edition dated 22nd April, 1985.



## Histological Changes In Male Gonads From Birth To Sexual Maturity In Buffaloes

LALITA V. DESHPANDE AND K. JANAKIRAMAN

Reproductive Biology Research Unit  
Gujarat Agricultural University  
Anand Campus, Anand

### ABSTRACT

Histological changes in male gonads from birth to sexual maturity in buffaloes have been described.

\* \* \*

The buffalo plays an important role in the Indian agricultural economy. With the realization of their importance more and more research on the species is taking place. However, the studies on male aspect are limited. With this study an attempt is made to understand the developmental changes in male gonad from birth to sexual maturity. Postnatal histological changes in testis are reported here; which indicate that the animal has a potential for development as early as 15-16 month of age.

### Materials and Methods

The testicular tissue from 4 male buffalo calves was sampled by repeated incision biopsies (as per Hotchkiss, 1944) over 17 stages from birth to 600 days of age. The incision biopsies did not have any deteriorating effect on the testicular growth and development. The testicular tissue sampled at biopsy was fixed in Bouin's fixative, was processed as per Luna (1968) and sectioned at 5-7 microns thickness and stained with Haematoxylin and Eosin.

**Seminiferous tubule diameter:**—The seminiferous tubule diameter was measured

at 2 different places (maximum and minimum) by ocular linear micrometer scale. Their average was worked out to give the mean diameter of that particular section of the tubule. The overall mean was an average of 150 such observations. The magnification used for this measurement was  $10 \times 45$ . The size was expressed as units which when multiplied by the least count 3.30 gives the measurements in microns.

**Tubular count:**—The number of the cross sections of the seminiferous tubules present in a microscopic field were counted to give tubular count. Such countings were done at 10 different location of the same sections at a given stage in a given animal, and then the mean of 10 observations was taken as tubular count. The magnification used was  $10 \times 10$ . Each mean represents the number of tubular cross sections occupying 400 square in the net micrometer. One square of the net micrometer comes to 1600 square microns of the section (under  $10 \times 10$  magnification).

**Interstitial space:**—Initially the interstitial space was measured microscopically by the number of squares occupied by interstitial space out of 100 squares of net micrometer ( $10 \times 45$  magnification). When multiplied by 20.25 least count, square micron area occupied by interstitial space can be known.



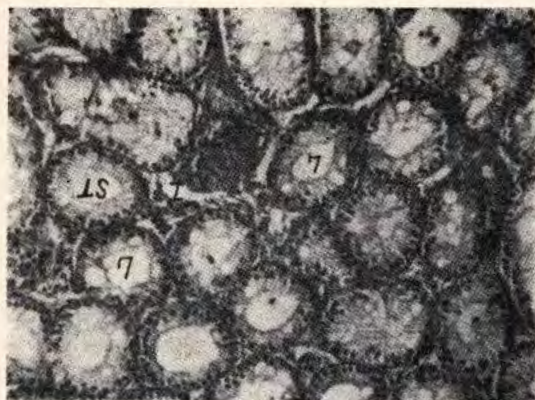


Fig. 1: Cross section (cs) of seminiferous tubules (ST) in Day old animal. ST are solid and are separated by interstitial space (I) (Magnification  $10\times 10$ ).

**Initiation of lumen formation:**—This fact was observed qualitatively and the age at which the tubules were first canalized was noted. The degree of lumination was also recorded.

### Results and Discussion

The growth of seminiferous tubule is the primary feature of testicular development. The size of seminiferous tubule increases from birth to sexual maturity. The mean diameter of the tubules was the criteria adopted to measure growth.

#### SEMINIFEROUS TUBULE DIAMETER:

The diameter of the tubules increased four fold from birth to 600 days of age. The diameter on Day one was as low as  $11.70 \pm 0.38$  units (Fig. 1), and was maintained on Day 28. Thereafter it kept gradually increasing and till day 240 the rate of increase was very slow. On Day 360 the tubular diameter got doubled the value at birth. The increase in diameter was much spectacular from 390 to 450 days (Fig. 2) again from Day 570 to 600 great enlarge-

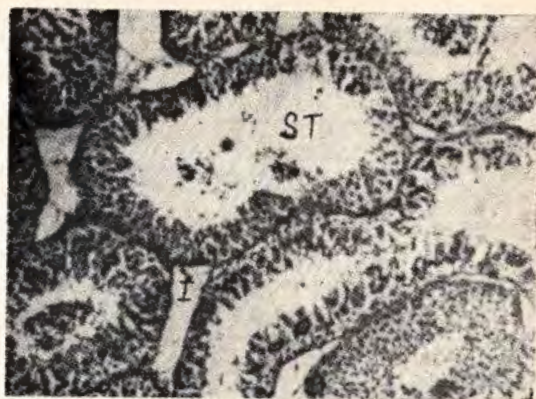


Fig. 2: Cross section of seminiferous tubule (ST) of 420 day old animal, showing lumen (L) formation in all tubules ( $10\times 10$  magnification). Increased ST size limits the interstitial space (I) into triangles.



Fig. 3: Cross section of ST in low fener (from 600 day old animal) showing fully developed ST.

ment in tubular diameter was observed (Fig. 3). On Day 600 the tubules measured 47.50 units in diameter. Such sigmoid growth curve was also observed by Goyal and Dhingra (1973) in buffalo; by Abdel Raouf (1960) in Swedish Red and White breed of cattle and by MacMillan and Hafs (1969) in Holstein bulls calves.

#### TUBULAR COUNT:

The tubular count was inversely related with the seminiferous tubule diameter,



when the later increases, the count decreases. The number of cross section of tubules in a given microscopic field halved at 240 days of age ( $\text{mean} \pm \text{SE } 202.5 \pm 25.94$ ) than the one present at birth i.e.  $398.0 \pm 6.15$ . Reduction in the tubular count was slow till Day 125 and faster between 125 to 240 Days of age. On Day 300 the tubular count was a high as  $233.2 \pm 18.66$  which got reduced to  $134.00 \pm 15.08$  on Day 420. Finally, the mean value of tubular count was found to be only  $49.40 \pm 23.22$  on Day 600. The overall was a declining pattern, regarding tubular count in correlation with seminiferous tubule diameter and interstitial space.

#### INTERSTITIAL SPACE:

At birth the tubules were widely separated apart from each other by the interstitial space, which on crude estimates accounted for 29.62 per cent of the total space area observed, rest was occupied by the tubules. The interstitial space increased slightly till day 125 when it occupied 35.6 percent area against 64.4 per cent occupied by tubules. The area occupied by tubules increased in subsequent stages, leading to decreased inter-tubular space, thus a reverse relationship between two characteristics existed. In animals older than 300 days the interstitial space was reduced to "triangles" in between the seminiferous tubules, thus bringing the tubules adjacent to each other and creating a compactness. Such triangle formation was observed by Abdel Raouf (1960) in 4-5 month old bull calves. The interstitial space kept reducing constantly and on Day 600 it was only 11.3 percent. Similar data is reported for adult Murrah buffalo bull by Sharma and Gupta, (1980).

Findings of the present study, till Day 125 support the report by Goyal and

Dhingra (1973) that in Murrah calves interstitial space increases with age from 4 to 52 weeks. However, the interstitial space started decreasing after 200 days of age in the present study. The results clearly indicate a reduction in inter-tubular space with increasing age in buffalo testes, which suggests that testicular growth is primarily tubular in nature.

#### LUMEN FORMATION:

At birth the tubules were not patent (Fig. 1) the centre of tubules was filled with homogenous ground substance. Slight clearing of central matrix was observed in few peripheral tubules on Day 125, the lumen started appearing by 200 days in our experimental animals in many tubules. The initiation of lumen was marked by lysis of ground tissue in the centre. The central region stained very lightly. Sometimes degenerating clumps of cells staining darkly were also seen in the centre of tubules. In this study the lumen was seen earlier than the age reported by Goyal and Dhingra (1973) in Murrah buffalo calves, probably because their sampling interval was much larger than ours. In the present study clear vacuolization in biopsy samples occurred by 330 days and the lumenation continued till 480 days of age in different animals. All tubules did not undergo simultaneously lumenation, but were in different phases of canalization. Peripheral tubules under the capsule are the first to form lumen. The presence of fully formed lumen was noted by 360 days in one animal and by 450-480 days in all animals.

In puberal and sexually matured animals the lumen is lined by spermatids and spermatozoa. Our results are supported by the findings of Igboeli and



Rakha (1971), in beef bulls, and Aire and Akpokdje (1975) in Fulani bull calves. They reported lumen formation as late as 11 months of age. The study helped to trace the developmental stages of the testis from birth to maturity and reveal the potential for sperm formation

and transport in buffalo calves much earlier than reported. There is a good scope to management and endocrine status is perhaps not adverse to bring about maturity in male calves towards fertile service by 16 months onwards.

## REFERENCES

- Abdel Raouf, M. (1960). The postnatal development of reproductive organs in bulls with special reference to puberty. *Acta Endocrin supp.* **49**:1-109.
- Aire, T.A. and Akpokdje J.U. (1975). Development of puberty in White Fulani (*Ros indicus*) bull calf. *Br. Vet. J.* **131**:146-151.
- Goyal, H.O. and Dhingra, L.D. (1973). A study on postnatal histology of the testis in buffalo (*Babalus bubalis*) from birth to one year. *Acta anat.* **84**: 237-250.
- Hotchkiss, R.S. (1944) cited by Escamilla, R.P. and Thomas, C.C. in "laboratory aids in Endocrine diagnosis" Springfield, Illinois, U.S.A.
- Igboeli, G. and Rakha, A.H. (1971). Puberty and related phenomena in Angoni (Shorthorn Zebu) bull. *J. Anim. Sci.* **33**: 647-650.
- Luna, Lee G. (1968). Ed. Manual of histologic staining methods of the Armed Forces Institute of Pathology. 3rd Ed. McGraw-Hill Book co. New York.
- Macmillan, K.L. and Hafs, H.D. (1969). Reproductive tract of Holstein bulls from birth through puberty. *J. Anim. Sci.* **28**: 233-239.
- Sharma, A.K. and Gupta, R.C. (1980). Duration of seminiferous epithelial cycle in buffalo bulls (*Bubalus bubalis*). *Arch. Androl* **3**: 147-152.



## Cytological Changes In Male Gonads From Birth To Sexual Maturity In Buffaloes

LALITA V. DESHPANDE and K. JANAKIRAMAN

Reproductive Biology Research Unit  
Gujarat Agricultural University  
Anand Campus, Anand.

### ABSTRACT

Cytological changes in male gonad from birth to sexual maturity in buffaloes have been described.

\* \* \*

The male buffalo calves of Surati breed were studied for the cytological changes occurring in the developing gonad. As little literature is available on this aspect on the species. An attempt is made to know the various cell types in male calves from birth through puberty and sexual maturity. The data revealed that the species possesses the potential of early breeding.

### Materials and Methods

The testicular tissue from 4 male buffalo calves of Surati breed was sampled by repeated incision biopsies (Hotchkiss, 1944), over 17 stages from birth to 600 days of age. The incision biopsies did not have any deteriorating effect on the testicular growth and development. The testicular tissue was fixed in Bouin's fluid, was processed as per Luna (1968) and was sectioned at 5-7 micron thickness. Staining was done with Haematoxylin and Eosin. Microscopical studies on intratubular cells and interstitial cells were made as given below:

The study of intratubular elements was done by identifying and counting their

numbers in  $15 \times 45$  magnification. The different types of cells were counted per cross section (c.s.) of the tubule. Overall mean of 25 seminiferous tubule c.s. per stage per animal was taken for different cell types.

The various cell types were classified as follows:

- (i) Basal indifferent cells:—These are generally present close to the basement membrane and are small. The cells are of various shapes. They have few nucleoli in their nucleoplasm. These line the basement membrane singly.
- (ii) Gonocytes:—These cells are present between the small basal indifferent cell layer and also sometimes towards the centre of tubule. Their size is three to six times larger than the basal indifferent cells. These have a centrally placed nucleolus and few lightly stained, fine chromatin granules.
- (iii) Spermatogonia:—These are large cells. The nucleus is large in size and exhibits either fine chromatin (type A spermatogonia) or coarse chromatin (type B spermatogonia). Type A and type B spermatogonia were counted separately.
- (iv) Spermatocytes:—  
Primary spermatocytes:— The spermatocytes in early leptotene



Fig. 1: Cytological changes in male gonads from birth to sexual maturity in buffaloes

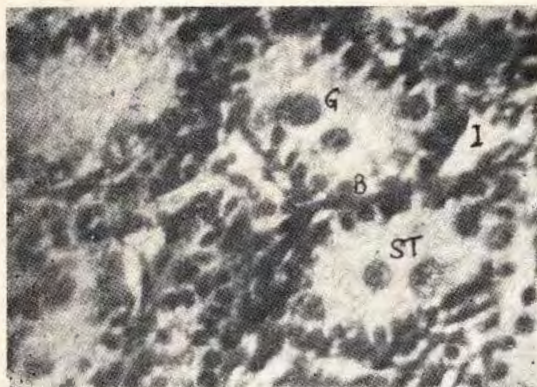


FIG. 1 High power  $10\times 40$  view of the cross section (C.S.) of seminiferous tubules (ST) of day old animal, which are separated by interstitial space (I). The solid ST shows gonocytes (G) and basal indifferent cells (B). Interstitial tissue contains mesenchymal cells (M).

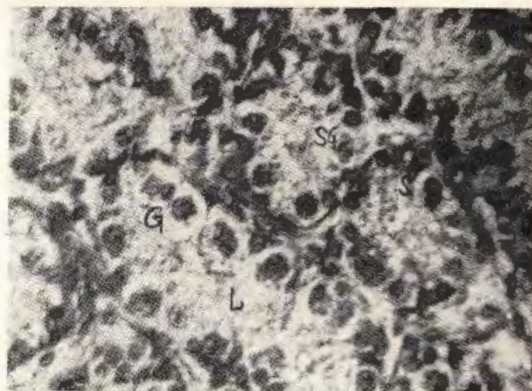


FIG. 3 Day 200 — gonocytes (G) are in division. Few spermatogonia (SG) and Sertoli cells (S) are also seen. Lumen formation (L) has been initiated ( $10\times 40$  magni.)

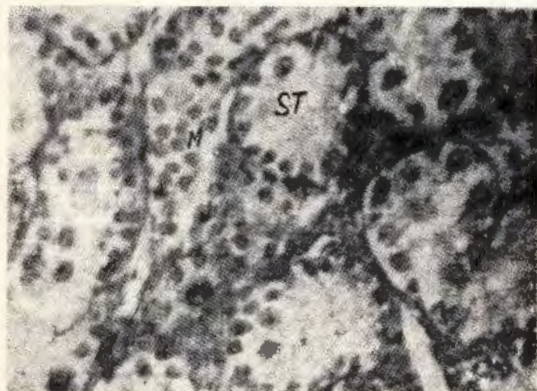


FIG. 2 Cross section of seminiferous Tubules at 125 days of age (Magnification  $10\times 25$ ). Interstitial space (I) occupied by mesenchymal cells (M) and fibroblasts (F).

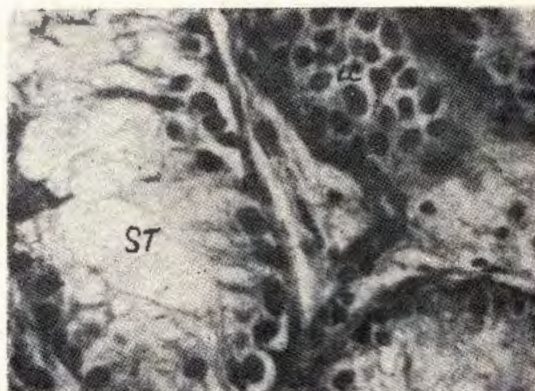


FIG. 4. C.S of seminiferous tubules at 420 days of age (Magnification  $10\times 40$ ). Triangular interstitial space contains groups of Leydig cells (LG)

phase resemble type B spermatogonia. The primary spermatocytes were observed in leptotene and zygotene phases of division. The cells in two phases were counted separately. Secondary spermatocytes:—

These cells have a spherical nucleus without nucleolus and have scattered chromatin mostly on nuclear envelope. These cells undergo second maturation division to produce spermatids. These



were seen rarely and their number was not counted.

- (v) **Spermatids:**—Spermatids assume various shapes round or elongated during their transformation to spermatozoa. The round spermatids are smaller than the secondary spermatocytes and appear as tiny round cells under light microscope. Round and elongated spermatids were counted separately,

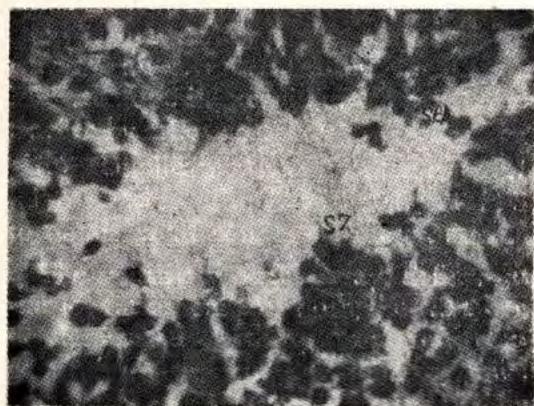


FIG. 5. High Power view of CS of seminiferous tubules of 600day old animal in active spermatogenesis. Spermatozoa (SZ) are seen attached to Sertoli cells (S) with their tails projecting into lumen. Spermatids (SPD) are seen in groups.

- (vi) **Spermatozoa:**—Many a spermatozoa transforming from spermatids are seen in later stages of development. These are also attached to Sertoli cells in earlier stages and are later released free into the lumen of the tubule.
- (vii) **Sertoli cells:**—The cytoplasmic boundaries are not distinct, but the cell possesses a typical pyramidal or oval nucleus. The cell is attached vertically to the basement membrane.

Interstitial cells or cells of Leydig were studied for the morphological

changes in their cytoplasm, nucleus and shape.

## Results and Discussion

**BASAL INDIFFERENT CELLS AND GONOCYTES:**—In the present study in the newborn animals the non-patent seminiferous tubules were lined mainly by 2 types of cells—gonocytes and basal indifferent cells (Fig. 1). At birth the number of basal indifferent cells and gonocytes per tubular cross section was found to be 15.19 and 2.71 respectively. The number of these cells of embryonic origin kept fluctuating from day 1 to 240. Mitotic figures in both cell types were observed right from Day one. The gonocyte number was unchanged till Day 240, after that it decreased fast and on Day 390 these were only 0.2 cells per tubular c.s. From Day 420 onwards gonocytes could not be observed any more. Gonocytes were observed till 12 weeks in Swedish Red and White calves (Abdel Raouf, 1960). Goyal and Dhingra (1973) reported an increase in the number of gonocytes from 1 to 12 months of age which is just opposite to the data reported in the present study. The basal indifferent cells in the present study decreased very little till day 390, but their number got reduced drastically on Day 420 when these figured only 3.4 cells per tubular c.s. thereafter these were observed. Goyal and Dhingra (1973) also observed a declining trend in the number of basal indifferent cells, but they reported 67.3 percent cells of the type in one year old animals whereas in the present work, only 41.8 percent were basal indifferent cells in animals of same age.

**SPERMATOGONIA:**—In the present study the primary spermatogonia was first observed at the age of 200 days (Fig. 3). At 300 days of age the number



of spermatogonia increased to 4.3 per tubular cross section. The cell number kept increasing constantly, so as to reach a number of 26.7 cells per tubular c.s. at 17 months of age. In Swedish Red and White bull presence of spermatogonia was noted as early as 8 weeks' age (Abdel Roouf, 1960). Type B spermatogonia were noticed at the age of 330 days, with highest number (8.29 cells per tubular c.s.) on Day 420. Thereafter it fluctuated.

**SPERMATOCYTES:**—The primary spermatocytes appeared at the age of 330 days. Although the average number of cells increased consistently, prominent raise in cell number was noted on Day 510 and Day 600. The spermatocytes (including leptotene and zygotene both types) averaged about 100 cells per tubular c.s. on Day 600. Contrary to the present study Goyal and Dhingra (1973) did not observe any spermatocytes in one year old Murrah calves. In cattle quite early appearance of spermatocytes has been reported by Santamarina and Reece, 1957 (2½ months) and Abdel Raouf, 1960 (5 months) slightly late appearance is reported by Hooker, 1944 (6 months) and by Igboeli and Rakha (1971), 9 months.

**SPERMATIDS AND SPERMATOZOA:**—In the present study round spermatid was first noted at the age of 450 days. The elongated spermatid appear one month later. The spermatozoa were first observed at the age of 510 days. A gradual increase in the number of spermatids and spermatozoa was noted till Day 600 when these were in abundance in the seminiferous tubules (Fig. 5). spermatogenesis in cattle is reported at an earlier age by Knudsen, 1954 and Abdel Raouf, 1960 (7 months), Hooker 1944 (8½ to 9½ months) and

Igboeli and Rakha, 1971 (11 months). Residual bodies during spermiogenesis were observed in large number in late developmental stages-around 540 days and onwards.

**SERTOLI CELLS:**—In the present study the Sertoli cells could be identified right from Day one, their number and size increased from birth to puberty. In day old animals the number of Sertoli cells was less than one which increased to reach 13.5 cells per tubular c.s. on Day 600.

**Leydig Cells:**—The mesenchymal cells started transforming from Day 125 onwards (Fig. 2). Metamorphosis involved increased cell and nuclear size, acquiring nucleoli, losing the processes appearance of granules in the cytoplasm and vacuolization of cytoplasm in late developmental stages (Albert, 1961 and Hooker, 1970). Till Day 360 more and more Leydig cells were being converted from mesenchymal cells. At this stage the interstitial space was reduced to "Triangles" between tubules, the Leydig cells in these spaces were in the form of pockets, sheaths, rows or singly also. Our data verifies the results of Goyal and Dhingra (1973) who observed Leydig cells around 15-16 weeks in Murrah calves. Fully developed secretory cells in large number appeared by 390 to 420 days (Fig. 4). From the foregoing data it is evident that the establishment of spermatogenesis is a very long and progressive phenomena. Based on the above data, in buffalo the whole process can be categorised as below:

1. Impuberal phase—when only gonocytes and basal indifferent cells are present. The phase stretches from birth to 200 days postnatally.
2. Prepuberal phase—from Day 200 to 420 when spermatogonia appeared



and gave rise to spermatocytes mitotically. Lumenation was initiated and the Leydig cell number increased greatly during this period.

3. Puberal phase—from Day 450 to 510. The spermatids and spermatozoa were observed during this stage along with fully active Leydig cells.
4. Postpubertal phase—from 510 onwards. It evinced a great increase in

the number of various spermatogenic elements.

It can be safely concluded that contrary to popular misconception, the buffalo male matures at a comparatively early age and can be used successfully for breeding to facilitate extensive use of proven sires in a shorter span and the life time use can also be more.

#### REFERENCES

- Abdel Raouf, M. (1960). The postnatal development of the reproductive organs in bulls with special reference to puberty. *Acta endocr. suppl.* **49**: 1-109.
- Albert, A. (1961). Mammalian testis in "Sex and Internal Secretions" 3rd Edn. Vol. I, Young W.C. (Ed). The Williams and Wilkins Co., Baltimore pp. 305-365.
- Goyal, H.O. and Dhingra, L.D. (1973). A study on postnatal histology of the testis in buffalo (*Bubalus bubalis*) from birth to one year. *Acta anat.* **84**: 237-250.
- Hooker, C.W. (1944). The postnatal histology and function of interstitial cells of the testis in bull. *Am. J. Anat.* **74**: 1-37 (*Anim. Breed. Abst.* **12**: 134).
- Hooker, C.W. (1970). The intertubular tissue of the testis in "The Testis", Vol. I, Johnson, A.D. Gomes, W.R. and Vandemark, N.L. (Eds), Academic Press, New York, pp. 483-550.
- Hotchkiss, R.S. (1944). Cited by Escamilla, R.P. and Thomas, C.C. in "Laboratory aids in endocrine diagnosis", Springfield, Illinois, U.S.A.
- Igboeli, G. and Rakha, A.H. (1971). Puberty and related phenomena in Angoni (Shorthorn Zebu) bulls. *J. Anim. Sci.* **33**: 647-650.
- Luna, Lee G. (1968). (Ed) Manual of Histologic staining Methods of the Armed Forces Institute of Pathology. 3rd Ed., McGraw Hill Book Co., New York.
- Santamarina, E. and Reece, R.P. (1957). Normal development of germinal epithelium and seminiferous tubules in the bull. *Am. J. Vet. Res.* **18**: 261-268.



## Antigenic Analysis Of Spermatozoa And Seminal Plasma of Exotic and Indigenous Rams By Geldiffusion and Immuno-electrophoresis

G.C. JAIN and K.K. VYAS

College of Veterinary and Animal  
Science, Bikaner, Rajasthan

### ABSTRACT

Analysis of Antigens of seminal plasma and spermatozoa of Chokla (10), Russian Merino and Rambouillet (6 each) rams by gel-diffusion and immuno-electrophoresis revealed the presence of three precipitin lines in chokla spermatozoa and 5 to 6 in seminal plasma antigens of all rams, against their hyperimmune serum raised in rabbits. Two common antigenic components between seminal plasma and spermatozoa were observed in chokla rams, whereas the seminal plasma of Russian Merino and Rambouillet showed three common antigens against the hyperimmune serum raised in rabbits. The immuno-electrophoretic studies further indicated that the seminal plasma of Russian Merino, Rambouillet and chokla rams with their hyperimmune serum gave 13, 14 and 10 precipitin lines, whereas the antigens of chokla spermatozoa gave only 3 precipitin lines. The study suggests that some antigenic differences exist in the spermatozoa and seminal plasma of different breeds of rams.

\* \* \*

The present study was aimed to study the fractionization of the seminal plasma and spermatozoal antigens by double gel diffusion and immuno-electrophoresis in Russian Merino, Rambouillet and chokla rams.

### Materials and Methods

Healthy male Russian Merino, Rambouillet (6 each) and chokla rams (10) were selected for the study. The semen was collected in the morning hours and the seminal plasma and the spermatozoa were separated by centrifuging and washing three times with PBS buffer (0.1M pH 7.00). The antigens were kept at  $-20^{\circ}\text{C}$  pending antigenic analysis. The procedure of Cruickshank-K. (1965) with some modifications was followed for the preparation of agar gel (Noble agar Difco 1%). The molten agar 4 C.C. was poured over the clean microslides and allowed to solidify. The agar gel slides were kept in refrigerator immersed in veronal buffer (pH 8.6) for subsequent use. The wells were made with the help of a pipette attached to a vacuum pump. The bottom of the wells was sealed with a drop of molten agar to prevent the seepage. The wells were charged with the following material for gel diffusion.

*Central wells:* (i) Seminal plasma antigen of chokla, Rambouillet and Russian Merino rams (ii) Spermatozoal antigen of chokla rams.

*Peripheral wells:* (i) Rabbit hyperimmune serum prepared against the seminal plasma of chokla, Rambouillet and Russian Merino rams in three peripheral wells and one well was kept as control.



TABLE: THE SCHEDULE OF INJECTIONS GIVEN FOR THE PREPARATION OF RABBIT HYPER IMMUNE SERUM AGAINST SPERMATOOZOA AND SEMINAL PLASMA

Group	Rabbit number	Total No. of Inj. given	Interval	Route	Nature and amount of antigen
Rambouillet I	1493	14	Alternate days	Subcutaneous	Rambouillet pooled Seminal plasma — 0.2 ml
					Incomplete Freund's Adjuvant — 0.2 ml
	1494	14	"	"	Antibiotic mixture — 0.1 ml
					Russian Merino Pooled seminal plasma — 0.2 ml
Russian Merino II	1497	"	"	"	Incomplete Freund's Adjuvant — 0.2 ml
					Antibiotic mixture — 0.1 ml
	1490	"	"	"	Chokla pooled seminal plasma — 0.2 ml
					Incomplete Freund's Adjuvant — 0.2 ml
Chokla III	1495	"	"	"	Antibiotic mixture — 0.1 ml
					Chokla Washed spermatozoa — 0.4 ml
	1496	"	"	"	Incomplete Freund's Adjuvant — 0.4 ml
					Antibiotic mixture — 0.2 ml
Chokla	1491	7	"	"	

N.B. A pause of 7 days was given after the last injection before collecting the blood from each group.

ii) Rabbit hyperimmune serum prepared against chokla ram spermatozoa in three peripheral wells and one well as control.

After charging with respective antigens and hyperimmune serum, the slides were transferred to a moist chamber for 7 days for the diffusion to occur. Every day the slides were examined for the appearance of any precipitin lines. In some cases the agar wells were again charged with the antisera and antigen to hasten the precipitation.

*Immunoelectrophoresis:* The following combinations were used:

- Spermatozoa antigen of chokla ram with its hyperimmune serum.
- Electrophorised seminal plasma antigens of chokla, Rambouillet and Russian Merino rams with

their corresponding hyperimmune serum.

#### *Preparation of hyperimmune serum:*

Albino rabbits were used to produce antibodies against the seminal plasma and spermatozoa antigens. The schedule of immunization for each group of rabbits is shown in Table 1. 5 ml of blood from each group of rabbits were collected from the ear vein. Serum was separated and kept in screw-capped vials at  $-20^{\circ}\text{C}$  pending antigenic analysis.

#### *Washing, staining and drying of slides:*

Antigen solution was leached from the agar gel by soaking in a saline solution (2% pH 7.4) and kept undisturbed to avoid floating of agar for 2 days. The slides were stained with bromophenol blue solution (0.1%) and then destained with acetic acid solution (5%).



## Results and Discussion

Analysis of antigens of seminal plasma and spermatozoa of chokla, Russian Merino and Rambouillet by gel diffusion and immunoelectrophoresis.

1. The chokla, spermatozoal antigen with its corresponding rabbit hyperimmune serum produced three precipitin lines whereas the seminal-plasma antigen produced five to six precipitin lines.
2. The antigens of seminal plasma of Russian Merino and Rambouillet rams produced five precipitin lines with their hyperimmune serum produced in rabbits.
3. Two common antigenic components between seminal plasma and-spermatozoa were observed by gel diffusion in chokla rams, whereas three common antigenic precipitin lines among the seminal plasma of chokla, Rambouillet and Russian Merino were observed. The reaction indicated that the common components were more between Russian Merino and Rambouillet than chokla rams.
4. The Immuno-electrophoretic studies further indicated that the seminal plasma of Russian Merino, Rambouillet and chokla rams with their hyperimmune serum gave 13,14 and 10 precipitin lines, whereas the antigen of chokla spermatozoa gave only 3 precipitin lines.

Our results are similar to Dikov and Tornov (1970) who observed two antigens in the ram spermatozoa. However, Kulangara (1969) observed 6 to 11 seminal plasma antigens and 5 to 10 in spermatozoa antigens in different individuals of Black-face and Merino rams, and 12 precipitin lines in semen and 10 in seminal plasma in indigenous rams (Agar, 1965) whereas, Harthaway and Hartree (1963) reported 4 antigens in the extracts of spermatozoa in rams. The variations in the antigenic components may be due to the existence of difference in the antigenicity of spermatozoa in rams (Hunter, 1963).

The double gel diffusion and immunoelectrophoresis of the spermatozoal and seminal plasma antigens of the different breeds of rams (exotic and indigenous) revealed the different seminal antigen pattern in rams and reflects that genetic difference among the different breed of the same species. Immunologic fingerprints can therefore be obtained of the ram semen for the first time, which could be of great importance in breeding practices.

### Acknowledgement

The authors acknowledge the I.C.A.R., New Delhi for providing financial assistance and the Dean, College of Veterinary and Animal Sciences, Bikaner for providing necessary facilities. We are also very much thankful to Dr. P. R. Jhatkar for the advice and technical help in conducting this study.

## REFERENCES

- Agar, N.S., Rawat, J.S. and Roy, A. (1965). *Indian Vety. J.* 42: 727.  
Cruickshank, R. (1965). *Medical microbiology*. The English Language Book Society and E & S Livingstone, Ltd., P. 592.  
Dikov, V. and Tornov, A. (1970). *Vety. Bull.*, 41: 567.  
Harthway, R.R. and Hartree, F.F. (1963). *J. Reprod. Fertil.*, 5: 225.  
Hunter, A.G. and Hornos H.O. (1969). *J. Reprod. Fertil.*, 20: 419.  
Kulangara, A.C. and Beatty, R.A. (1969). *J. Immunol.*, 102: 1445.



## Plasma Testosterone During Oestrous Cycle And Postpartum Period Among Buffaloes

MAHENDRA SINGH and M.L. MADAN

Animal Physiology Division  
National Dairy Research Institute  
Karnal — 132 001

### ABSTRACT

Investigating buffalo endocrinology during oestrous cyclicity and postpartum period, plasma testosterone (T) was estimated in jugular plasma using RIA techniques. During oestrous cycle, blood samples were collected daily and at regular 4 hourly intervals, 3 days before and three days after behavioural oestrus. For postpartum animals, analysis was carried out from sample drawn every 7-8 days postpartum. The mean values of testosterone from different animals on the day of oestrus was  $0.054 \pm 0.0206$  ng/ml. The mean testosterone levels remained same up to day 6 of oestrous cycle and then rose gradually upto day 9 during diestrus, with values of  $0.1035 \pm 0.0424$  ng/ml. Testosterone levels were 0.110, 0.093, 0.080 ng/ml on day 3, 2 and 1 before oestrus. Individual animals showed conspicuous pulses during oestrous cycle. In all the animals the levels of testosterone were high during luteal phase with a number of variable peaks. The mean concentration of testosterone during the post partum period was 0.038, 0.063, 0.038, 0.074 and 0.038 ng/ml on day 7, 15, 22, 30, 37 and 45, respectively. The mean postpartum testosterone level was not significantly different over this period.

\* \* \*

The dairy industry in many South

and South East Asian countries is predominantly buffalo oriented. However, information on hormonal factors responsible for oestrus and ovulation is scarce particularly in light of the fact that the problems related to buffalo reproduction, such as late maturity, repeat breeding, delay in post-partum estrus and anestrus, limit the productivity of the animal. Limited information regarding the peripheral plasma progesterone, estrogens and LH profile is available for buffaloes during cyclicity (Baehlaus *et al.*, 1980; Arora and Pandey, 1982) and early post-partum (Perera *et al.*, 1981; Naqvi, 1982; Prakash, 1983).

Evidence is now available that testosterone, besides being a precursor for oestradiol, is also involved in triggering the mechanism for the onset of luteolysis in the cow. Peaks of testosterone have been recorded around days 11-14 of the oestrus cycle in cows (Shemesh and Hansel, 1974; Herriman *et al.*, 1979; Kesler *et al.*, 1979) and also preceding oestrus behaviour (Shemesh and Hansel, 1975; Kanchev *et al.*, 1976; Kesler *et al.*, 1979). The objectives of the present study were to determine the plasma testosterone profile in buffaloes during cyclicity and early post-partum.

### Materials and Methods

Five regular cycling Murrah buffalo heifers ranging from 42 to 54 months of



age, and five pregnant Murrah buffaloes in their second or third lactations were selected from the National Dairy Research Institute herd for experimentation. All animals were maintained under uniform feeding and managemental conditions existing in the herd. Estrus detection for cycling heifers was carried out by trained animal attendants with the help of a teaser bull paraded three times over 24 hours. Behavioral symptoms of heat, including the presence of vaginal mucus was confirmed by rectal palpation and examination.

**TABLE 1: Testosterone antiserum characterisation**

Steroid	% cross reactivity
Testosterone	100
5- $\alpha$ -dihydroxytestosterone	6.65
Androstenedione	1.80
11-B-hydroxyandrostenedione	0.00

Blood samples were collected at noon daily by jugular vein puncture in heparinized tubes from each heifer for a minimum of two estrous cycles. The pregnant buffaloes were allowed to calve and jugular blood samples were collected from them subsequently on days 7, 15, 22, 30, 37 and 45 postpartum. All blood samples thus collected were centrifuged within 1/2 hr of collection, plasma separated and stored in deep freeze at  $-20^{\circ}\text{C}$  till further analysis for testosterone by radioimmunoassay (RIA)

**RIA of testosterone:** Testosterone was estimated by RIA standardized in the laboratory.

Duplicate 0.2 ml of plasma aliquots were taken in 12 $\times$ 75 mm tubes and extracted with 2 ml of ether for 1 min twice. The lower aqueous layer was frozen in an ice-salt mixture and upper organic layer was decanted in 12 $\times$ 75

mm tubes (Corning). The ether was evaporated to dryness in a waterbath at 35-40 $^{\circ}\text{C}$ . The residue was dissolved in 0.2 ml of PBS (pH 7.5, 0.1M), vortexed and this was followed by addition of 0.1 ml of testosterone antiserum used at a

**TABLE 2: Mean  $\pm$  SEM plasma testosterone ng/ml during estrous cycle of buffalo heifers.**

Days from estrus	Testosterone (ng/ml)
-4	0.080 $\pm$ 0.010
-3	0.110 $\pm$ 0.042
-2	0.093 $\pm$ 0.030
-1	0.080 $\pm$ 0.010
0	0.54 $\pm$ 0.020
1	0.072 $\pm$ 0.023
2	0.066 $\pm$ 0.022
3	0.053 $\pm$ 0.021
4	0.054 $\pm$ 0.020
5	0.059 $\pm$ 0.010
6	0.071 $\pm$ 0.030
7	0.080 $\pm$ 0.032
8	0.100 $\pm$ 0.040
9	0.103 $\pm$ 0.042
10	0.052 $\pm$ 0.020
11	0.092 $\pm$ 0.031
12	0.053 $\pm$ 0.021
13	0.072 $\pm$ 0.023
14	0.061 $\pm$ 0.050
15	0.071 $\pm$ 0.030
16	0.074 $\pm$ 0.010
17	0.073 $\pm$ 0.011

dilution of 1:60,000 and then 0.1 ml of testosterone tracer having 10,000 CPM was added in each tube. The resulting mixture was vortexed and incubated at 4 $^{\circ}\text{C}$  in refrigerator overnight. Following incubation, 0.5 ml of fresh prepared activated charcoal-dextran suspension (1% activated charcoal, 0.5% dextran) under constant stirring condition with magnetic stirrer, was added to each tube, vortexed and centrifuged at 4 $^{\circ}\text{C}$  just after charcoal addition at 4 $^{\circ}\text{C}$  in ice water. The supernatant containing the bound testosterone was decanted into



scintillation vials and counted in 5 ml of scintillation fluid (1000 ml toluene, PPO—4 g, POPOP—0.1 g). In addition to above unknown tubes, four other sets of tubes were also run with each assay, as follows:

i) Standard tubes containing 0.1 ml of series of concentration in duplicate.

ii) Blank tubes in duplicate containing 0.3 ml PBS and 0.1 ml tracer (10,000 cpm) to observe non-specific binding of charcoal separation.

iii) Four tubes containing 0.1 ml tracer and 0.1 ml antisera and 0.2 ml PBS to obtain maximum binding of tracer by the antibody.

iv) Duplicate tubes containing 0.1 ml of tracer, diluted with 0.3 ml PBS to obtain total counts of tracer added.

The sensitivity of the assay, defined as the lowest amount of hormone that can be significantly detected from zero concentration, was found to be 5 pg/tube. The Accuracy of the method estimated by determining the recovery of 50, 125, 250 and 500 pg of testosterone added to charcoal stripped plasma, was found to be 105, 92, 105 and 102% respectively. The cross reactivity of the antisera with different steroids indicated high specificity for testosterone (Table 1). The intra and interassay coefficient of variation for the method was 5.0 and 8.9% respectively.

## Results

The mean testosterone levels in cycling heifers from day 4 pre-oestrus upto day 17 post-oestrus (day of oestrus being depicted as day 0) is presented in Table 2. The mean testosterone levels in buffaloes on days 7, 15, 22, 30, 37 and 45 postpartum is presented in table 3.

The mean testosterone value recorded at oestrus was 54 pg/ml and remained relatively constant upto day 5 of the oestrous cycle rising gradually to 103 pg/ml ( $P < 0.05$ ) on day 9 of the cycle. Thereafter the mean hormone level again dropped ( $P < 0.05$ ) and fluctuated between 52 and 92 pg/ml.

The mean postpartum testosterone levels among buffaloes remained low on days 7, 15 and 22 postpartum showing a small though non-significant ( $P < 0.05$ ) increase on days 30 and 37.

## Discussion

The results for testosterone pattern in cycling Murrah buffaloes indicate an increase in the jugular testosterone levels on day 9 of oestrus which roughly coincides with the period when the luteolytic activity has set in. Similar observations have also been recorded for in cattle though the timing of the peak was slightly different (Shemesh and Hansel, 1974; Herriman *et al.*, 1979; Kesler *et al.* 1979). However, no testosterone peak

TABLE 3: Postpartum Testosterone (Pg/ml) among buffaloes.

Animal No.	Days Postpartum					
	7	15	22	30	37	45
231	0.052	0.142	0.069	0.19	0.17	0.050
551	0.034	0.039	0.035	0.037	0.062	0.039
97	0.034	0.029	0.019	0.034	0.027	0.019
1168	0.033	0.041	0.028	0.056	0.038	0.044
Av. $\pm$ SEM	0.038 $\pm$ 0.005	0.063 $\pm$ 0.027	0.038 $\pm$ 0.011	0.079 $\pm$ 0.037	0.074 $\pm$ 0.033	0.038 $\pm$ 0.007



preceding oestrus was obtained in buffaloes, which was in contrast to the observations of Shemesh and Hansel (1975), Kanchev *et al.* (1976) and Kesler *et al.* (1979). In the absence of any information in buffaloes, this variance could be attributed to the species difference. The present observations are suggestive of testosterone playing a possible role in luteolysis in buffaloes.

The post-partum testosterone pattern in buffaloes did not confirm to any distinct trend. However, the small though non-significant increase in the hormone level on day 30 and 37 postpartum might probably have been due to the fact that 3 of the 5 animals had started showing luteal activity during that period. A more

detailed close sampling than the one carried out in this study for postpartum buffaloes will therefore be more helpful in evaluating the testosterone profile during the postpartum period.

### Acknowledgement

The authors are indebted to Dr. I.S. Verma, Director, N.D.R.I., Karnal for providing the necessary facilities to conduct this research. They are also grateful to Dr. P.N. Rao, Director, Department of Organic and Biological Chemistry, South-West Foundation for Research and Education, Texas, U.S.A. for his generous gift of testosterone antiserum.

### REFERENCES

- Arora, R.C. and Pandey R.S. (1982). *Acta Endocrinologica*, **100** (2):279.  
 Bachlus, N.K., Arora, R.C., Prasad, A. and Pandey, R.S. (1980). *Theriogenology*, **13**: 297.  
 Herriman, I.D., Harwood, D.J., Mallinson, C.B. and Heitzman, R.J. (1979). *J. Endocr.* **81**: 61.  
 Kanchev, L.N., Dobson, Hillary; Ward, W.R. and Fitzpatrick, R.J. (1976). *J. Reprod. Fert.*, **48**: 341.  
 Kesler, D.J., Garverick, H.A., Candle, A.B., Bierschwal C.J., Elmore, R.G. and Youngquist, R.S. (1979). *J. Dairy Sci* **62**: 1825.  
 Naqvi, S.K.M. (1982). M.Sc. Thesis, Kurukshetra Univ., Kurukshetra.  
 Perera, B.M.A.O., Abeygunawardena, H., Thamotharm, A., Kindhal, H. and Edqvist, L.H. (1981). *Theriogenology*, **15**: 463.  
 Prakash, B.S. (1983). Induction of parturition in bovines. Ph.D. Thesis, Kurukshetra Univ. Kurukshetra  
 Shemesh, M. and Hansel, W. (1974). *J. Anim. Sci.*, **39**: 720.



## Serum FSH Levels During And After Synchronized Oestrus Of Murrah Buffaloes (*Bubalus bubalis*)

M.L. KAKER, M.N. RAZDAN and M.M. GALHOTRA,

Department of Animal Production Physiology,  
Haryana Agricultural University, Hisar — 125 004

### ABSTRACT

Circulating FSH profile of 9 Murrah buffaloes during synchronized oestrus with MGA feeding and subsequent oestrus were investigated. Only 3 buffaloes exhibited peak FSH levels during synchronized oestrus. Mean basal FSH levels recorded on different days after estrus fluctuated between  $7.79 \pm 1.38$  and  $24.93 \pm 3.29$  ng/ml. All the 9 buffaloes returned to next estrus, but only 4 buffaloes were available for studying serum FSH profile.

\* \* \*

Melengestrol acetate (MGA), a potent progestagen has been attempted for oestrus synchronization in buffaloes by a few workers (Shukla *et al.*, 1971; Mithuji *et al.*, 1972). A high percentage of treated animals show oestrous behaviour during the short period following withdrawal of MGA but fertility at the synchronized oestrus has been reported to be very low. The present investigation was undertaken to study the circulating Follicle Stimulating Hormone (FSH) profile of MGA fed buffaloes during synchronized estrus and subsequent oestrus.

### Materials and Methods

**Animals:** Nine healthy Murrah buffaloes, 30 days after calving, were selected from the University Farm and were divided randomly into 2 groups. Groups 1 (5 animals) and 2 (4 animals) were fed with 1 and 2 mg/animal/day

melengestrol acetate 60 premix (MGA), respectively, for 18 days continuously. All the animals were closely watched for oestrous behaviour before and during MGA feeding, and following MGA withdrawal. This was done, thrice daily using a trained teaser bull. The animals which were detected in oestrus, were put to natural service.

**Blood sampling:** Blood samples were collected 24 h before the start of MGA feeding, on days 7 and 14 of the MGA feeding and 24 h after the withdrawal of the treatment. Further blood samples were collected at the time of detection of oestrus (0 h) and thereafter every 4 h for 24 h, followed by sampling on every third day up to 23 days. Serum was separated by centrifugation at 3,000 rpm (1000 g) for 30 min at 5°C and stored frozen at -20°C till used for assay.

**FSH assay:** The double antibody radioimmunoassay, using a complete bovine system, was followed for measuring serum FSH levels. Details of the technique were reported earlier (Razdan *et al.*, 1982).

### Results and Discussion

The mean plasma FSH levels of buffaloes in Groups 1 and 2 prior to start and during treatment are presented in Table 1. FSH levels during treatment ranged from  $8.41 \pm 2.33$  to  $15.73 \pm 4.22$  ng/ml serum among two groups, which are considered as fluctuating basal levels.



**Table 1. Mean ( $\pm$ S.E.) serum FSH levels before and during MGA feeding.**

Time	Group 1 (1 mg)	Group 2 (2 mg)
24 h pre-treatment	14.65 $\pm$ 2.60	12.65 $\pm$ 3.55
7 days after the start of treatment	8.41 $\pm$ 2.33	12.54 $\pm$ 7.70
14 days after the start of treatment	14.85 $\pm$ 3.39	15.73 $\pm$ 4.22

These values were not different from the pre-treatment values. Serum FSH values of individual buffalo for the first 24 h after the detection of synchronized estrus under both groups are given in Table 2. The mean values observed on different days after estrus detection are presented in Table 3. In group 1, only 1 out of 5 animals showed peak FSH levels of 69.93 ng/ml at oestrus detection. In group 2, only 2 out of 4 animals exhibited high FSH values. Buffalo No 7. showed highest

concentration of 73.26 ng/ml at the oestrus detection. Buffalo No. 6 had 48.28 ng/ml at 4 h of estrus detection (Table 2).

The mean FSH levels measured on different days after oestrus fluctuated within normal range of basal FSH levels when compared to normal cycling Murrah buffaloes reported earlier (Razdan *et al.*, 1982).

All the 9 animals returned to next oestrus but blood samples from only 4

**TABLE 2. Serum FSH concentration (ng/ml) at different intervals after detection of synchronized oestrus.**

Time after detection of oestrus (h)	Buffalo No.								
	Group 1 (1 mg)					Group 2 (2 mg)			
	1	2	3	4	5	6	7	8	6
-48 to 72	4.99	15.56	21.64	11.32	22.31	15.32	13.32	27.64	11.65
0	69.73	27.97	—	20.97	19.31	17.65	73.26	12.32	11.09
44	39.96	16.65	28.64	15.32	18.65	48.28	6.60	8.899	9.66
8	18.98	19.58	18.32	13.32	18.65	24.38	—	20.65	16.65
12	8.66	11.32	16.65	15.32	15.98	15.32	—	17.98	18.85
16	10.65	6.99	3.99	10.65	26.64	18.98	—	13.32	10.65
20	10.65	14.65	13.99	14.32	16.65	16.98	36.63	14.98	11.09

**TABLE 3. Mean ( $\pm$ S.E.) serum FSH concentration at different intervals during the synchronized oestrus cycle.**

Time after detection of estrus (days)	Group 1 (1 mg)	Group 2 (2 mg)
2	12.05 $\pm$ 2.29	13.73 $\pm$ 2.86
5	12.78 $\pm$ 2.73	24.93 $\pm$ 3.29
8	10.72 $\pm$ 1.70	17.73 $\pm$ 1.77
11	7.79 $\pm$ 1.38	16.56 $\pm$ 1.77
14	8.38 $\pm$ 1.33	14.48 $\pm$ 2.18
17	0.49 $\pm$ 1.93	20.97 $\pm$ 6.61
20	9.34 $\pm$ 0.76	20.16 $\pm$ 6.46
23	8.10 $\pm$ 0.18	22.47 $\pm$ 5.82



**TABLE 4. Serum FSH concentration (ng/ml) at four hourly intervals after detection of estrus during oestrus subsequent to synchronization.**

Time after detection of oestrus (h)	Buffalo No.			
	Group 1 (1 mg)		Group 2 (2 mg)	
	1	2	7	8
0	10.32	21.98	16.65	73.26
4	7.49	23.98	14.65	63.27
8	66.60	17.32	17.64	16.65
12	34.96	16.65	29.30	18.32
16	18.65	11.65	21.64	11.99
20	14.65	13.32	16.98	14.65
24	6.99	10.98	11.65	—

**TABLE 5. Mean ( $\pm$ S.E.) serum FSH concentration at different intervals after detection of oestrus during oestrous cycle subsequent to synchronization.**

Time after detection of estrus (days)	Group 1 (1 mg)	Group 2 (2 mg)
2	11.15 $\pm$ 1.49	19.47 $\pm$ 0.83
5	13.48 $\pm$ 3.16	14.65 $\pm$ 0.50
8	8.40 $\pm$ 2.57	16.81 $\pm$ 3.16
11	4.66 $\pm$ 0.50	10.98 $\pm$ 1.66
14	7.32 $\pm$ 0.06	15.31 $\pm$ 4.99
17	10.32 $\pm$ 0.66	13.98 $\pm$ 0.66
20	9.49 $\pm$ 2.07	12.40 $\pm$ 5.24
23	6.63 $\pm$ 0.69	9.66 $\pm$ 0.00

animals could be collected for FSH assay. The FSH levels observed during first 24 h of oestrus are given in Table 4 and the mean values observed on different days are given in Table 5. Buffalo No. 1 showed peak FSH level of 66.60 ng/ml at 8 h of oestrus detection. Buffalo No. 2 did not show marked elevated FSH values during first 24 h of estrus, although FSH levels during first 4 h were slightly higher than rest of the period. It is possible that FSH peak value might have been missed due to late detection of oestrus in this animal. Buffalo No. 8 showed FSH peak level of 73.26 ng/ml at oestrus detection. This animal had not shown any peak level during synchronized oestrus.

Buffalo No 7 had elevated FSH levels of (29.30 ng/ml) at 12 h of oestrus detection than at other hours of estrus (Table 4).

The mean FSH values observed during different days after estrus detection were obviously basal levels. All the 4 buffaloes conceived at this oestrus.

None of the buffaloes conceived at the synchronized oestrus. Out of the 9 buffaloes in two groups only 3 buffaloes showed peak levels of FSH during estrus. This suggested that the inhibitory effect of high level of progesterone continued for some time after withdrawal of MGA. This prolonged inhibitory effect may be responsible for the suppression of FSH peak in most of the buffaloes which in turn could be one of the contributing



factors responsible for poor fertility at the first synchronized oestrus. Lamond *et al.* (1971) and Britt and Ulberg (1972) recorded higher concentration of progesterone during follicular phase in MGA treated cows than the levels observed in the controls. Poor fertility at the synchronised estrus in cows had also been recorded by Zimbelman (1966) and Randel *et al.* (1972).

#### Acknowledgement

This work was carried out under a

research project sponsored by the Indian Council of Agricultural Research, New Delhi. We thank Drs. L.E. Reichert and D.J. Bolt for the generous gift of standard FSH and RIA grade FSH, respectively. Our thanks are also due to the Department of Livestock Production and Management, Haryana Agricultural University, Hissar, India, for allowing to collect blood samples from the experimental animals.

#### REFERENCES

- Britt, J.H. and Ulberg, L.C. (1972). Melengestrol acetate administration to dairy heifers and progesterone levels in the peripheral blood plasma. *J. Reprod. Fert.* 29: 119-122.
- Lammond, D.R., Dickey, J.F., Henricks, D.M., Hill, J.R. and Leland, T.M. (1971). Effect of progestin on the bovine ovary. *J. Anim. Sci.* 33: 77-81.
- Mithuji, G.F., Shukla, K.P., Menon, G.N. (1972). Effect of melengestrol acetate on the estrus in Surti buffalo heifers. *Indian J. Dairy Sci.* 25: 284-285.
- Randel, R.D., Callahan, C.J., Erb, R.E., Garverick, H.A. and Brown, B.L. (1972). Effect of melengestrol acetate on plasma progesterone, luteinizing hormone and total corticoids in dairy heifers. *J. Anim. Sci.* 35: 389-397.
- Razdan, M.N., Kaker, and Galhotra, M.M. (1982). Serum FSH levels during estrus and a 4-week period following mating in Murrah buffaloes (*Bubalus bubalis*). *Theriogenology* 17: 175-181.
- Shukla, K.P., Mithuji, G.F. and Buch, N.C. (1971). Synchronization of estrus in Surti buffaloes with melengestrol acetate. *Indian J. Anim. Sci.* 41: 1008-1010.
- Zimbelman, R.G. (1966). Effects of progesterone on ovarian and pituitary activities in the bovine. *J. Reprod. Fert. (Suppl. 1)*: 9.19.



## Studies On Some Factors Affecting Gestation Period In Cattle

R.K. PANDIT, R.G. AGRAWAL and S.P. SHUKLA

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

and

All India Co-ordinated Research Project on Cattle, Livestock Farm,  
Adhartal, Jabalpur (M.P.) 482 004

### ABSTRACT

Effect of heritage, parity, sex and birth weight on gestation period were studied in 1401 calves. For correlation and regression studies 814 pairs of gestation period and birth weight were analysed. The calves with 50% Brown Swiss heritage ( $\frac{1}{2}B\frac{1}{2}H\frac{1}{2}G$ ) were significantly heavy ( $P < 0.01$ ) at birth ( $30.71 \pm 1.17$  kg) and carried for the maximum duration in the womb ( $284.27 \pm 1.41$  days) as compared to all other groups. The male calves ( $23.94 \pm 0.23$  kg) were heavy in weight and carried in the womb for longer duration than the female ( $278.17 \pm 0.22$  days). The sex ratio was 50.25%. There was no significant effect of parity of dam on birth weight and gestation period. Correlation between gestation period and birth weight of calves was 0.316, which was significantly positive ( $P < 0.01$ ).

\* \* \*

The length of gestation in cattle is considered from fertile service to parturition. Number of factors are said to influence the gestation period. Systematic studies pertaining to the factors influencing gestation period in cattle appears to be lacking (Salisbury *et al.*, 1978). The present investigation was aimed to envisage the effect of breed, parity, sex and birth weight on the gestation period in cattle.

### Materials and Methods

The study was conducted at the All India Co-ordinated Research Project on Cattle, Jabalpur. It included indigenous Gir (G) cows as foundation stock. Frozen semen of Holstein Friesian (H), Jersey (J) and Brown Swiss (B) exotic breeds procured from U.S.A. was utilised for cross-breeding. After the desired number of  $\frac{1}{2}$  and  $\frac{1}{4}$  exotic crossbred progenies were generated, *inter-se* mating was followed using liquid semen of  $\frac{3}{4}$ th exotic cross-bred bulls on the same genetic group of females. Close mating was avoided.

Total 711 cows were employed to generate 1401 calves in various genetic groups. In all, 814 calves were weighed immediately after birth. The number of calves studied in each genetic group are presented in Table-1. For correlation and regression studies, 814 pairs of gestation period and birth weight were analysed statistically.

### Results and Discussion

The mean gestation period in the herd was  $277.69 \pm 0.16$  days with a range of  $275.13 \pm 0.38$  to  $284.27 \pm 1.41$  days in different genetic groups (Table 1) and parities (Table-2). There was a significant difference ( $P < 0.01$ ) in the gestation period between various genetic groups (Table-3), the minimum in



**TABLE 1: Gestation period and birth weight of male and female calves with sex ratio in different genetic groups (Mean±SE).**

Dam	Genetic group	Male calves		Female calves		Overall mean		Sex ratio (Male%)
	Calves	Duration in womb(days)	Birth weight (kg)	Duration in womb(days)	Birth weight (kg)	Duration in womb(days)	Birth weight (kg)	
G	$\frac{1}{2}J\frac{1}{2}G$	278.55±0.58 (101)	17.68±1.16 (17)	278.16±0.50 (106)	20.36±0.44 (68)	278.35±0.38 (207)	19.82±0.43 (85)	48.79
G	$\frac{1}{2}H\frac{1}{2}G$	277.70±0.37 (209)	22.61±0.36 (87)	276.90±0.39 (226)	23.96±0.45 (53)	277.29±0.27 (435)	23.13±0.29 (140)	48.04
	$\frac{1}{2}H\frac{1}{2}G$	277.80±0.52 (126)	22.96±0.42 (95)	277.76±0.50 (108)	22.19±0.36 (103)	277.78±0.36 (234)	22.56±0.28 (198)	53.84
	$\frac{1}{2}H\frac{1}{2}G$	281.07±0.56 (108)	27.66±0.47 (89)	279.31±0.57 (110)	26.50±0.45 (75)	280.18±0.40 (218)	27.13±0.36 (164)	49.54
	$\frac{1}{2}J\frac{1}{2}G$	276.15±0.49 (123)	23.66±0.42 (92)	274.02±0.58 (113)	22.48±0.37 (89)	275.13±0.38 (236)	23.08±0.28 (181)	52.11
	$\frac{1}{2}J\frac{1}{2}H\frac{1}{2}G$	277.44±1.42 (16)	20.56±1.34 (8)	276.83±1.33 (12)	19.91±1.06 (11)	277.18±1.00 (28)	20.18±0.81 (19)	57.14
	$\frac{1}{2}H\frac{1}{2}J\frac{1}{2}G$	278.64±1.09 (14)	22.45±1.29 (11)	276.00±1.64 (14)	23.78±1.70 (9)	277.32±1.00 (28)	24.15±1.02 (20)	50.00
	$\frac{1}{2}B\frac{1}{2}H\frac{1}{2}G$	284.86±2.02 (7)	30.60±1.66 (5)	283.75±2.08 (8)	31.00±1.00 (2)	284.27±1.41 (15)	30.71±1.17 (7)	46.66

Note: Figures in parenthesis indicate number of calves studied in each group.

**TABLE 2: Gestation period and birth weight of male and female calves with sex ratio in different parities (Mean±SE).**

Parity	Male calves		Female calves		Overall mean		Sex ratio (Male %)
	Duration in womb (days)	Birth weight (kg)	Duration in womb (days)	Birth weight (kg)	Duration in womb (days)	Birth weight (kg)	
1st	277.95±0.38 (295)	22.95±0.33 (213)	277.14±0.38 (286)	23.36±0.31 (194)	277.55±0.27 (581)	23.14±0.23 (407)	50.94
2nd	278.18±0.33 (244)	25.15±0.42 (104)	277.92±0.36 (227)	22.37±0.39 (130)	278.05±0.24 (451)	23.61±0.30 (234)	54.10
3rd	278.90±0.51 (116)	24.84±0.58 (60)	276.11±0.57 (117)	23.25±0.59 (55)	277.50±0.40 (233)	24.08±0.42 (115)	49.78
4th	278.29±0.63 (62)	25.44±0.82 (25)	277.02±0.75 (57)	22.87±0.68 (26)	277.68±0.49 (119)	24.13±0.56 (51)	52.10
5th	274.00±1.54 (7)	21.50±1.50 (2)	276.20±2.40 (10)	22.20±1.89 (5)	279.29±1.53 (17)	22.00±1.35 (7)	41.17
Overall mean	278.17±0.22 (704)	23.94±0.23 (404)	277.20±0.23 (697)	22.98±0.21 (410)	277.69±0.16 (1401)	23.46±0.16 (814)	50.25

Note: Figures in parenthesis indicate number of calves studied in each group.



$\frac{1}{2}H\frac{1}{4}J\frac{1}{4}G$  and maximum in  $\frac{1}{2}B\frac{1}{4}H\frac{1}{4}G$  calves. The gestation period for which the male calves were carried ( $278.17 \pm 0.22$  days) was significantly more ( $P < 0.01$ ) than those of female ( $277.20 \pm 0.23$  days). The mean sex ratio ranged between 41.17 to 57.14% amongst various genetic groups and parities with overall mean as 50.25%. The calves were carried longest in the second parity of dam ( $278.05 \pm 0.24$  days) and for shortest duration in the fifth parity ( $275.29 \pm 1.53$  days). However, the effect of parity on gestation period was non-significant.

Comparable results with respect to genetic groups studied in the present investigation in relation to gestation period were not available. However, Salisbury *et al.* (1978) described gestation length for various dairy breeds to vary from 278 to 284 days with maximum gestation length in the Brown Swiss breed as found in the present investigation also. Jondet and Arias (1973) believed that breed of sire had a significant effect on gestation length. As observed in the present findings, Manrique and Wilcox (1978) also reported that the gestation length of the cows carrying male foetuses was longer than those carrying female foetuses. Chapman *et al.* (1938) described

that the sex ratio in female calves is variable, but the trend is towards a higher proportion of males in the younger foetuses. This evidence suggests that more males than females are conceived, but a greater embryonic death rate among males tends to narrow the ratio by the time of birth. Fisher and Williams (1978) observed that duration of pregnancy increases with increasing parity. However, in the present study no such relationship could be established as the effect of parity on the gestation length was found to be non-significant.

The mean birth weight of the calves was  $23.46 \pm 0.16$  kg with a range of  $19.82 \pm 0.43$  to  $30.71 \pm 1.17$  kg. The lightest calves were in  $\frac{1}{2}J\frac{1}{4}G$  group, while heaviest in  $\frac{1}{2}B\frac{1}{4}H\frac{1}{4}G$ . A significant difference ( $P < 0.01$ ) was observed in the birth weight calves from various genetic groups. A significant difference ( $P < 0.01$ ) was also observed in the weight of male ( $23.94 \pm 0.23$  kg) and female ( $22.98 \pm 0.21$  kg) calves. The weight of the calves born to primiparous cows ( $23.14 \pm 0.23$  kg) increased upto 4th parity ( $24.13 \pm 0.56$  kg), which declined in the 5th parity cows ( $22.00 \pm 1.35$  kg). However, the difference was non-significant.

The calves with 50% Brown Swiss heritage ( $\frac{1}{2}B\frac{1}{4}H\frac{1}{4}G$ ) were found heaviest

TABLE 3: Analysis of variance for gestation period and birth weight of calves in relation to various genetic groups, sex and parity.

Trait	Source of Variation	df	MS
Gestation Period	Between genetic group	7	532.20**
	Between parity	4	43.94
	Between sex	1	333.00**
	Error	1389	32.21
Birth weight	Between genetic group	7	587.89**
	Between parity	4	31.96
	Between sex	1	187.96**
	Error	802	15.30

\*\*  $P < 0.01$



in the present study. Shrivastava *et al.*, (1978) also reported mean birth weight of Brown Swiss half-breds to be more than Holstein and Jersey half-breds. It is obvious that the birth weight of calves vary from breed to breed and within breed from dam to dam. Rathore (1949) pointed out that the heterosis of the dam was accomplished by heavy weights of calves at birth but the heterosis of the calf itself was associated with greater gain in the later life.

The correlation between gestation period and birth weight was 0.316, which was significantly positive ( $P < 0.01$ ) with the regression value of birth weight on gestation period being 0.79.

It was evident from the observation that the calves belonging to  $\frac{1}{2}B\frac{1}{4}H\frac{1}{4}G$  genetic group were heaviest and carried in the womb for longest period as compared to all other groups. Similarly, the male calves were heavier than female and carried longer. The lightest calves were delivered during 5th parity, hence, minimum gestation period as compared to other parity groups. The findings are in close agreement to those of Zavertyaev (1979).

### Acknowledgement

We thank Dr. H.K.B. Parekh, Senior Scientist, All India Co-ordinated Research Project on Cattle, Jabalpur, for providing facilities.

### REFERENCES

- Chapman, A.B., Casida, L.E. and Cote, A. (1938) Sex ratios of foetal calves. *Am. Soc. Animal Prod. Proc.* 31: 303-304.
- Fisher, L.J. and Williams, C.J. (1978) Effect of environmental factors and foetal and maternal genotype on gestation length and birth weight of Holstein calves. *J. Dairy Sci.* 61: 1462-1467.
- Jondet, G.E. and Arias, A.A. (1973) Gestation length in the Aberdeen-Angus breed and its crosses. *Memoria Association Latinoamericana de Production Animal.* 8: 77-89 (*Anim. Breed. Abstr.* 42: 562).
- Manrique, U. and Wilcox, C.J. (1978) A study of gestation and birth weights in Jersey cattle. *Memoria Association Latinoamericana de Production Animal.* 13: 140 (*Anim. Breed. Abstr.* 47: 4771).
- Rathore, A., (1949) Difference in growth of Sindhi and crosses of Sindhi with Jersey, Brown Swiss, Holstein Friesian and Guernsey cattle. Thesis, Iowa State Coll., Ames (*Anim. Breed. Abstr.* 20: 1550).
- Salisbury, G.W. VanDemark, N.L. and Lodge, J.R. (1978) Physiology of reproduction and artificial insemination of cattle. 2nd edn., Freeman & Co., San Francisco.
- Shrivastava, B.B., Saxena, M.M., Koul, G.L., Singhal, R.A. and Garg, R.C. (1978) Studies on causes of variation in birth weight of crossbred calves. *Indian J. Anim. Sci.* 48: 158-161.
- Zavertyaev, B.P. (1979) The biologic and genetic significance of pregnancy duration in dairy cattle. *Biologicheskoe Seleksionnoe znachenie perioda stel' nosti molochnogo skota.* *Genetica, USSR.* 15: 535-540 (*Anim. Breed. Abstr.* 47: 4170).



## Induction of Parturition in Cattle

E. MADHAVAN and M.O. KURIEN

Department of Animal Reproduction,  
College of Veterinary and Animal Sciences,  
Mannuthy — Trichur.

### ABSTRACT

Parturition was induced in 9 cows by administration of Dexamethazone alone 20 mgm. intramuscular and in 19 cows by giving a combination of Dexamethazone 20 mgms. and Stilboestrol at an average gestation period of 266 and 263 days respectively keeping 9 cows as control. All the induced cows calved at an average interval of 45.7 hours after the administration of the drug. Parturition occurred at 262.65 day of gestation in induced cows compared to 275.56 day of gestation in control. Those given a combination of Dexamethazone and stilboestrol calved 3.31 days earlier than those given Dexamethazone alone. Average birth weight of calves in the control and treated group was 27.65 kg. and 23.98 kg. respectively. Incidence of retained placenta was higher in the treated cows compared to control. Administration of Dexamethazone and oestrogen could reduce the incidence of retained placenta. Post Partum oestrus was delayed in the treated cows compared to control animals.

\* \* \* \*

The ability of synthetic Cortico steroids to induce parturition in cattle has practical application in dairy industry especially because of the ability to synchronise the calving period with availability of labour, for therapeutic termination of pregnancy in prolonged gestation and

also for various clinical reasons. Since the initial reports of the use of Cortico steroids in the induction of parturition in cattle (Adams, 1969) several successful reports have appeared in the literature (Carrol, 1974; Thomas, 1975; O Farrel and Langley, 1975). However, Winter *et al.* (1974) Barth *et al.* (1978) and Davis *et al.* (1979) reported high incidence of retention of foetal membranes in induced calving. According to Garverick *et al.*, (1974) administration of oestrogen in combination with dexamethazone reduced incidence of retained placenta. Based on the above reports, a trial was carried out to study the effect of dexamethazone alone and a combination of dexamethazone and oestrogen on the induction of parturition in cattle.

### Materials and Methods

Twentyseven cross bred cows belonging to the Livestock Farm attached to the Kerala Agricultural University in advanced stage of gestation and not reported to have any difficulties in the previous calvings were selected for the study. These cows between 255 to 270 days of gestation were randomly allotted in three groups of nine each. Cows in group I was not given any treatment and kept as control. Cows in group II were given Dexamethazone (9 alpha fluoro 16 alpha—methyl prednisolone) 20 mgms. intramuscularly. Cows in group III were given 25 mgms of Dexamethazone and



Item	Control	Experimental		
		Dexametha- zone alone	Dexametha- zone and stilboest-rol	Mean
	Group I	Group II	Group III	
1. No. of cows	9	9	9	
2. No. responded to treatment		9	9	
3. Average gestation period before treatment (days)		266	263	264.50
4. Average time response after drug administration to calving an hour		48.6	42.8	45.7
5. Gestation length in days	275.56	268.06	264.75	266.40
6. Average birth weight of calves in kg.	27.65	24.52	23.62	23.98
7. Calving difficulty	nil	1	1	1
8. Retained foetal membrane	1	4	2	3
9. Onset of Post partum oestrous in days	58.2	78.2	66.51	72.38

50 mgms of stilboestrol intramuscularly. Time from injection of the drug to calving was recorded. The calving difficulties if any were recorded and birth weight of calves immediately after birth was noted. Cows that had not expelled placenta by 24 hours were considered to have retained foetal membranes. Onset of post partum oestrus in all the cows in each group was recorded and average post partum oestrous interval in each group was calculated.

### Results and Discussion

Data presented in the table would reveal that the gestation length could be reduced to 266.40 days by induction of parturition compared to 275.56 days in the control. All the cows in which parturition was induced responded to treatment with all of them calving within 45.7 hours after injection of the drug. The interval from treatment of calving averaged 48.6 hours and 42.8 hours in group II and III respectively. Thus treatment with Dexamethazone and oestrogen resulted earlier calving than with Dexamethazone alone. Garverick *et al.*, (1974) reported a shorter response time

in beef cows given Dexamethazone plus oestradiol compared to dexamethazone alone. The mean birth weight of calves born to cows in group I, II and III was 27.65 kg., 24.52 kg. and 23.64 kg. respectively. Induction of calving resulted in average reduction of 3.67 kg. in their birth weight, the average birth weight of calves born with induced calving being 23.98 kg. Wagner *et al.*, (1974) opined average increase of 0.5 kg. per day in the weight of foetus during the last few days of gestation. The study also revealed none of the cows in the control group had difficult calving while one each in the two treatment groups had difficult birth. Beardsley *et al.*, (1974) and Carrol (1974) also reported that though, the calves in the induced birth was smaller in size, calving difficulty was greater in them compared to normal birth. Winter *et al.*, (1974) and Beardsley *et al.* (1974) also reported that induction of calving would result in greater incidence of difficult birth. However, Kelly *et al.* (1973) reported that by reducing gestation length by inducing calving the birth weight of calves would be reduced and the dystocia would be minimum.



According to Mc Diarmid (1980) incidence of Dystocia due to maternal foetal disproportion is not great in induced calving and the calving difficulty might be increased as a result of incomplete preparation of the birth canal.

Perusal of data in the table would reveal that incidence of retained placenta was higher in induced calving compared to control. It was also revealed that dexamethazone in combination with oestrogen decreased the incidence of retained placenta compared with those which were given dexamethazone alone. Garverick *et al.* (1974) reported that the failure to increase the serum oestrogen to quantities similar to those of natural calving prior to parturition might explain the high incidence of retained placenta in induced calving. He found that 6 mgm. of estradiol benzoate given with dexamethazone elevated blood oestrogen in beef cows and reduced the incidence of retention of foetal membrane. However, Davis *et al.* (1979) did not find decreased incidence of retained placenta in cows given 40 mgms of non conjugated oestrone or oestradiol 17.13. Schmitt *et al.* (1975) observed that a dose of 8 mgm of oestradiol benzoate to dairy cows failed to

reduce the incidence of retained foetal membrane and failed to increase either circulatory plasma oestradiol or excretion to total oestrogen in urine to that of control.

The treatment also revealed that there was delay in the onset of post partum oestrus in induced calving (72.35 days) compared to control (58.2 days). It could also be seen that post partum oestrus occurred earlier in group III than in group II. This might be attributed to the higher incidence of retained placenta. Arthur (1979) and Sandals *et al.* (1979) reported that the delay in the onset of post partum oestrus might be due to mild uterine infection which would follow retained foetal membrane. However, several workers claimed that induction of parturition with subsequent reproductive health management would not affect the future reproductive performance (Lauderdale, 1972; Beardsley *et al.* 1974; Carrol, 1974; Bolte *et al.* 1976).

#### Acknowledgement

The authors are thankful to the Dean, College of Veterinary and Animal Sciences, Mannuthy for permission to publish this paper.

#### REFERENCES

- Adams, N.M. (1969). The elective induction of labour and parturition in cattle. *J. Am. Vet. Med. Assn.* **154**: 261-263.
- Arthur, G.H. (1979). Retention of after birth in cattle a review and commentary *Vet. Annual* **19**: 26-36.
- Beardsley, G.L., Muller, L.D.; Owner, M.J.; Luden, E.C. and Tucker (1974). Initiation of parturition in dairy cows with dexamethazone (I) cow response and performance. *J. Dairy Sci.* **57**: 1061-1066.
- Bolte, K.A., Garverick, H.A., Kisler, D.J., Day, B.N. and Matter, E.C. (1977). Dexamethazone and oestradiol benzoate induced parturition in Dairy cattle. *Theriogenology* **45**: 58.
- Barth, A.D., Adams, W.M., Mann, J.C. and Rawlings, N.C. (1978). Induction of parturition in beef cattle using estrogens in conjunction with dexamethazone. *Canadian Vet. J.* **19**: 175-180.
- Carrol, E.J. (1974). Induction of parturition in Farm animals. *J. Anim. Sci. Suppl.* **38**: 1-9.
- Davis, D.L., Jenkin, A.L., Garverick, M.A., Massey, J.W., Brerschevak, C.J., and Day, B.N. (1979). Induction of



- parturition in cattle with long and short acting cortico steroids and oestradiol benzoate. *J. Anim. Sci.* **49**: 360-368.
- Garverick H.A.; Day, B.N., Matter, E.C., Gomez, L. and Thompson, G.W. (1974). Use of oestrogen with dexamethazone for inducing parturition in beef cattle. *J. Anim. Sci.* **38**: 584-590.
- Kelly, J.M., Mc Lennan, W. and Bell, R.L. (1973). Induction of parturition in cattle by administration of Cortico steroids. *Vet. Rec.* **93**: 371-73.
- Lauderdale, J.W. (1972). Effect of corticosteroid administration in bovine pregnancy. *J. Ame. Vet. Med. Assn.* **160**: 867-871.
- Mc Diarmid, S.C. (1980). Betamethazone for induction of parturition in cows—a comparison of formulation. *Newzealand Vet. J.* **28**: 61-64.
- O. Farrel, K.J. and Langely (1975). The induction of parturition in Dairy cows with betamethazone. *Irish Vet. J.* **25**: 151-155.
- Sandal, W.C., Burtin, R.A., Cole, J.F. and Martin, S.N. (1979). The effect of retained placenta and metritis complex on Reproductive performance in dairy cattle. *Canadian Vet. J.* **20**: 131-135.
- Schmitt, D., Garverick, H.A., Matter, E.C., Sekes, J.D., Day, B.N. and Erb, R.E. (1975). Induction of parturition in dairy cattle with dexamethazone and oestradiol benzoate. *J. Anim. Sci.* **40** 261.
- Thomas, G.W. (1975). The effect of dexametbazone T.M.A. when used to synchronise parturition in monozygotic twins in dairy cows. *Aust. J. Exp. Ag. Anim. Hus.* **15**: 591-93.
- Wagner, N.C., Willian, R.L. and Evans, L.E. (1974). Controlled parturition in cattle *J. Anim. Sci.*: **38**: 485-489.
- Winter, J.L., Pomcelet, G.H., Lavote, V.A. and Moody, E.L. (1974). Induced calving in beef production. *J. Anim. Sci.* **38**: 1339-1340.



## Biochemical Polymorphic Effect On Reproductive Status In Crossbred Cattle

A. VENKATAMUNI CHETTY, A. RAMA-MOHANA RAO and B.T. JAIRAM

Department of Animal Reproduction and Gynaecology  
College of Veterinary Science, Tirupati

### ABSTRACT

Sixty blood and serum samples from three equal groups viz., prepuberal, anestrus and cycling animals maintained under rural conditions were subjected to haemoglobin and serum albumin typing. Three haemoglobin phenotypes viz., AA, AB and BB were found in this present study. Similarly three albumin types AB, AA and BB were observed. Significant difference was not observed due to reproductive status both in Hb and Alb variants. However, Hb gene frequencies in prepuberal animals appeared differently from anestrus and cycling animals. Low incidence of Alb A and higher incidence of Alb B was observed in anestrus animals.

\* \* \*

Investigation of biochemical polymorphism in cattle especially genetic typing of haemoglobin and albumin is of recent development in animal production (Harpreet Singh and Khanna, 1971; Khanna and Singh, 1972, Krishna Singh and Nair, 1981 and Harpreet Singh, 1981). The application of biochemical polymorphism in generating exotic gene flow in our animal development was limited to few studies on production parameters (Krishna Singh and Nair, 1981; Harpreet Singh *et al.*, 1983 and Jairam and Nair, 1983). No study was made so far applying the genetic typing of blood proteins especially haemoglobin

and albumin variants on reproductive status of crossbred animals. A study was therefore made for understanding the reproductive status of the crossbred animals as maintained by the farmers in relation to genetic variants of blood proteins.

### Materials and Methods

Blood samples of 60 crossbred animals comprising of three equal groups of prepuberal, anestrus and cycling animals were collected. These animals having varying level of Jersey blood (25 to 87.5%) were maintained under rural conditions in Chittoor area of Andhra Pradesh. Haemoglobin types were studied on agar gel electrophoresis as described by Balakrishnan and Nair (1966). The separation of albumin was based on a discontinuous buffer system on starch gel electrophoresis as described by Poulik (1957).

### Results and Discussion

Three Hb phenotypes viz. AA, AB and BB as reported by Harpreet Singh and Khanna (1971) and Nandakumaran *et al.* (1982) were observed in the present study. The gene frequencies of Hb A and Hb B were found to be respectively 0.30 and 0.70 in prepuberal, 0.53 and 0.47 in anestrus and 0.50 and 0.50 in cycling animals. There was no significant variation in gene frequencies between groups as shown in Table 1. However, low



**TABLE 1 Distribution of Haemoglobin Variants in Various Reproductive Conditions in Crossbred Cattle**

Reproductive Status	No. of observations	Phenotypic frequencies				X <sup>2</sup>	Gene frequencies	
			AB	B	A		B	A
Prepuberal heifers	20	O	12	8	—	1.6	0.70	0.30
		%	60	40	—			
		E	8.4	9.8	1.8			
Anestrus animals	20	O	13	3	4	0.66	0.47	0.53
		%	65	15	20			
		E	10.0	4.4	5.6			
Cycling animals	20	O	8	6	6	0.54	0.50	0.50
		%	40	30	30			
		E	10.0	5.0	5.0			

O = Observed frequency

E = Expected frequency

A = Slow moving

B = Fast moving

**TABLE 2 Distribution of Albumin Variants in Serum of Various Reproductive Conditions in Crossbred Cattle**

Reproductive status	No. of observations	Phenotypic frequencies			X <sup>2</sup>	Gene frequencies	
			AB	A		A	B
Prepuberal heifers	20	O	12	6	2	0.60	0.40
		%	60	30	10		
		E	9.6	7.2	3.2		
Anestrus animals	20	O	10	1	9	0.30	0.70
		%	50	5	45		
		E	8.4	1.8	9.8		
Cycling animals	20	O	14	4	2	0.55	0.45
		%	70	20	10		
		E	9.9	6.05	4.05		

O = Observed frequency

E = Expected frequency

A = Fast moving

B = Slow moving

incidence of allele B (0.47) in anestrus and allele A (0.30) in prepuberal heifers was observed. Absence of Hb A type in homozygus form was found in prepuberal heifers. Perhaps this represents non-diffusion of gene A in its crosses. In all the three groups higher frequencies of heterozygotes (AB) were observed. The gene frequencies in prepuberal animals appeared differently from anestrus and cycling animals.

Similarly three albumin type AB, AA

and BB were observed in this study as reported by Harpreet Singh (1981) and Nandakumaran *et al.* (1982). The frequencies of Alb A and Alb B genes were recorded as 0.60 and 0.40 in prepuberal, 0.30 and 0.70 in anestrus and 0.55 and 0.45 in cycling animals as shown in Table 2. There was no significant difference in gene frequencies between groups. However, in anestrus animals low incidence of Alb A allele (0.30) and higher incidence of Alb B allele (0.70)



was noticed. In all the three groups higher incidence of heterozygotes (AB) was observed. Since limited studies were made with few samples, further detailed

studies are necessary to throw more light and confirm the present findings on haemoglobin and albumin polymorphism in crossbred cattle.

#### REFERENCES

- Balakrishnan, C.R. and P.G. Nair. 1966. Haemoglobin polymorphism in Indian Cattle. *Indian J. Genetics and Plant Breeding*. 26A (Suppl. Synup. No.) 374-385.
- Harpreet Singh. 1981. Studies on Albumin and Amylase polymorphism in Kumaoni-Hill cattle. *Indian Vet. J.* 50: 104-106.
- and N.D. Khanna. 1971. Studies on haemoglobin polymorphism in Haryana and Haryana crossbred cattle. *Indian J. Anim. Sci.* 41: 6-8.
- , Satish Kumar and P.N. Bhat. 1983. Genotypic plasticity of Friesian herds in India. *Indian J. Anim. Sci.* 53(12): 1287-1291.
- Jairam, B.T. and P.G. Nair. 1983. Genetic polymorphism of milk proteins and economic characters in dairy animals. *Indian J. Anim. Sci.* 53(1): 1-8.
- Khanna, N.D. and H. Singh. 1972. Serum albumin polymorphism in four Indian breeds. A note. *Indian J. Anim. Sci.* 42(7): 470-471.
- Krishna Singh, B. and P.G. Nair. 1981. Genetic studies on some breeds of cattle. use of genetic markers for differentiating breeds. *Indian Vet. J.* 58: 42-46.
- Nandakumaran, B., S.N. Tandon and N.D. Khanna. 1982. Genetic heterozygosity and genetic distances between four cross-bred population of cattle employing blood protein polymorphism system. *Indian J. Dairy Sci.* 35: 13-17.
- Poulik, M.D. 1957. Starch gel electrophoresis in discontinuous buffer system. *Nature (London)*. 180: 1977-1979.



## Effect Of Forced Exercise On Seminal Characteristics And Sexual Behaviour Of Buffalo Bulls

J.S. MATHAROO, MEHAR SINGH and M.S. TIWANA

Department of Animal Science  
Punjab Agricultural University, Ludhiana 141 004

### ABSTRACT

Investigations were conducted on eight healthy Murrah buffalo bulls (5-13 years old) to study the effect of exercise on seminal characteristics and sexual behaviour of buffalo bulls. On an average exercise and non exercise groups donated 3.29 and 2.25ml of semen and the differences were statistically significant ( $P < 0.05$ ). But the effect of the exercise on semen consistency, mass activity, initial motility and sperm concentration was not significant. The study further revealed a significant ( $P < 0.01$ ) difference in reaction time of the two groups i.e. 247 and 94 seconds for exercise and non exercise groups respectively. On the whole, higher reaction time followed an increase in semen volume but similar consistency, sperm concentration/ml, mass activity and initial motility were obtained in exercise group as against the non-exercise group.

\* \* \*

Forced exercise has been considered to be an important pre-requisite for the management of breeding males. Observations made by Bartlett and Perry (1939) on bulls used for artificial insemination suggested that forced exercise was of advantage in improving the quality of semen. But the evidences, thereafter, indicated that the forced exercise in case of bulls kept in loose pens, did not have significant effect on semen quality and

quantity (Lepard, *et al.* 1941; Snyder and Ralston, 1955). No such studies seem to have been made in buffalo bulls. The present investigation was therefore, undertaken to study the effect of forced exercise on semen quantity, quality and sexual behaviour in buffalo bulls kept in loose pens.

### Materials and Methods

Eight healthy Murrah buffalo bulls of 5-13 years of age maintained at the Punjab Agricultural University, Dairy Farm were used for the present investigation. Bulls were housed in half walled pukka bull pens. The bulls were divided into two groups of four each keeping in view their seminal characteristics and age. Group-I was given forced exercise for half an hour daily with the help of manual bull exerciser whereas Group-II was kept as control. Semen was collected twice a week by artificial vagina technique. A total number of 48 collections were made. Sexual behaviour comprising of reaction time, libido index and service behaviour were noted at the time of semen collection. Semen was examined for physical characteristics such as volume, colour, consistency, mass activity, initial motility and sperm concentration. Total sperm production was calculated as volume x sperms/ml. The analysis of data was done according to Snedecor and Cochran (1967) after transferring



TABLE 1 Effect of forced exercise on semen characteristics of buffalo bull

Bull No.	Volume	Consistency (0-3)	Mass activity (0-4)	Sperm concentration millions/ml	Total sperm production $\times 10^6$	Initial motility (Percent)
Group-I (Exercise)						
952	$3.21 \pm 0.76$	$2.33 \pm 0.16$	$3.16 \pm 0.27$	$1365 \pm 118.5$	26461	$64.16 \pm 3.52$
586	$1.8 \pm 0.45$	$2.66 \pm 0.16$	$3.5 \pm 0.25$	$1275 \pm 522$	14558	$67.5 \pm 2.82$
558	$5.0 \pm 0.92$	$2.6 \pm 0.16$	$3.25 \pm 0.38$	$1480 \pm 173$	44750	$69.1 \pm 2.39$
156	$3.14 \pm 0.48$	$2.5 \pm 0.15$	$3.7 \pm 0.19$	$1375 \pm 73$	26172	$70.5 \pm 2.14$
Average	$3.29 \pm 0.40$	$2.54 \pm 0.39$	$3.39 \pm 0.69$	$1360 \pm 290$	111941*	$67.59 \pm 7.0$
Group-II (N-Exercise)						
962	$2.1 \pm 0.43$	$2.41 \pm 0.23$	$2.91 \pm 0.08$	$1308 \pm 200$	18654	$60.00 \pm 2.2$
771	$2.4 \pm 0.49$	$2.1 \pm 0.10$	$3.35 \pm 0.16$	$1196 \pm 67.6$	16464	$64.16 \pm 2.0$
589	$3.18 \pm 0.27$	$2.8 \pm 0.10$	$3.6 \pm 0.24$	$1601 \pm 64.3$	30074	$66.66 \pm 2.0$
888	$1.3 \pm 0.53$	$2.6 \pm 1.06$	$3.8 \pm 0.16$	$1538 \pm 109$	12253	$73.3 \pm 3.0$
Average	$2.25 \pm 0.22$	$2.52 \pm 0.08$	$3.37 \pm 0.12$	$1402 \pm 65.21$	77545*	$66.04 \pm 1.50$

\* Total sperm production during the experimental period.

the percent scores of motility into arc sine values.

### Results and Discussion

Findings of the experiment on semen characteristics in relation to forced exercise are presented in table 1.

#### Semen characteristics

On an average exercise and non-exercise group of buffalo bulls donated 3.29 and 2.25 ml semen, respectively. The analysis of variance revealed a significant ( $P < 0.05$ ) difference in semen volume of the two groups. Bartlett and Perry (1939) also observed an increase in semen volume as a result of exercise. The results obtained in the present investigation are also in agreement with Poroshin and Oboskalov (1976) who has reported 83, 34, 5, 20, 23, 12 and 17 per cent increase in ejaculate volume for bulls aged 3, 4, 5, 6, 7, 9 and 10 years respectively due to exercise. The increase in semen volume in the exercise group may also be attributed due to the higher

reaction time encountered in this group which might have led to more excitement leading to increased semen volume. However, Lepard, Shuart and Foster (1941) and Snyder and Ralston (1955) found that exercise had no significant effect on semen quantity. No effect of forced exercise on the semen consistency, mass activity initial motility and sperm concentration/ml was observed. This was in agreement with previous studies (Lepard *et al.* 1941 and Snyder and Halston, 1955) in cattle. Total sperm production was observed to be higher in case of exercise group as compared to non-exercise group, but the difference was found to be non-significant. An increase of 1.5 to 23.2 per cent sperm concentration due to exercise has also been reported by Poroshin and Oboskalov (1976).

#### Libido and Service behaviour

On an average reaction time of  $247 \pm 33.39$  and  $94 \pm 26.41$  seconds was observed in exercise and non exercise



**TABLE 2a Libido index and service behaviour of buffalo bulls in relation to forced exercise**

Character	Observation expressed in percentage	
	(Group-I) Exercise	(Group-II) Non exercise
Approach to the dummy.		
Very keen	9.0	66.6
keen	91.0	33.4
Chin rest	86.0	87.5
Election of penis with seath	99.0	91.7
Protruaction of penis out side the seath	22.7	29.1
Curling of lips	45.5	25.0
Salivation at the time of ejaculation	22.7	12.5
Licking of dummy	72.7	58.3
Shniffing of urine	13.1	Nil
Reaction time (Seconds)	247 ± 33.39	94 ± 26.41

**TABLE 2b Service behaviour of buffalo bulls at the time of ejaculation in relation to forced exercise**

Characteristics	Frequency of a character in percentage	
	Group-I (Exercise)	Group-II (Non exercise)
Approach to the dummy		
Eager	63.7	12.5
Very eager	36.3	87.5
Location of forelegs		
Between pin and hook bone	86.9	91.7
in front of hook bone	13.1	8.3
Copulatory thrust		
Strong	42.0	46.0
Medium	59.0	54.0
Lifting of hind legs from the ground		
Complete	41.0	50.0
Partial	59.0	50.0

troups, respectively. These differences were statistically significant ( $P < 0.01$ ).

The results on libido index and service behaviour are presented in table 2a and 2b. Approach to the dummy was observed to be very keen and keen in 9.0 and 91.0 per cent of observations in exercise group, whereas it was 66.6 and 33.4 per cent of the observations in non-exercise groups. It is obvious from the observations that

all the bulls were observed to be keen at the time of approaching dummy, which may be due to the reason that study was conducted on bulls trained for artificial collection of semen and more over during the favourable season of buffalo breeding. No difference was observed in respect of chin rest character in exercise and non exercise groups, table 2a. Similarly, there was not much



differences in exercise and non-exercise bulls for erection of penis with sheath and protrusion of penis out side the sheath at the time of first mount on the dummy, table 2a.

Curling of lips and salivation were observed to be 45.5 and 22.7 per cent in exercise groups, somewhat higher as compared with non-exercise group in which the values were 25.0 and 12.5 percent Licking of dummy was expressed in 72.7% and 58.3% cases in exercise and non-exercise groups respectively. Sniffing of urine and vocalization were shown by 13.1 per cent cases only in exercise group.

Approach to the dummy by the bulls to serve the vagina was observed to be eager in 63.7 and 12.5% cases in exercise and non exercise groups, respectively

but non exercise bulls were observed to be more eager to serve the vagina than the exercise bulls (Table 2b). Not much differences were noted as regard location of fore legs, between pin and hook bone in exercise and non exercise bulls, but the location of the fore legs in front of hook bone was obtained in 13.1% cases in exercise group where as it was only in 8.3% cases in non exercise group.

A strong copulatory thrust at the time of ejaculation was expressed in 42% in exercise and 46% cases in non exercise bulls. The copulatory thrust was observed to be medium in 59.0 and 54.0% cases in exercise and non exercise bulls, respectively. A slight difference in regard of lifting hind legs from the ground at the time of ejaculation was noticed in exercise group only. (Table 2b).

#### REFERENCES

- Bartlett, J.W., and E.J. Perry (1939). Lessons Learned from eighteen months experience with cooperative artificial breeding of dairy cattle in new Jersey. *Am. Soc. Animal. Prod. Proc.* 32: 243-245.
- Lepard O.L., C.E. Chuart and A. Foster. (1941). The effect of exercise on the amount and quality of dairy bulls' semen. *J. Dairy Sci.* 24: 509.
- Poroshin, V.P. and V.I. Obskalov (1976). The effect of exercising A.I. Bulls on semen quality and concentrate. *Anim. Breed. abstr.* 44 (7) No 3165.
- Snedecor, C.W. and W.G. Cochran (1967). *Statistical method* (6th Ed.) Oxford and IBH. IOWA state University Press, Ames, IOWA.
- Snyder, J.W., N.F. Ralston (1955). Effect of forced exercise on bull fertility. *J. Dairy Sci.* 38: 125-130.



## Non-Specific Genital Infections In Repeat Breeder Buffaloes

F.S. KAVANI, P.M. DHOLAKIA and S.B. KODAGALI

College of Veterinary Science and Animal Husbandry,  
Gujarat Agricultural University,  
Anand Campus, Anand — 388 001.

### ABSTRACT

A total of 69 repeat-breeder buffaloes were investigated for primary isolation of bacteria from cervical mucus samples. Out of them 57 (82.60%) buffaloes were found positive. The overall frequencies of different isolates in buffaloes were: gram negative bacilli 44.57 per cent, *Corynebacterium* 24.09 per cent, gram positive cocci 24.09 per cent and Anthracoids 7.22 per cent.

The antibiotic sensitivity test conducted with isolated organisms by paper disc sensitivity test, revealed a wide variation in the sensitivity pattern. The sensitivity test conducted in the composite cervical culture against the 8 antibacterial drugs viz., Penicillin, Streptomycin, Tetracycline, Furadentin, Neomycin, Ampicillin, Chloramphenicol and Gentamycin. The majority of mucus samples were found sensitive to Gentamycin (80.70%) and Chloramphenicol (63.16%). It could be seen that in repeat breeding animals non-visible genital infections (low-grade) played an important role for lowering the breeding efficiency.

The intra-uterine infusions of Dicrysticine, Mastalone-U, Phenivet and Gentavet were carried out after drug sensitivity test. The success of intra-uterine infusions in repeat breeder buffaloes was 53.84 per cent with Dicrysticine, 64.28 per cent with Mastalone-U,

73.33 per cent with Phenivet and 73.33 percent with Gentavet. The overall conception rate in repeated and control group of buffaloes were 66.67 and 27.27 per cent respectively. Chi-square analysis to know the differences in the conception rate between treated and control group was found to be highly significant ( $P < 0.01$ ).

\* \* \*

Intensive dairy cattle and buffalo breeding under marginal feeding and maintenance has resulted into a great stress on these animals from the point of reproduction and production. Besides, the presence of specific venereal infections or low grade non-specific infections introduced during natural or artificial breeding or at the time of previous breedings and calvings may be responsible for unfavourable uterine environment. Various studies have indicated that non-specific bacterial infections could be clinically visible or non-visible, palpable or non-palpable changes may be responsible for the hostile environment in the tubular genitalia for fertilization and subsequent survival of zygote. This is more economically important type of problem affecting the dairy breeds of Surti buffaloes. On clinical examination there is no visible or palpable evidence or pathology.

### Materials and Methods

A total of 69 repeat breeder buffaloes



and heifers were investigated for bacteriological examination. While 33 buffaloes were kept as control.

Mucus samples were collected aseptically by aspiration using sterilized glass pipette (10 ml Cap.), the pointed end of which was connected to a syringe with rubber junction, by recto-vaginal technique (Panagala *et al.*, 1978). After collection the samples were sent to laboratory and processed immediately.

Isolation work was done as per Cruickshank (1965). The isolates were subjected to in-vitro antibiotic sensitivity test as per the method recommended by Bauer *et al.*, (1966). Antibiotic discs supplied by Pasteur Biological Laboratories (India) were used. The isolates were tested for their sensitivity with 8 antibiotics viz., Penicillin, Streptomycin, Tetracycline, Furadentin, Neomycin, Ampicillin, Chloramphenicol and Gentamycin.

Out of 69 repeat breeder buffaloes, whose cervical mucus samples were investigated bacteriologically, 12 samples were found negative for presence of organisms. Remaining 57 animals were treated with antibiotic preparation as

per the drug sensitivity tests. In this group 33 repeat breeder buffaloes which were not tested for cultural examination and drug sensitivity test were kept as control.

## Results and Discussion

Under the present study genital microflora were isolated from 69 (15 heifers, 54 buffaloes) repeating buffaloes. Out of 15 samples in heifers, 4 samples (26.66%) did not reveal any bacteria and 8 (14.81%) samples from buffaloes were sterile. In all 11 (73.33%) heifers and 46 (85.18%) buffaloes had the presence of bacteria in the genital tract (Table 1.)

Repeat breeding animals showed the evidence of non-specific infections caused by varieties of micro-organisms. Perusal of literature indicated that non-specific bacterial infections either clinically diagnosable or not may be responsible for reduced fertility.

The results obtained presently, indicated that 73.33% heifers and 85.18% buffaloes harboured micro-organisms and these were in conformity with the observations made by Krishnamurthy *et al.*, (1974), and Verma and Tyagi (1974).

TABLE 1: Genital microflora isolated from repeat breeder buffaloes

	No. of animals	Microflora isolation		Positive bacterial isolation			Different bacterial organisms			
		+ve samples	-ve samples	Total No.	Single type	Mixed type	Gram negative	Coryne- bacterium bacilli	Anthra- coid	Gram positive cocci
Heifers	15	73.33 (11)	26.66 (4)	16	54.54 (6)	45.45 (5)	43.75 (7)	25.00 (4)	12.50 (2)	18.75 (3)
Buffaloes	54	85.18 (46)	14.81 (8)	67	65.21 (30)	34.78 (16)	44.77 (30)	23.88 (16)	5.97 (4)	25.37 (17)
Total	69	82.60 (57)	17.39 (12)	83	43.37 (36)	25.30 (21)	44.57 (37)	24.09 (20)	7.22 (6)	24.09 (20)

Figures in parenthesis indicate number of observation.



TABLE 2 Treatment of repeat breeder buffaloes with antibiotics and resulting pregnancies.

Drug used	No. of animals	Insemination		number Cycle III	Pregnancy per cent			Fertile oestrus interval (days)	Overall conception rate
		Cycle I	Cycle II		Cycle I	Cycle II	Cycle III		
Dicrysticin—S	13	13	10	8	23.07 (3)	15.38 (2)	15.38 (2)	32.57 ± 5.81	53.84 (7)
Mastalone—U	14	14	10	7	28.57 (4)	21.42 (3)	14.28 (2)	31.88 ± 6.25	64.28 (9)
Phenivet	15	15	9	5	37.50 (6)	26.66 (4)	7.14 (1)	27.54 ± 4.12	73.33 (11)
Gentavet	15	15	7	4	53.33 (8)	20.00 (3)	—	22.36 ± 2.61	73.33 (21)
Total	57	57	36	24	36.84 (21)	21.05 (12)	8.77 (5)	28.00 ± 2.27	66.67 (38)
(Treated group)									
Control group	33	33	31	29	6.06 (2)	6.06 (2)	15.15 (5)	47.66 ± 5.98	27.27 (9)

Figures in parenthesis indicate number of animals.

Besides, many other workers have also stressed that non-specific infection of uterus results in breeding difficulties in cattle (Jainudeen, 1965; Jerkovic *et al.*, 1971). The present findings do not support the findings of Hawak *et al.* (1958), Nunn (1970) and Hartigen *et al.* (1972) who found low occurrence of infection in the repeat breeders.

Under the present study, the genital microflora were invariably isolated from repeat breeder buffaloes. With the non-visible type of infection, there have been single and mixed type of isolations to the tune of 43.37% (36) & 25.30% (21) respectively.

#### Antibiotic Sensitivity:

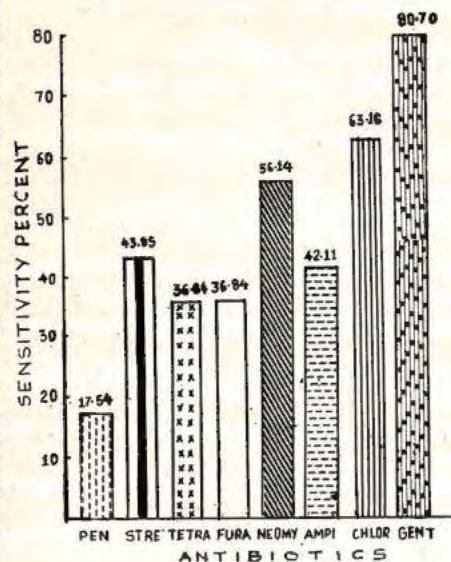
The sensitivity test of micro-organisms with antibacterial agents is felt to be of paramount importance, in effective check of various infections, because many

organisms, in the process of their multiplication in vivo, develop resistance to the antibiotics due to their indiscriminate usage. The information about the sensitivity test and to choose the appropriate antibiotic for treatment is meagre in literature. However, in the present study, primary isolation of organism along with their sensitivity test was conducted to find out a suitable drug for successful treatment for the repeaters. When the composite samples were tested with different antibiotics viz., Penicillin, Streptomycin, Tetracycline, Furadentin, Neomycin, Ampicillin, Chloramphenicol and Gentamycin isolates were found to be sensitive to the tune of 17.54, 43.86, 36.84, 36.84, 56.14, 42.11, 63.16 and 80.70 per cent in buffaloes respectively. (Fig.: 1).

It was observed that the sensitivity was limited to higher antibiotics range only.



**Fig:1 ANTIBIOTIC SENSITIVITY IN REPEAT BREEDER BUFFALOES.**



This might be perhaps due to undue usage of lower range antibiotics for various ailments for a considerable period. The present findings are in agreement with those of Gragg (1964) and Nunn (1970). While they were not in conformity with the observations of Polakova and Labduska (1962). Thus, it may be concluded that the choice of drug for treatment of repeat breeders should be so

made which may be effective even in lower concentration.

#### *Antibiotic Therapy:*

In the present study, microflora in the repeat breeder buffaloes was isolated from cervical mucus samples and the specific antibiotics were used for the treatment. Out of 57 buffaloes treated with Dicrysticine, Mastalone-U, Phenivet, and Gentavet for bacterial infection, 38 (67.67%) conceived. In 33 buffaloes kept as control 9 (27.27%) conceived. The conception rate differed highly significantly between treated and control group ( $p < 0.01$ ) (Table — 2).

General clinical practitioners have employed intra-uterine infusion of antibiotics with variable results in increasing fertility in repeat breeders. However, significant differences could not be seen between treated and untreated control (Paufler, 1969; Buckstrom, 1970). On the contrary some reports of good success have been claimed with Penicillin Plus Streptomycin in a limited trial, having suitable control (Luktuke *et al.*, 1958 and Khan and Luktuke, 1967). The present findings suggest that antibiotics should not be used arbitrarily for intra-uterine therapy. However, usage of specific antibiotic resulted into encouraging pregnancy rates in repeat breeder buffaloes.



## REFERENCES

- Backstrom, G. (1970) Lugol treatment of repeat breeder cows. *Svensk Vet. Tidn.*, **22**: 376-378 (*Vet. Bull.*, **40**: 5085).
- Bauer, A.W., Kirby, W.N.M., Sherris, J.C. and Turck, M.D. (1966) Antibiotic susceptibility testing a standard single disc method. *Amer. J. Clin. Path.*, **45**: 493-496.
- Cruickshank, R. (1965) *Medical Microbiology*. 11th Ed. The English Language Book Society and E. & S. Livingston Ltd., Great Britain.
- Gragg, J.E. (1964). Bovine infertility — bacterial flora and therapy. *South Vet.*, No. **338**: 57-60.
- Hawk, H.W., Kiddy, C.A., Wilson, J.B., Esposito, M. and Winter, A.J. (1958) Bacteriological studies of uteri of clinically normal cows of low fertility. *J. Dairy Sci.*, **41**: 120-128.
- Hartigan, P.J., Murphy, J.A., Nunn, W.R. and Griffin, J.F.T. (1972). An investigation into the causes of reproductive failure in dairy cows. *Irish Vet. J.*, **26**: 245-247. (*Vet. Bull.*, **45**: 3038).
- Jainudeen, M.R. (1965) The "repeat breeder" cow — a review. *Ceylon Vet. J.*, **13**: 10.
- Jerkovic, W., Zakula, S. and Perkuncin, R. (1971). Effect of the microflora of the uterus on the fertility of cows. *Veterinaraki Glashik*. **75**: 819 (*Vet. Bull.*, **42**: 2911).
- Krishna-Murthy, G.V.K., Nanjiah, R.D. and Murthy, B.S.K. (1974). Bacterial flora of cervical mucus in repeat breeding bovines. *Indian Vet. J.*, **51**: 264-268.
- Khan, C.K.A. and Luktuke, S.N. (1967) Studies on the incidence of anoestrus and repeat breeding in Haryana cows. *Indian Vet. J.*, **44**: 679.
- Luktuke, S.N. Nayudu, P.R.V. and Bhattacharya, P. (1958) Preliminary investigations on intra-uterine treatment with antibiotics in repeat breeders. *Indian J. Vet. Sci.*, **28**: 93-99.
- Nunn, W.R. (1970) Observations on bacteriology of genital tracts of infertile cows in Ireland. *Irish Vet. J.*, **28**: 181-188 (*Vet. Bull.*, **41**: 1426).
- Pauffer, S. (1969) Intra-uterine application of By Kocillin-M (Neomycin+Penicillin) suspension at the time of insemination. *Trieraztli Uasch.*, **24**: 588-591.
- Polakova, M. and Lebduska, J. (1962) The in-vitro action of Riva-cillin (Penicillin — Rivano) on micro-organisms in bovine lochia. *Vet. Prac. Ustavu. Vet. Brno.*, **2**: 157-170 (c.f. *Vet. Bull.*, **35**: 393).
- Panagala, V.S., Fish, N.A. and Barnum, D.A. (1978). Microflora of the cervico-vaginal mucus of repeat breeder cows. *Canadian Vet. J.*, **10**: 83-89.
- Verma, S.K. and Tyagi, R.P.S. (1974). A note on the isolation of micro-organisms from the uteri of repeat breeder cows. *Indian Vet. J.*, **51**: 305-307.



## Mycoflora Of The Genital Tract Of Surti Buffaloes

N M SHAH and P M DHOLAKIA

Department of Bacteriology, College of Veterinary Science & Animal Husbandry,  
Gujarat Agricultural University, Anand Campus, Anand.

### ABSTRACT

The present investigation reports on the isolation of fungal organisms from the cervicovaginal mucus samples of 100 Surti buffaloes under different reproductive status viz. normal animals, animals with endometritis and anoestrus animals. Fungi were isolated from 47% of animals irrespective of their reproductive status. The fungi isolated include *Mucor* sp., *Aspergillus* sp., *Fusarium* sp., *Microsporon* sp. and *Geotrichum* sp. *Aspergillus* sp. (23.8%) predominated in endometritis cases.

\* \* \*

Indiscriminate use of broad spectrum antibiotics and corticosteroids has probably led to an overall increase in the incidence of fungal infections. Fungal infections of the bovine genital tract resulting into infertility have been described by Jungherr (1935) and Saxena and Pathak (1972). Fungi have been isolated from cervical mucus of infertile as well as healthy cows by Rollinson and Haq (1948), Ainsworth and Austwick (1955) and Wawrzkievics and Galeza (1972). In the present study attempts were made to isolate and identify fungi from cervicovaginal mucus of Surti buffaloes under different reproductive status.

### Materials and Methods

The cervico vaginal mucus samples from 100 Surti buffaloes, brought for gynaecological check up to the A.I.

Centre of this College were examined. Animals chosen for study included those which were: (1) in oestrus and having normal discharge, (2) having mucopurulent discharge (cases of mild endometritis) (3) in anoestrus.

The samples were collected aseptically by aspiration using sterilized glass pipette (10 ml. cap.), the pointed end of which was connected to a syringe with rubber junction by rectovaginal technique (Pattabhiraman *et al.*, 1967; Panangala *et al.*, 1978). In anoestrous animals, sterile saline was infused into the genital tract and aspirated back. After collection, the samples were brought to Bacteriology laboratory and processed immediately.

Isolation of fungi was carried out as per Cruickshank *et al.* (1975) using Sabouraud's dextrose agar medium and cultures were characterized as per Sigurd Funder (1961).

### Results and Discussion

Out of 100 samples of cervicovaginal mucus examined, 47 samples were found to be positive for fungal organisms. All groups of animals yielded almost similar percentage of isolates irrespective of their reproductive status. The fungi isolated were *Mucor* sp., *Aspergillus* sp., *Fusarium* sp., *Microsporon* sp. and *Geotrichum* sp. (Table — 1).

Jerkovick *et al.* (1971) found *Aspergillus* sp. to be most common in endometritis cases which confirms the findings of



TABLE 1. Fungal isolates obtained from cervicovaginal mucus of Surti buffaloes.

Sr. No.	Name of Fungi	Normal fertile animals in oestrus (36)		Animals having endometritis (42)		Animals in anestrus (22)	
		No. of isolates	%	No. of isolates	%	No. of isolates	%
1.	<i>Mucor</i> sp.	11	30.55	6	14.26	8	36.36
2.	<i>Aspergillus</i> sp.	4	11.11	10	23.80	2	9.09
3.	<i>Fusarium</i> sp.	2	5.55	1	2.38	0	00.00
4.	<i>Microsporon</i> sp.	0	00.00	2	4.76	0	00.00
5.	<i>Geotricum</i> sp.	0	00.00	1	2.38	0	00.00
Total		17	47.22	20	47.61	10	45.45

present study. Lecklark *et al.* (1972) found *Penicillium* sp. more frequently in infertile animals, however in the present study, *Penicillium* sp. was not obtained. Sinha *et al.* (1980) isolated fungi in 33% of 146 cervical mucus samples from infertile cows and buffaloes. They found *A. fumigatus*, *A. niger*, *Absidia* sp. and *Rhizopus* sp. as predominant species while the other isolates were *Curvularia* sp., *Trichosporon* sp. and *Candida* sp.

It is likely that subsequent to bacterial infection and resultant lowering of uterine resistance, fungi might be playing

the roles as secondary invader or it may be predisposing cause for setting up of bacterial infection. Though as many as 47% of samples yielded fungi, more work is required to be done for assessing the pathogenic role of fungi in infertility conditions among animals particularly as fungi are ubiquitous in nature.

#### Acknowledgement

We are grateful to the Principal for the facilities provided and to the Department of Gynaecology for the help in collection of samples.

#### REFERENCES

- Ainsworth, G.C. and Auswick, P.K.C. (1955). A survey of animal mycosis in Britain: General aspects. *Vet. Rec.* **67**: 88-97.
- Cruickshank, R., Duguid, J.P., Marmoin, B.P. and Swain, R.H.A. (1975). *Medical Microbiology. The practice of Medical Microbiology.* 12th Ed. Churchill livingstone, Edinburgh.
- Jerkovic, U., Zakula, S. and Perkucin, R. (1971). Effect of the microflora of the uterus on the fertility of the cows. *Veterinarski Glasnik* **25**: 819-823 (*Vet. Bull.* **42**: 2911).
- Jungherr, E. (1935). Mycotic affections of the bovine reproductive system. *J. Am. Vet. med. Assoc.* **86**: 64-75.
- Leclerk, A., Gusy, P., Malo, R., Lamothe, P. and Renaud, G. (1972). Relationship between reproduction and the presence of microorganisms in the external opening of the cervix in the cow. *Canad. Vet. J.* **13**: 234-239.
- Panangala, V.S., Fish, N.A. and Barnum, D.A. (1978). Microflora of the cervicovaginal mucus of repeat breeder cows. *Canad. Vet. J.* **19**: 83-89.
- Pattabhiraman, S.R., Venkataswamy, V. and Thangaraj, T.M. (1967). Physicochemical properties of oestral mucus of cows. *Indian Vet. J.* **44**: 413-417.
- Rollinson, D.H.L. and Haq, I. (1948). Mycotic infection of the prepuce of the bull. *Vet. Rec.* **60**: 69-70.
- Saxena, S.C. and Pathak, R.C. (1972). *Agri. Uni. J. of Res.* **21**: 21.
- Sigurd Funder (1961). *Practical Mycology Manual for identification of fungi.* 2nd Ed. A.W. Broggers Boltrykkeri A/S, Oslo-Norway.
- Sinha, B.K., Sharma, T.S. and Mehrotra, V.K. (1980). Fungi isolated from the genital tract of infertile cows and buffaloes in India. *Vet. Rec.* **106**: 177-178.
- Wawrkievicz, K. and Galeza, J. (1972). Fungal flora of the genital tract of beef cows and the semen of bulls. *Medycyna Weterynaryjna* **28**: 424-426 cited by Sinha *et al.* (1980).



## Studies On Mycotic Abortion Caused By *Aspergillus Fumigatus* Fresenius

M. PAL, B.S. MEHROTRA and S.M. DAHIYA

Department of Veterinary Public Health, College of Veterinary Science, G.A.U.  
Anand-388 001, Gujarat, India

### ABSTRACT

Role of *Aspergillus fumigatus* in the etiology of abortions was studied in 31 buffaloes and 22 cows. Of the 53 animals investigated, mycotic abortion due to *A. fumigatus* could be recorded in 2 buffaloes and 1 cow giving a prevalence rate of 5.1 per cent. Abortions in all the animals occurred at 6-7 months of gestation period. Diagnosis was based on the isolation of *A. fumigatus* from the placental tissues, stomach contents, skin scrapings and lungs of the aborted foetuses, detection of 2-4  $\mu$  thick septate, dichotomously branched fungal hyphae compatible with *Aspergillus* under direct microscopy by potassium hydroxide technique and demonstration of *A. fumigatus* antibodies in the sera of one buffalo and one cow by immunodiffusion method. The isolates of *A. fumigatus* recovered from clinical and environmental samples were found pathogenic to male Swiss albino mice when inoculated intravenously into caudal vein. The epidemiological findings revealed the presence of the fungus in the saprobic environment of the milch animals.

\* \* \*

Abortions in dairy animals are important both from economic as well as public health point of view. A number of infectious agents such as viruses, bacteria, fungi, protozoa, chlamydia, mycoplasma and rickettsia are incriminated in the etiology of abortions in animals (Blood

*et al.*, 1979). In recent years due to reduction in the incidence of bacterial abortions, mycotic abortions are receiving more interest and importance (Ainsworth and Austwick, 1955; Hillman, 1969; Ainsworth and Austwick, 1973).

Mycotic abortion is a sporadic infection of genital tract of animals particularly of cows (Ainsworth and Austwick, 1973). The incidence of abortion varies from locality to locality and is probably associated with the concentration of fungi in the saprobic materials and surroundings of the milch animals (Hillman, 1969; Kremlev, 1971; Carter *et al.*, 1973; Venev, 1974; Siddique *et al.*, 1976). Although a number of fungi and actinomycetes are associated with the etiology of abortions in animals, *Aspergillus fumigatus* is considered as the chief organism responsible for a substantial number of abortions (Hugh-Jones and Austwick, 1967; Carter *et al.*, 1973; Konig and Nicolet, 1974; Jerrett, *et al.*, (1984) Mycotic abortion due to *A. fumigatus* has been recorded in cows, sheep, goat and buffaloes (Adamesteanu and Baba, 1973; Ainsworth and Austwick, 1973; Osman and Gabel, 1978). There appears to be little information on the clinico-epidemiology and mycoserology of mycotic abortions in milch animals. The present paper describes the clinical, mycological, serological and epidemiological observations in the naturally





FIG. 1. Six month old foetus aborted from an 8 year-old Murrah she buffalo due to natural infection with *Aspergillus fumigatus*.

occurring abortions due to *A. fumigatus* in cows and buffaloes.

### Materials and Methods

The study was conducted on 58 dairy animals which comprised of 31 buffaloes, 22 cows and 5 goats. A total of 91 clinical samples which included 27 foetal stomach contents (15 buffaloes, 9 cows, 3 goats), 24 foetal skin scrapings (12 buffaloes, 8 cows, 4 goats), 21 foetal lungs (11 buffaloes, 9 cows, 1 goat) and 19 placentas (10 buffaloes, 6 cows, 3 goats) were collected aseptically to process for mycological investigation. All these organs were examined for gross lesions, if any. A portion of the material was treated with 10 per cent potassium hydroxide for 10 minutes for direct microscopy. Each specimen was liberally inoculated on to slants of Sabouraud's dextrose agar (Emmons *et al.*, 1977) with chloramphenicol (0.05 mg/ml) and incubated at 37°C for one week. The blood was collected by jugular vein from a positive cow and a buffalo for *A. fumigatus* precipitins by immunodiffusion



FIG. 2. Four day old primary culture of *Aspergillus fumigatus* from the stomach contents of a six-month old aborted foetus on Sabouraud's dextrose agar with chloramphenicol after 3 days of incubation at 37°C.

technique. Environmental prevalence of *A. fumigatus* was studied in 12 samples of fodder, 12 animal excreta and 12 soil (Pal and Mehrotra, 1982). In order to detect the presence of *A. fumigatus* in the air, 12 petri plates of Rose Bengal agar were exposed for 3-4 minutes in the inside environment of animal sheds. The morphology of the fungus was studied in lactophenol cotton blue mounts as per the description given by Raper and Fennell (1965). The pathogenicity test was conducted with 8 isolates of *A. fumigatus* in male Swiss albino mice (Pal, 1983).

### Results

Of the 58 animals investigated, mycotic abortion could be diagnosed in 3 animals giving a prevalence of 5.1 per cent. The positive animals were 7 and 8 years old she-buffaloes and 8 year old cow (Table 1). The isolation of *Aspergillus fumigatus* was successful from 3 stomach contents, 3 skin scrapings, 2 lungs of the



**TABLE 1: Association of *Aspergillus fumigatus* with abortion in dairy animals.**

Species of animal examined	Number of cases screened	Number found positive for <i>A. fumigatus</i>
Buffalo	31	2 (6.4)*
Cow	22	1 (4.5)
Goat	5	0 (0.0)
Total	58	3 (5.1)

\* Figures in parenthesis indicate percentage

**TABLE 2: Isolation of *Aspergillus fumigatus* from various clinical materials of aborted foetuses and placentas.**

Types of clinical specimen investigated	Number of samples examined	Animals yielding <i>A. fumigatus</i>		
		Buffalo	Cow	Goat
Stomach contents	27	2	1	0
Skin scrapings	24	2	1	0
Lungs	21	1	1	0
Placentas	19	2	1	0
Total	91	7	4	0

foetus besides 3 placentas (Table 2). No isolation could be achieved from any of the clinical specimens of goats. The details of the clinical, mycological and serological observations are summarised in Table 3. Abortions in all the 3 animals occurred during 6-7 months of pregnancy. The placentas in most of the cases were found thickened, necrotic, haemorrhagic and oedematous. The aborted foetus from a eight-year-old Murrah she-buffalo showed discrete, raised areas on the skin of head and back (Fig. 1). *Aspergillus fumigatus* was isolated from the stomach contents of a 6-month-old foetus aborted from a 8-year-old Murrah buffalo (Fig. 2). Branched, septate hyphae, 2-4  $\mu$  thick compatible with *Aspergillus* could be detected in the 2 skin scrapings and 3 placental tissues by potassium hydroxide

techniques. Precipitins against *A. fumigatus* was demonstrated in two sera samples obtained from a buffalo and a cow. The fungus was highly prevalent in the environment of all the 3 dairy animal (Table 4). All the 8 isolates of *A. fumigatus* proved to be pathogenic to Swiss albino mice as evidenced by the death of the laboratory animals and also by reisolation of the pathogen from most of the visceral organs.

### Discussion

The results of this study suggested that *Aspergillus fumigatus* may be considered as an important causative agent in the etiology of infectious abortion. This is evident that 3 animals out of 58 were positive for mycotic abortions giving a incidence rate of 5.1 per cent. All the



**TABLE 3: Clinical, mycological and serological findings in mycotic abortion of animals due to *Aspergillus fumigatus*.**

Animal species	Age of animal	Stage of abortion	Lesion on foetal skin	Gross lesions on placenta	Clinical signs	Isolation of <i>A. fumigatus</i>				Prevalence of <i>A. fumigatus</i> antibodies in sera
						Lung	Stomach contents	Skin scrapings	Placenta	
1. Buffalo	8yrs	6 month	Discrete, raised areas on skin of head and neck	Thickened, necrotic and haemorrhagic	Rectal temp. 40.4°C, reduced appetite, retention of placenta	+	+	+	+	+
2. Cow	8yrs	6 month	Circular, ringworm type lesions on the head region	Haemorrhagic, oedematous supplicative, necrotic and thickened	Rectal temp. 40.6°C, vaginal discharge, anorexia, retention of placenta	+	+	+	+	+
3. Buffalo	7yrs	7 month	No skin lesions observed	Oedematous, thickened necrotic	Rectal temp. 39.8°C, reduced appetite, vaginal discharge	-	+	-	+	sera was not tested

three abortions (2 in buffalo and 1 cow) occurred during six and seventh month of pregnancy. This observation is similar with Adamesteanu and Baba (1973) who reported mycotic abortion in cows due to *A. fumigatus* in late gestation.

Although macroscopic lesions on foetus and placenta are not very characteristic to warrant a diagnosis of mycotic abortion, a tentative diagnosis can be made by observing central necrosis, leather-like consistency, thickening and haemorrhages on the cotyledons and ringworm type circular lesions on the skin of head and neck of the foetus

(Ainsworth and Austwick, 1973). We have observed similar gross lesions on the foetal skin as well as cotyledons of one buffalo and a cow. Further, 2-4  $\mu$  thick, dichomotously branched, septate hyphae could be demonstrated in the placental tissues and skin scrapings of one cow and a buffalo when examined by potassium hydroxide techniques.

The fungi have been frequently recovered from the placenta, the amniotic fluid, foetal stomach contents and foetal skin lesions (Ainsworth and Austwick, 1973). Very rarely isolations of the fungi have been made from the other organs



**TABLE 4: Prevalence of *Aspergillus fumigatus* in the environment of animal sheds of animal positive for mycotic abortion.**

Sr. No.	Species of animal	Age of animal	Isolation of <i>A. fumigatus</i> from the saprobic materials			
			Fodder	Animal excreta:	Soil	Air
1.	Buffalo	8 yrs	3/4	1/4	2/4	3/4
2	Cow	8 yrs	2/4	2/4	3/4	3/4
3.	Buffalo	7 yrs	1/4	1/4	2/4	2/4
Total			6/12	4/12	7/12	7/12

of the foetus such as the lungs and liver. However, Austwick and Venn (1961) have found that the best isolations can be achieved from the stomach contents of the foetus on mycological agar containing antibiotics. In this study *A. fumigatus* was isolated in pure and heavy growth on Sabouraud's dextrose agar with chloramphenicol at 37°C from the foetal stomach contents, skin lesions and placental tissues besides lungs of the foetus. It is pertinent to mention in this context that the isolation of the pathogen from within 24 hours from the placental tissues on mycological media may be considered significant provided the organism isolated showed the similar morphology in the clinical specimen under direct microscopy (Ainsworth and Austwick, 1973). Interestingly both the criteria were confirmed in the present investigation.

The sera from the two aborted dams (cow and buffalo) when tested by immunodiffusion technique on the method of Ouchterlony (1967) revealed the presence of precipitins against *Aspergillus fumigatus*. However, the significance of agar gel precipitation test in the sero diagnosis of mycotic abortions due to *A. fumigatus* has been discussed by Corbel (1972) and Uppal *et al.* (1978).

The pathogenesis of mycotic abortion due to *Aspergillus fumigatus* is still controversial. Most of the investigators believe that the primary infection occurs in the lungs as the result of the inhalation of the fungus from the mouldy fodder (Cordes *et al.*, 1964; Korotochencko *et al.*, 1974; Venev, 1974) and the infection may spread to the genital organs by means of blood stream. However, a recent experimental study made by Kremlev (1977) in cows to elucidate the role of *A. fumigatus* and other fungi in the pathogenesis of mycotic abortion reported that possibly the fungi and their toxins penetrated the uterus and foetus by haematogenous route. Likewise Wenev (1975) has stated that cows in heat if inseminated with mould contaminated semen may develop sexual cycle disorders. In order to substantiate any of the above views, a detailed systematic study tracing the path of the organism would be rewarding.

#### Acknowledgement

We are grateful to Dr. I. D. Sharma and Dr. H. S. Jain, Animal Husbandry Department, Delhi for their kind help and cooperation in the collection of clinical material and detailed history of the cases. Technical help of Mr. Ram Prakash is also thankfully acknowledged.



## REFERENCES

- Adamesteanu, C. and Baba, A.I. (1973). Some observations on mycotic abortion in cows. *Revista de Zootechnie si Medi. Vet.* **23**: 65-68.
- Ainsworth, G.C. and Austwick, P.K.C. (1955). A survey of animal mycoses in Britain: General aspects. *Vet. Rec.* **67**: 88-97.
- Ainsworth, G.C. and Austwick, P.K.C. (1973). *Fungal Diseases of Animals*. Commonwealth Agricultural Bureaux, Farnham Royal Slough, England.
- Ainsworth, G.C. and Venn, J.A.J. (1961). Mycotic abortion in England and Wales 1954-1960. *Proc. IVth International Cong. Animal Reproduction*. The Hague pp 670-675.
- Blood, D.C., Henderson, J.A. and Radostits, O.M. (1979). *Veterinary Medicine. The English Language Book Society and Bailliere*, Tindall, London.
- Carter, M.E., Cordes, D.O., de Menna, M.E. and Hunter, R. (1973). Fungi isolated from bovine mycotic abortion pneumonia with special reference to *Mortierella wolfii*. *Research Vet. Sci.* **14**: 201-206.
- Corbel, M.J. (1972). The serological response to *Aspergillus* antigens in bovine mycotic abortion. *Br. Vet. J.* **128**: ix-xiii-ixxv.
- Cordes, D.O., Dodd D.C. and O'Hara, P.J. (1964). Bovine mycotic abortion. *N.Z. Vet. J.* **12**: 95-100.
- Emmons, C.W., Binford, C.H., Utz, J.P. and Kwon-Chung, K.J. (1977). *Medical Mycology*. Lea and Febiger Philadelphia, U.S.A.
- Hillman, R.B. (1969). Bovine mycotic placentitis in New York State. *Cornell Vet.* **59**: 269-288.
- Hugh-Jones, M.E. and Austwick, P.K.C. (1955). Epidemiological studies in bovine mycotic abortion. I The effect of climate on incidence. *Vet. Rec.* **81**: 273-276.
- Jerrett, I.V., McOrist, S., Waddington, J., Browning, J.W., Malecki, J.C. and McCausland, I.P. (1984). Diagnostic studies of the fetus, placenta and maternal blood from 265 bovine abortions. *Cornell Vet.* **74**: 8-20.
- Konig, H. and Nicolet, J. (1974). Pathological and mycological studies on bovine placentae after abortion. *Berliner and Munch. Tier. Woch.* **87**: 56.
- Kremlev, E.P. (1971). Mycotic abortion in cows. *Vet. Moscow* **47**: 89-91.
- Kremlev, E.P. (1977). Pathogenesis of mycotic abortion in cows. *Vet. Moscow, USSR* **7**: 71-74.
- Korotchenko, N.V., Gavdye, O.V. and Saposhinsky, Y.I. (1974). Mycotic abortion in ewes. *Problemy Vet. Sanitarii* **49**: 62-65.
- Osman, A.M. and Gabel, A.M. (1978). Mycotic findings in female genitalia of certain Egyptian ruminants affected with various reproductive disorders. *Mykosen* **21**: 53-58.
- Ouchterlony, O. (1967). In: *Handbook of Experimental Immunology* edited by D.M. Weir. Blackwell Scientific Publications, England.
- Pal, M. (1983). Keratomycosis in a buffalo calf (*Bubalus bubalis*) caused by *Aspergillus fumigatus*. *Vet. Record* **113**: 67.
- Pal, M. and Mehrotra, B.S. (1982). Studies on the efficacy of sunflower agar from the isolation and identification of *Cryptococcus neoformans*. *Arogya-J. Hlth. Sci.* **8**: 74-79.
- Raper, K.B. and Fennell, D.I. (1965). *The Genus Aspergillus*. The Williams and Wilkins Co. Baltimore, U.S.A.
- Siddique, I.H., Grant, G.H., Blackwell, J.G. and McKenzie, B.E. (1976). Organisms associated with abortion and reproductive problems in cattle. *Mod. Vet. Pract.* **57**: 809-811.
- Uppal P.K., Thakur, K.K. and Oberoi, M.S. (1978). Sero-diagnosis of mycotic abortion in bovine caused by *Aspergillus fumigatus*. *Aspects All & App. Imm.* **XI**: 121-125.
- Venev, S. (1974). Investigation on abortion in cows due to *Aspergillus fumigatus*. *Fresenius Vet. Med. Nauki* **11**: 67-71.
- Venev, S.A. (1975). Routes of infection of cows with *Aspergillus fumigatus* with reference to abortion and pathogenicity of the casual agent. In *20th World Vet. Congress: Summaries Vol. 2*: 269.



## Neoplasms In The Genital System of Cows

M.K. BHOWMIK

Department of Veterinary Pathology,  
Bidhan Chandra Krishi Viswavidyalaya,  
Krishi Viswavidyalaya — 741 252,  
West Bengal

### ABSTRACT

As the genital neoplasms are one of the important causes of infertility and sterility in bovines, the present study is of special significance. Out of 10,000 genitalia of cows examined in the Calcutta Slaughter Houses, only 28 (0.28%) cases of neoplastic growths were observed. Of these, 2 (0.02%) fibropapillomas and 6 (0.06%) squamous cell carcinomas in the vulva, 3 (0.03%) leiomyomas in uterus and vagina, 1 (0.01%) adenoma in uterus, 2 (0.02%) adenocarcinomas in uterus and cervix, 2 (0.02%) lymphosarcomas in uterus, 2 (0.02%) fibromas in cervix and vagina, 8 (0.08%) dermoid cysts and 2 (0.02%) granulosa cell tumour in the ovary were observed, during pathological investigations.

\* \* \*

Neoplasms in the genital organs of cows are grave concern due to reproductive failure in the form of infertility or sterility and mortality. The reproductive failure is caused by destruction of normal architecture and narrowing or obstructing the lumina of tracts which are concerned for the secretion and transport of ovum.

The neoplastic growths in the genitalia are rather difficult to detect clinically unless they are well pronounced. Literature on the subject is scanty, based only on case records and thus it is proposed to

describe below the prevalence and pathology of neoplasms of the genitalia of cows.

### Materials and Methods

In the course of examination of 10,000 genital organs of cows slaughtered for beef at Calcutta slaughter houses, 28 genitalia showing abnormal growths were collected during January, 1982 to December, 1984. The respective organs showing growths were preserved in 10% neutral formol-saline, processed through conventional techniques, sectioned at 4-5  $\mu$  in thickness and stained with haematoxylin (Lillie Mayer's) and eosin. Some of these were also stained by Masson's trichrome and Van Gieson's picrofuchsin for connective tissue.

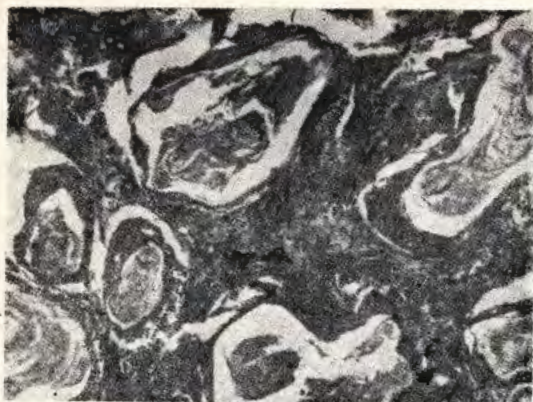
### Results and Discussion

Out of a total of 10,000 genital organs examined, 28 (0.28%) were found to have neoplastic conditions.

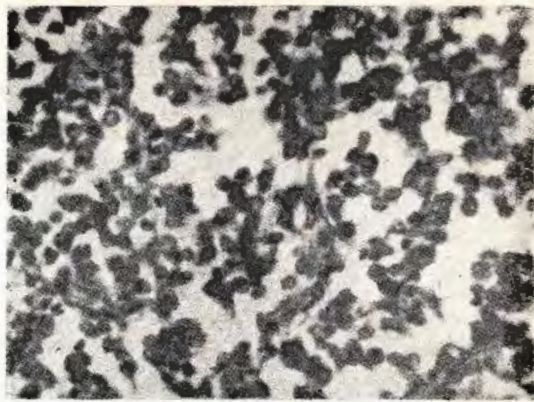
*Fibropapilloma:* It was observed in 2 (0.02%) cases involving the skin of the vulva. Jones and Hunt (1983) also opine that it is a rare tumour of cows.

Pathologically, it was cauliflower-like in appearance, grayish-white in colour, variable in size and projecting on the surface. Histopathological lesions consisted of matured connective tissue extremely covered with stratified squamous epithelium of limited thickness.

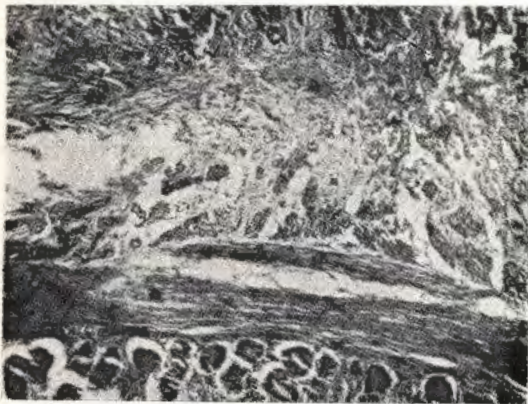




**Fig. 1:** Microphotograph showing oval masses of Keratinised epithelial cells arranged concentrically, known as cell nest. H & E X 100.



**Fig. 3:** Microphotograph showing massive proliferation of lymphocytes with hyperchromatism and distinct mitotic figures. H & E X 400.



**Fig. 2:** Microphotograph showing spindle-shaped muscle fibers, separated by connective tissue. H & E X 80.



**Fig. 4:** Microphotograph showing multilayered neoplastic cells arranged both solid and papillomatous forms, which were supported by fibrous stroma and blood vessels. H & E X 80.

A viral etiology is attributed for this condition (Runnells *et al.* 1976).

**Squamous cell carcinoma:** This neoplasm involved the skin of 6 (0.6%) vulva. Among the excellent reviews on the subject could be mentioned those of Nair and Sastri (1954), Murray (1968), and Damodaran *et al.* (1975).

This tumour was soft, grayish in colour

with haemorrhagic foci and ulceration. Histologic sections featured a squamous cell carcinoma which consisted of rapid proliferation of prickly cell layer running random in all directions. The cells were embryonic as evidenced by larger size, numerous mitotic figures, hyperchromasia and lack of differentiation. There were round or oval masses of keratinised



epithelial cells arranged concentrically, known as cellnest (Fig. 1). The connective tissue was abundant with numerous thin-walled blood vessels. The pathological lesions observed had a close resemblance to those described earlier in bovine (Nair and Sastri, 1954; Murray, 1968 and Damodaran *et al.* 1975).

It is believed that the high intensity of biologically potent ultraviolet radiation that occurred in countries near the equator, such as India, Ceylon, Kenya etc. possibly induced cancerous changes in the unpigmented vulvular skin of cattle (Wettimuny *et al.* 1974). Discussing the possibility of a hereditary basis for the incidence of vulvular cancer, Vandegraaff (1976) considered it probable that a hereditary predisposition resulted from the amount of white coat inherited and hence the likelihood of the offspring having partly or wholly unpigmented vulvas.

**Fibroma:** It was encountered in 1 case of each in the cervix (0.01%) and vagina (0.01%) which are in agreement of earlier reports in cow (Chenna Reddy, 1980) and she-buffaloes (Sane and Purohit, 1958; Rama Rao and Rajya, 1976; Sharma *et al.*, 1977).

Grossly, it was hard, smooth and encapsulated. Histologically, it consisted of interlacing bundles of fibrous tissue running in all directions and the nuclei of the cells were spindle shaped. Fibromas situated in the female genitalia blocked the passage thereby inducing infertility.

**Leiomyoma:** This tumour was recorded in 3 (0.03%) cases — 1 (0.01%) in vagina and 2 (0.02%) in uterus. A case of uterine leiomyoma was also reported by Chakraborty and Kwatra (1984).

It was pink in colour, firm in consistency, spherical in shape, dry in appearance and protruding in the

respective organs. Histopathologically, the muscle fibres were spindle shaped with elliptical nuclei having chromatin. The bundles of muscles were separated by connective tissue with abundant blood supply (Fig. 2). This tumour in the vagina and uterus caused obstruction to the passage of secretion and transport of ova resulting infertility or sterility.

**Lymphosarcoma:** It was noticed in 2 (0.02%) uterus. Olson (1974) and Bhowmik and Iyer (1978) also reported that this neoplasm is 2.0 to 2.5 per 10,000 buffaloes, which bears similarity to the present records.

The neoplasm was grayish-white in colour and appeared as solitary tumors. The histologic sections consisted of massive proliferation of lymphocytes and their precursors which completely replaced the architecture of the organ. Neoplastic cells were either diffusely, scattered or developed ill-developed follicles. The cells were either oval in shape with vesicular nuclei or the nuclei were hyper-chromatic with distinct mitotic figures (Fig. 3).

Lymphosarcoma is sporadic in adult cattle and undoubtedly fatal (Gresham and Jennings, 1964; Bhowmik and Iyer, 1978). The viral etiology of this neoplasm was attributed by Jarrett (1964).

**Adenoma:** This benign tumour was encountered in 1 (0.01%) uterus which is in agreement of Kumar and Singh (1984) in a she-buffalo.

Pathologically, it was soft, pink in colour and encapsulated. There was excessive proliferation of glandular epithelial cells with faint granular cytoplasm and oval nucleus. The cells were grouped into masses separated by stroma forming lobules.

**Adenocarcinoma:** It was recorded in 2 (0.02%) cases — 1 (0.01%) in cervix



and 1 (0.01%) in uterus. The prevalence of this condition in the genitalia was also described by Runnells *et al.* (1976) and Jones and Hunt (1983).

Pathologically, it was firm, grey or yellow in colour, nodular in appearance and projecting on the surface. The proliferating epithelial cells were single or multilayered and replaced the parenchymal architectures. Sometimes they broke through the basement membrane and infiltrated in the underlying stroma. The cells were arranged both solid and papillomatous forms (Fig. 4) and had the usual characteristics of malignancy, i.e. vesicular nuclei with large nuclei, hyperchromatism and distinct mitotic figures. The growth was supported by fibrous stroma and thick-walled blood vessels (Fig. 4).

Adenocarcinoma is rare tumour in the uterus of the aged cattle and is always serious (Runnells *et al.*, 1976; Jones and Hunt, 1983). Hormonal imbalance is believed for the development of this tumour in the genitalia (Meissner *et al.*, 1957). It is not known how frequently sterility is associated with this neoplasm since the clinical data is lacking.

**Dermoid cyst:** It was observed in 8 (0.08%) ovaries. The tumour is very common in the ovaries of she-buffaloes (Rama Rao and Rajya, 1976; Kumar and Singh, 1984).

Pathologically, the ovarian architecture was replaced by dermoid cyst which was creamy-white in and lined by skin and its colour and appendages.

**Granulosa cell tumour:** Two (0.02%) ovaries showed granulosa cell tumour,

which corroborated the findings of Mukherjee (1969). Its low incidence can be attributed to factors associated with the ageing.

The tumour was oval, yellow in colour, lobulated, encapsulated and projecting on the surface. Cut surface revealed cystic spaces filled with clear fluid. Histologic sections consisted of masses of large polyhyal cells with granular cytoplasm and centrally placed nuclei. The cells were either arranged in solid masses or follicles around central lumen containing acidophilic materials. Hyperchromatism and mitotic figures were plentiful. The pathological lesions are in agreement with Mukherjee (1969) and Jones and Hunt (1983).

This tumour is mostly observed in 2—5 years old cows and associated with hyperestrinism (Runnells *et al.*, 1976) which invariably causes nymphomania resulting to infertility or sterility.

The results showed the lowest incidence (0.28%) of genital neoplasms in cows, which are in agreement with the statement of Laing (1970). The low incidence can be attributed either to a species difference in susceptibility or to factors associated with endocrine functions.

As the present materials were collected from the slaughterhouse, history of cases, clinical signs associated with tumours, fertility examination of the cases etc. could not be ascertained.

### Acknowledgement

Thanks are due to the Head, Deptt. of Veterinary Pathology and the Vice-Chancellor of this Viswavidyalaya for the funds and facilities provided.



## REFERENCES

- Bhowmik, M.K. and Iyer, P.K.R. (1978) Studies on the pathology of chronic lesions in the mammary glands of buffaloes. 2. Neoplastic conditions. *Indian Vet. J.* 55: 418-419.
- Chakraborty, A.K. and Kwatra, M.S. (1984) Studies on the pathological conditions of genital organs of cows in Assam. iii. Abnormalities in uterus. *Indian J. Anim. Reprod.* 5: 85-88.
- Chenna Reddy, M.C. (1980) A case of uncommon voluminous vaginal fibroma in a non-descript cow. *Indian Vet. J.* 57: 861.
- Damodaran, S., Sundararaj, A. and Ramakrishnan, R. (1975) Vulvular carcinoma in bovines. *Indian Vet. J.* 52: 602-604.
- Gresham, G.A. and Jennings, A.R. (1964) *An introduction to comparative pathology*. 1st Ed. Academic Press, London. pp. 361.
- Jarrett, W.F.H. (1964) Leukemia in cat. Transmission experiments with leukemia (lymphosarcoma). *Nature*. 202: 566-568.
- Jones, T.C. and Hunt, R.D. (1983) *Veterinary Pathology*. 5th Ed. Lea and Febiger, Philadelphia pp. 1503-1542.
- Kumar, N. and Singh, B. (1984) Some neoplasms involving female genitalia of buffaloes. *Indian Vet. J.* 61: 185-187.
- Laing, J.A. (1970) *Fertility and infertility in the domestic animals*. 1st Ed. Williams and Williams, Baltimore. pp. 215.
- Weissner, W.A., Sommers, S.C. and Sherman, G.S. (1957) Endometrial hyperplasia, endometrial carcinoma and endometrosis produced experimentally by estrogen. *Cancer*. 10: 500-509.
- Mukherjee, S.C. (1969) *M.V.Sc. thesis*, Orissa Univ. of Agril. & Tech., Bhubaneswar, India.
- Murray, M. (1964) A case of vulvular carcinoma in a cow. *Brit. Vet. J.* 124: 514.
- Nair, K.P.C. and Sastri, G.A. (1954) Carcinoma in the vulva of a cow. *Indian Vet. J.* 30: 325.
- Olson, C. (1974) A note on bovine lymphosarcoma. *J. Am. Vet. Med. Assn.* 165: 630-631.
- Rama Rao, P. and Rajya, B.S. (1976) A note on the neoplasms in female genital systems of buffaloes *Indian Vet. J.* 53: 323-324.
- Runnells, R.A. Monlux, W.S. and Monlux, A.W. (1976) *Principles of Veterinary Pathology*. 7th Ed. Scientific Book Agency, Calcutta. Opp. 382.
- Sane, C.R. and Purohit, B.L. (1958) Infertility in buffaloes due to neoplastic growths of the genital tract. *Indian Vet. J.* 35: 581-585.
- Sharma, G.P., Reddy, M.V., Hafeezuddin, M., Reddy, V.S.C., Sulochana, S. and Mahendar, M. (1977) A note on fibroma of cervix of buffalo cow. *Ind-an Vet J* 54: 763.
- Vandegraaff, R. (1976) Squamous cell carcinoma of the vulva in Merino sheep. *Aust. Vet. J.* 52: 21-23.
- Wettimuny, S.G. de.S., Wanduragala, H.H.M.L. and Pannanglia, U.S. (1974) Neoplastic and proliferative lesions of the vulva of Ayershire cattle in Srilanka. *Ceylon Vet. J.* 22: 17-20.



## Uterine Torsion In Buffaloes I-Incidence

T.S. MANJU and S.K. VERMA

Department of Veterinary Gynaecology & Obstetrics,  
College of Veterinary Sciences,  
H.A.U. Hissar

### ABSTRACT

A survey of obstetrical disorders treated over the last 12 years at the Veterinary Clinic, H.A.U. Hissar revealed that uterine torsion comprises the single largest cause of dystocia in buffaloes. Its incidence was high during the months of July to October and was more common in pleuriparous buffaloes. A constant feature observed was the close association of uterine torsion with parturition. The most common form of rotation was 180 degrees and the direction was clock-wise. Post-cervical uterine torsion occurred in a much higher frequency than pre-cervical uterine torsion.

\* \* \*

It is estimated that out of the world's approximately 130 million domestic buffaloes, about one half exists in India and a quarter in China (FAO, 1975). In India, buffaloes contribute about 55 percent of the milk and 60 percent of the meat produced in the country. In view of the significant contribution of buffaloes towards national economy, it has become necessary that these animals reproduce fairly regularly with minimum intercalving periods for maintaining optimum reproductive efficiency. This envisage a study into the incidence, causes and remedial measures of the various reproductive disorders in buffaloes. Some of these aspects have been recently studied and reviewed by Gupta et al (1981). It was briefly reported in that

study that abnormal parturition and uterine torsion in particular constitute a serious reproductive disorder affecting a fairly large number of buffaloes. In this paper we report the result of a detailed analysis of the incidence of uterine torsion in buffaloes.

### Materials and Methods

The overall incidence of uterine torsion and its relation to season and parity of the animal was studied from clinical records of obstetrical disorders maintained at the Veterinary Clinic, H.A.U. Hissar over a period of 12 years ranging from January 1970—January 1983. In addition, the incidence of uterine torsion in relation to the stage of gestation, degree, direction and position was studied from 17 clinical cases presented for treatment at the same clinic during the last year.

### Results and Discussion

The analysis of the data on the incidence of difficult calving in buffaloes and cows revealed that uterine torsion comprises the single largest cause of dystocia in buffaloes (Table 1). The incidence of 43.44% recorded in the present study is in close agreement with the reports of Mannari and Tadkod (1976) and Pattabiraman et al (1979). However, a relatively much higher incidence (Jit Singh et al 1978), and a marginally lower incidence of uterine torsion have also been reported. We subscribe with the



**TABLE: Incidence of uterine torsion in buffaloes and cows at Veterinary Clinics, Haryana Agricultural University, Hissar during the period Jan. 1970 — Jan. 1983.**

	Buffaloes	Cows	Total
Total recorded Dystocias	145 (74.35)	50 (25.65)	195
Uterine torsion	63 (43.44)	7 (14)	70 (35.9)

Figures in parenthesis indicate percentage.

view of Pearson (1971) that the breed and geographical location has a significant influence on the incidence of uterine torsion. Nevertheless, the incidence in buffaloes seems to be relatively much higher than the reported incidence in Cows (Morten and Cox 1978, Pearson 1971). Besides species differences, limited studies made so far have attributed the voluminous abdomen and the wallowing habit in buffaloes, to the high incidence of uterine torsion in this species (Jit Singh et al 1978).

The present study revealed a definite seasonal pattern in the incidence of uterine torsion. The incidence was highest during the months of July to October and lowest during the months of March to June. The incidence also followed a similar month-wise pattern with highest incidence in the months of August and September. Its high incidence between July and October corresponds closely with the calving season in the species.

The incidence of uterine torsion was

higher in pleuriparous (73.02) than in primiparous buffaloes (26.98%). This has been previously reported by Mannari and Tadkod (1976) and Jit Singh et al (1978). This may perhaps be due to the progressive stretching of the broad ligament associated with successive pregnancies.

The incidence of uterine torsion with the stage of gestation, degree, direction and position was related in fourteen clinical cases treated during the last year (Table II). A consistent feature observed was its close association with parturition as all the cases were presented near term or in the first stage of labour. The association of uterine torsion with parturition, particularly the first stage of labour has been earlier reported by Fouad and El-Sawaf (1964), Thangaraj et al (1972), Jit Singh et al (1979) and Pattabiraman et al (1979). Although the reason for its close association with labour has not been completely understood, Wright (1958) contended that it is due to exciting causes which operate maxi-

**TABLE. II: Incidence of different degrees, direction and position of uterine torsion in buffaloes.**

	Degree				Direction		Position	
	90°	180°	270°	360°	Clockwise	Anticlockwise	Pre-cervical	Post-cervical
Numbers of animals	2	9	2	1	14	—	1	13
Percentage	14.28		14.28	7.4	100.0	—	7.14	92.86



mally during the first stage of labour. On the other hand, Pearson (1971) speculated the excessive foetal movement that occur during the first stage of labour as a direct exciting cause for uterine torsion.

The present study also revealed that 180 degree rotation of the uterus was the most common degree of uterine torsion and 90 and 270 degrees torsion occurred with almost similar frequency. 360 degree rotation was recorded in a solitary case. Fouad and El-Sawaf (1964) and Jit Singh et al (1978) also reported 180 degrees torsion to occur most frequently in buffaloes.

The direction of torsion was clockwise in all the 14 clinical cases. Similar observations have been made by Jit Singh et al (1978) and Pattabiraman et al (1979). In cows on the other hand uterine torsion has been reported to occur predominantly on the left side (Pearson

1971). Although the reasons for the variation are not known, it is probable that in buffaloes, a more capacious abdomen and a distended rumen in the left side may prevent the more frequent rotation of the gravid horn in the anti-clockwise direction.

The incidence of postcervical uterine torsion was much higher than that of precervical uterine torsion. According to Pearson (1971), the uterus in torsion rotates on its vaginal and mesometrial attachments and therefore, in most cases the actual twist affected the anterior vagina.

### Acknowledgement

Author's thanks are due to Dr. R. C. Gupta, Professor and Head, Department of Veterinary Gynaecology & Obstetrics for his valuable suggestion and providing the facilities in the present study.

### REFERENCES

- ↪ Fouad, K. and El-Swaf, S. (1964). Some observations on torsion in buffaloes with reference to its etiological factors. Vet. Med. J. Giza. 9: 173-177.
- Gupta, R.C.; Sharma, A.K.; Verma, S.K.; Khar, S.K. and Datt, S.C. (1981). Studies on various reproductive disorders in buffaloes (*Bubalus bubalis*) A clinical review. Philp. J. Vet. Med. 20: 133-144.
- Jit Singh, Benaras Prasad and Rathor, S.S. (1978). Torso uteri in buffalos (*Bubalis*) An analysis of 65 cases. Indian Vet. J. 55: 161-165.
- Mannari, M.N. and Tadkod, D.M. (1976). Uterine torsion in buffaloes. Indian J. Anim. Res. 10: 83.
- Morten, D.M. and Cox, J.E. (1968). Bovine dystocia — A survey of 200 cases met with general practice. Vet. Rec. 82: 530-537.
- Pattabiraman, S.R. and Pandit, R.K. (1980). Studies on haematological and biochemical constituents in blood of buffaloes with uterine torsion. Cherion. 9: 338-2340.
- Pearson, H. (1971). Uterine torsion in cattle — A review of 168 cases. Vet. Rec. 89: 597-603.
- Thangaraj, T.M.; Krishnamurthy, R. and Venkataswami, V. (1972). Laparotomy to correct uterine torsion. Indian Vet. J. 49: 1262-1264.
- ↪ Wright, J.G. (1958). Bovine Dystocia. Vet. Rec. 70: 347.



## Profiles Of Some Plasma Biochemical Constituents Associated with Uterine Torsion And Following Its Correction By Laparohysterotomy In Buffaloes

T.S. MANJU, S.K. VERMA R.C. GUPTA, V.M. MANDAKHOT and A. KRISHNASWAMY

Department of Gynaecology and Obstetrics,  
College of Veterinary Sciences,  
H.A.U. Hissar - 125 004

### ABSTRACT

The objective of this study was to monitor the profiles of certain plasma biochemical constituents associated with uterine torsion and following its surgical correction by laparohysterotomy in buffaloes. Blood samples were obtained from fourteen affected animals before surgical intervention for the delivery of foetus and correction of uterine torsion and from further eight animals on days 5 and 10 post-operation. Blood plasma samples were analysed for the concentrations of calcium, inorganic phosphorus, total proteins, sodium, potassium, copper, zinc and cortisol. Six of the 14 affected animals died within 24-48 after surgery and the pre-operation biochemical profiles in these animals were similar to those which survived after surgery. In comparison to normal buffaloes at term, the affected animals had significantly lower plasma levels of inorganic phosphorus, total proteins, copper and zinc and significantly higher levels of plasma cortisol. Post-operatively, only the plasma levels of inorganic phosphorus and total proteins showed significant fluctuations, but all the constituents studied were within the range of normal values for non-pregnant non-lactating animals by day 10 post-operation. However, plasma cortisol had not returned to basal levels suggesting

that the stressful factors continued to operate by 10th day following surgical correction of uterine torsion in buffaloes.

\* \* \*

Several earlier reports have emphasized uterine torsion as the single largest cause of maternal dystocia in buffaloes (Fouad and EL-Sawaf, 1964; Mannari and Tadkod, 1976, EL-Naggar, 1978). In a recent survey we found that uterine torsion constitutes nearly 44 percent of all maternal dystocias in buffaloes (Manju and Verma, in press). The economic impact of such a high prevalence among buffaloes could be tremendous as uterine torsion may affect subsequent lactation and reproductive efficiency and may be even fatal. Although several techniques of relieving uterine torsion are now available (Fouad and EL-Sawaf, 1964; EL-Naggar, 1978, Jit Singh et al, 1978) the success rate generally depends upon the time-lapse between the occurrence of uterine torsion and its presentation for treatment, the techniques of treatment and the post-treatment measures. An improved rate of success may perhaps be obtained if the animal is evaluated before and after correction of uterine torsion for predicting prognosis and to supplement the post-treatment regimens. These objectives have been achieved with



success by the use of a number of metabolic profile tests in a variety of affections in man and domestic animals. However, their use in buffaloes affected with uterine torsion has received virtually no attention. We studied the profiles of some biochemical constituents associated with uterine torsion in buffaloes and the results presented in this paper is a part of a longterm study on the various aspects of uterine torsion in buffaloes.

### Materials and Methods

This study utilized 14 murrah buffaloes presented for treatment of uterine torsion at our clinic. The details of the degree of torsion and the position and direction of torsion in these animals have been reported earlier (Manju and Verma, 1985). All the affected animals were presented at term and an attempt had been invariably made by the local veterinarian to relieve uterine torsion by rolling. We made no further attempt to relieve uterine torsion by rolling of the animal and uniformly adopted laparohy-

strotomy to deliver the foetus and correct the uterine torsion through an incision made lateral and parallel to the milk vein. During the course of surgery each animal received 4000 ml of 5% Dextrose saline i.v., 40 ml chromostat, i.v. (Life Plasma), Hostacortin, (Hoechst) 10 ml, i.m. and 540 ml Unimezol i.v. (Unichem). Post-operatively each animal received 60 i.u. oxytocin i.v., Dicrystacin 5 g i.m. (Sarabhai), Calborol, 540 ml i.v. (May and Baker) and Dextrose saline 2 liters i.v. Calborol and Dextrose saline therapy was restricted for two days, while the antibiotic therapy was given daily for 5 days. Blood samples were drawn into heparinized test tubes from each animal immediately after the completion of clinical examination and before any treatment being instituted. Blood samples were also obtained on 5th and 10th day post-operation from 8 animals which survived following surgical intervention for correction of uterine torsion. Blood samples were also drawn, once, from a group of 6 normal buffaloes

TABLE 1: Mean plasma biochemical concentrations in normal buffaloes at term and in buffaloes before and after correction of uterine torsion by laparohysterotomy.

PLASMA CONCENTRATIONS								
	Calcium (mg %)	Inorganic phosphorus	Total pro- teins.(g%)	Sodium (Meq/L)	Potassium (Meq/L)	Copper (ug %)	Zinc (ug %)	Cortisol (ng/ml)
Normal-at term (N=6)	10.72 ± 0.11	5.95 ± 0.20	9.38 ± 0.11	117.66 ± 0.61	2.60 ± 0.02	89.58 ± 6.79	243.0 ± 1.50	1.11 ± 0.48
Pre-operation (N = 14)	9.51 ± 0.75	3.87 ± 0.48	7.40 ± 0.36	108.00 ± 5.27	2.91 ± 0.47	57.14 ± 3.62	148.0 ± 15.0	63.30 ± 13.70
Post-operation (N-8)								
DAY-5	11.11 ± 0.27	6.87 ± 0.39	8.70 ± 0.22	116.00 ± 3.02	2.48 ± 0.14	71.87 ± 8.09	93.0 ± 21.0	61.74 ± 30.54
DAY-10	10.83 ± 0.29	5.66 ± 0.28	7.83 ± 0.13	107.00 ± 3.02	2.21 ± 0.14	81.25 ± 8.49	148.0 ± 19.0	11.72 ± 4.22



near term (-5 to -1 d) for comparison with the pretreatment biochemical profiles in the affected animals. We preferred to use normal buffaloes at term for this purpose because the affected animals presented to us were invariably at the completion of their gestation period.

All the plasma samples were analysed for the levels of calcium, inorganic phosphorus, sodium, potassium, total proteins, copper and zinc using standard analytical procedures, plasma cortisol levels were estimated by Radioimmunoassay using  $^{125}\text{I}$  labelled kits procured from Biodata, Switzerland. The procedure followed was as advised by the manufacturers.

### Results and Discussion

Of the 14 cases subjected to laparohysterotomy for the delivery of foetus and surgical correction of uterine torsion, 6 animals died within 24-48 after surgery. Four of the 6 animals showed extensive peritonitis on necropsy. These animals had earlier exhibited signs of severe dehydration and toxæmia when presented for treatment. The cause of death in the remaining two animals was probably shock associated with rolling and/or laparohysterotomy. However, the pre-operation plasma biochemical profiles of the animals which died following laparohysterotomy were similar to the pre-operation biochemical profiles of the animals which survived after surgical treatment. Therefore, we were unable to speculate the prognosis of the case based on plasma biochemical profiles. Perhaps, the interval between the occurrence of uterine torsion and its presentation for treatment and the number of rollings given to the animal prior to its presentation to us might have had a bearing on the plasma biochemical profiles in both the groups of animals.

Additionally, some treatments given by the local veterinarian may also have had an influence on the plasma biochemical profiles. Unfortunately, we could not obtain the details of rolling and various treatment measures received by the animal before the cases were presented to us.

When the pre-operation levels of each biochemical constituents in the animals irrespective of whether the animal died or survived after laparohysterotomy were compared with normal buffaloes at term, the affected group of animals were found to have significantly lower values of plasma inorganic phosphorus, total proteins, copper and zinc and extremely high levels of cortisol. However, this study could not substantiate the observations of Pattabiraman and Pandit (1980) that buffaloes affected with uterine torsion had lower levels of plasma calcium. This was probably because they used animals in late gestation for comparison and plasma calcium levels are known to be higher at late gestation than at term (Muttalli, 1980). We are however, not aware of the stage of gestation at which buffaloes affected with uterine torsion were used in their study.

The low plasma inorganic phosphorus observed in the affected animals has also been recorded in cases of dystocia in cows (Bostedt 1974, Ramanarayana 1978) and buffaloes (Muttalli, 1980). That buffaloes affected with uterine torsion had lower levels of plasma proteins has also been previously reported by Pattabiraman and Pandit (1980). Similarly Pryor (1976) speculated the possibility of an association between the zinc status of the animal and the events occurring at parturition and Duffy et al (1977) showed that cows with parturient abnormalities exhibited a dramatic fall



in plasma zinc levels. Although the present study recorded lower levels of plasma inorganic phosphorus, total proteins, copper and zinc in the affected group of animals, we are unable to state whether these differences were as a result of different managemental conditions under which each affected animal was maintained since the control group of animals used for the purpose of comparison were all from a single herd maintained under uniform conditions of feeding and management. Nevertheless, animals affected with uterine torsion had consistently higher plasma levels of cortisol than in the control group of animals. Therefore, we suggest that uterine torsion induces considerable stress on the animal and the lower levels of plasma inorganic phosphorus and zinc in the affected animals are perhaps an indirect reflection of the stressful events occurring in uterine torsion as there is some evidence that their levels are influenced by cortisol (Wagner, 1973; Wilkinson, 1980).

The plasma levels of calcium, sodium, potassium, copper and zinc did not exhibit significant fluctuations during the post-operative period. Therefore this study could not confirm the observations of Bestedt (1974) that cows with parturient abnormalities had low levels of plasma calcium which sustained for a longer duration and that of Mousely and Oxford (1971) who demonstrated a 10 percent fall in plasma calcium levels within one hour after minor surgery in sheep. Perhaps, a more frequent sampling schedule than the one used in this study may have provided a more clear picture of the alterations in the plasma profiles of calcium following laparohysteromy in buffaloes affected with uterine torsion. The non-significant differences in plasma

calcium values before and after laparohysteromy may also be due to the fact that the affected animals received calcium borogluconate intravenously in 2-3 divided doses during the first 3 days post-operation. A almost steady levels of plasma calcium, sodium and potassium recorded during the post-operative period may suggest that the fluid and electrolyte therapy given to these animals was adequate.

Among other plasma constituents studied, inorganic phosphorus showed a dramatic increase by 5th day post-operation and although the levels were marginally lower by 10th day, its concentration was still higher in comparison to the pre-operation values. On the otherhand, the plasma total proteins had increased to significantly higher levels by day 5 post-operation, but fell significantly by day 10. We have no explanations for these fluctuations, but considering the fact that none of the affected animals were lactating Post-operatively the plasma levels of inorganic phosphorus and total proteins were within the range of values for non pregnant nonlactating animals (Kaneko, 1980).

By far, the most dramatic change observed was in the plasma levels of cortisol. Its level by day 5 post-operation, was similar to the pre-operation concentrations suggesting that the affected animals continued to be under a spell of stress. By day 10, however, the plasma cortisol levels had appreciably reduced suggesting that the animals were on the course of recovery. However, the plasma cortisol remained slightly elevated and did not approach the basal values for non-pregnant, non-lactating animals suggesting that stressful factors continued to operate by day 10 post-operation.



## REFERENCES

- Bostedt, H. (1974). Studies on the calcium, inorganic phosphate and magnesium content of blood serum of cattle in relation to difficulties at parturition. *Zentralblatt. fur Veterinarmedizin*. 20: 172-172.
- Duffy, J.H., Bingley, J.B. and Linda, Y. (1977). The plasma zinc concentration of non-pregnant, pregnant and parturient Hereford Cattle. *Aust. Vet. J.* 53: 519-522.
- El-Naggar, M. (1978). Evaluation of field oriented treatment of uterine torsion in buffaloes in Egypt. *Indian Vet. J.* 55: 61-67.
- Fouad, K. and El-Sawaf, S. (1964). Some observations on torsion in buffaloes with reference to its etiological factors. *Vet. Med. J. Giza*. 9: 173-177.
- Kaneko, J.J. (1980). *Clinical Biochemistry of Domestic Animals*. 3rd Ed. Academic Press, New York.
- Jit Singh, Benaras Prasad and Rathor, S.S. (1978). Torsion in buffaloes (*Bubalus Bubalis*) An analysis of 65 cases. *Indian Vet. J.* 55: 161-165.
- Manju, T.S. and Verma, S.K. (1985). Studies on uterine torsion in buffaloes. *Indian J. Anim. Reprod.* (In press).
- Mannari, M.N. and Tadkod, D.M. (1976). Uterine torsion in buffaloes. *Indian J. Anim. Res.* 10:83.
- Mousely, Y. and Oxford, S.M. (1971). Cited by Muttalli (1980).
- Muttalli, T.N. (1980). Studies on blood serum concentration of certain electrolytes and non-electrolytes during normal and few disturbed conditions of reproduction in the buffaloes (Surti). M.V.Sc. Thesis, University of Agricultural Sciences, Bangalore.
- Pattabiraman, S.R. and Pandit, R.K. (1980). Studies on haematological and biochemical constituents in blood of buffaloes with uterine torsion. *Cherion* 9: 338-340.
- Pryor, W.J. (1976). Plasma zinc status of dairy cattle in the periparturient period. *New Zealand Vet. J.* 24: 57-58.
- Ramanarayana (1978). Studies on blood serum concentrations of certain electrolytes and non-electrolytes during normal and few disturbed conditions of reproduction in cross-bred cows. M.V.Sc. Thesis, Submitted to University of Agr. Sciences. Bangalore.
- Wagner, T.N., Ray, D.E., Lox C.D. and Stott, G.H. (1973). Effect of stress on serum zinc and plasma corticoids in dairy cattle. *J. Dairy Sci.* 56: 748-752.
- Wilkinson, J.S. (1980). Pituitary and Adrenal Function. In: *Clinical Biochemistry of Domestic Animals*, 3rd ed. by Kaneko, J.J. Academic Press.



## Studies On The General Characteristics Of Caprine Foetal Fluids

R.A. LUTHRA, R.C. GUPTA, S.K. KHAR and P. BARU

Department of Gynaecology & Obstetrics  
College of Veterinary Sciences  
H.A.U. Hissar - 125 004

### ABSTRACT

Foetal fluids from twelve pregnant goats during different stages of gestation were studied for their general characteristics like colour, consistency, pH. and specific gravity. The light yellow colour of the allantoic fluid changed to intense brown, whereas the amniotic fluid became colourless, with the advancement of gestation. The allantoic fluid remained watery throughout the gestation, however the amniotic fluid became turbid and mucoid in the second half of gestation. The pH of allantoic fluid decreased with the advancement of gestation and changed finally to acidic from alkaline in the beginning. The pH of amniotic fluid also followed the same trend but it again became lightly alkaline in the last stage of gestation. There was no significant change in the specific gravity of both the fluids.

\* \* \*

The caprine foetus is surrounded by two fluids: i.e. an inner amniotic fluid and an outer allantoic fluid throughout the gestation. These foetal fluids play an important role in the efficient handling of the foetal waste products and in preventing mechanical shock to the developing foetus during the entire gestational length. Furthermore, the fluids are also helpful during the process of parturition.

The characteristics of the allantoic and amniotic fluid have been studied in Cattle (Morgan and Whitehair, 1943; Arthur, 1965) and Sheep (Medougall, 1949; Mellor and Slater, 1971). However the goat has remained an exception in this respect for a long time.

### Materials and Methods

The study was carried out on a total of 12 pregnant goats of different gestational lengths. Stage I had animals of 1-2 months of gestation, Stage II had animals of 2-3 months of gestation, Stage III had animals of 3-4 months of gestation and Stage IV had animals of 4-5 months of gestation. Each had three animals.

The pregnant uteri were exposed by mid ventral lapotomy after inducing local anesthesia (2% Gescain) at mid ventral line just anterior to the udder. A small incision in the uterus was made and using a sterile 20 ml glass syringe, attached with a 18 gauge needle about 20 ml of fluid was collected separately from each placental sac.

The physical characteristics i.e. colour, consistency, pH and specific gravity of both the fluids were studied immediately after their collection.

### Results

The colour of the allantoic fluid changed considerably during different



stages of pregnancy. During stage I of gestation the colour was light yellow and there after the colour changed to light brown during stage II and intense brown during the III and IV stages of gestation. The Amniotic fluid was also slightly yellowish during stage I of gestation, but changed to a colourless fluid during the II, III, and IV stages.

TABLE 1. Mean values for pH of allantoic and amniotic fluid

Stage of gestation	Allantoic fluid	Amniotic fluid
I	7.35 $\pm$ 0.06	7.31 $\pm$ 0.07
II	6.84 $\pm$ 0.32	6.93 $\pm$ 0.10
III	6.48 $\pm$ 0.18	6.82 $\pm$ 0.08
IV	6.84 $\pm$ 0.09	7.06 $\pm$ 0.17

Data are expressed as values  $\pm$  standard error.

The consistency of allantoic fluid remained watery throughout gestation. However, the amniotic fluid became turbid and mucoid in the second half of gestation.

The pH of allantoic fluid was 7.35 during the I stage of gestation and thereafter there was a fall in the pH to 6.84 and 6.48 during II and III stages respectively. In the last stage of gestation, it however increased to 6.84 (Table-1). However, this fall in the pH of allantoic fluid during III and IV stage was significant ( $P < 0.05$ ) when compared with the stage I of gestation. (Fig. 1)

TABLE 2: Mean values for specific gravity of allantoic and amniotic fluid.

Stage of gestation	Allantoic fluid	Amniotic fluid
I	0.997 $\pm$ 3.21	0.997 $\pm$ 4.09
II	1.003 $\pm$ 5.01	1.029 $\pm$ 0.02
III	1.004 $\pm$ 0.009	1.003 $\pm$ .008
IV	0.998 $\pm$ 4.48	1.006 $\pm$ 0.02

Data are expressed as values  $\pm$  standard error.

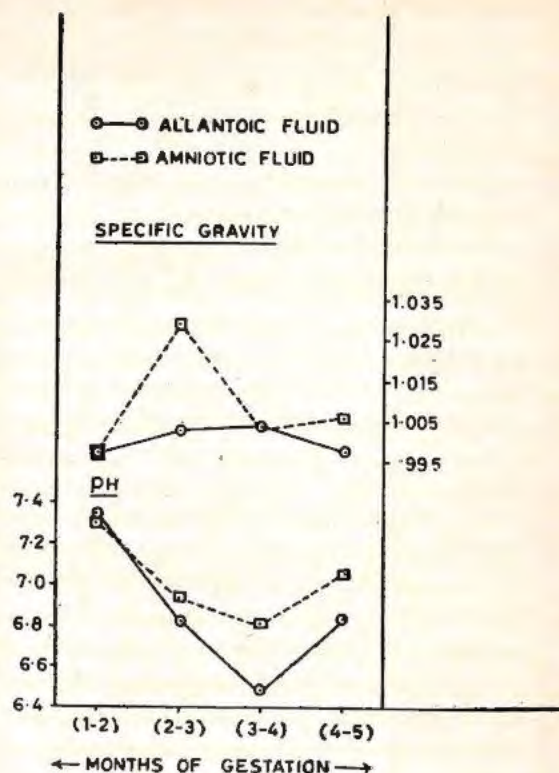


Fig. 1

The pH of amniotic fluid also decreased with advancement of gestation from 7.31 during I stage to 6.93 and 6.82 during II and III stages of gestation, respectively. The decrease in the pH in stage III was highly significant ( $P < 0.01$ ) in comparison to stage I. The pH however rose to 7.06 during the IV stage of gestation. (Table 1, fig. 1).

There was no significant change in the specific gravity of allantoic as well as amniotic fluids throughout gestation (Table-III).

### Discussion

The general characteristics of bovine foetal fluids are influenced by exchange of biochemical constituents through the placenta, foetal urine formation and its flow through the urachus or urethra



and foetal secretions from lungs and salivary glands (Baetz et al, 1976).

Arthur (1965) observed that the foetal fluids of bovine were like pale urine, and as the gestation advanced the allantoic fluid became more urine like whereas the amniotic fluid turned to a colourless and slightly viscous fluid.

In the present study the amber coloured allantoic fluid of early gestation changed to light brown and intense brown in late gestation, whereas the amniotic fluid changed to a colourless, mucoid and gelatinous fluid from yellowish in the early gestation. Similar changes in goats were also reported by Bongso et al. (1979).

Arthur (1965) observed that in cattle the changes in the colour of both the fluids and consistency of amniotic fluid with advancing gestation may be due to the onset of salivary secretion and increased mucous secretion from the alimentary tract and/or to decreased flow of urine in to the amniotic cavity as the sphincter of the urinary bladder began to function between  $6\frac{1}{2}$  to  $7\frac{1}{2}$  months of gestation. Similar onset of the function of the bladder sphincter probably occurs earlier in case of goat (Bongso et al, 1979).

The mean pH of the amniotic fluid for all stages was 7.03. Initially during the I stage, the pH was alkaline (7.31). However, during the II and III stages the pH was acidic which again changed to alkaline during the IV stage of gestation (fig. 1). The pattern of change of pH was similar to the findings reported in Cows (Morgan and Whitehair, 1943).

The initial alkaline pH of the allantoic fluid (7.35) during I stage, changed to acidic during the subsequent stages of gestation. Meller & Slater (1971) also observed the amniotic fluid to be alkaline (pH 7-7.50) in comparison to allantoic fluid (pH 6.00 - 7.40).

McDougall (1949) reported that in sheep amniotic fluid had a lower specific gravity than the allantoic fluid. In the present study although there was no significant change in the specific gravity of both the fluids across gestation yet the mean specific gravity of allantoic fluid for all stages (1.001) was slightly lower than for the amniotic fluid (1.009). This may be due to the change in the consistency of the amniotic fluid and/or to the higher solute concentration in the amniotic fluid than in the allantoic fluid.

## REFERENCES

- Arthur, G.H. (1965). Further observations on the foetal fluids of cattle with particular reference to source and qualitative changes. *Vet. Rec.* 77: 623-624.
- Baetz, A.L., Hubbert, W.T. and Graham, C.K. (1976). Changes of biochemical constituents in bovine fetal fluids with gestational age. *Am. J. Vet. Res.* 37: 1047-1052.
- Bongso, T.A., Edirisinghe, R. and Athuraliya, D. (1979). Studies on foetal fluids in goats. *Indian Vet J.* 56: 562-569.
- McDougall, E.I. (1949). The composition of foetal fluids of sheep at different stages of gestation. *Biochem. J.* 45: 397-400.
- Melior, D.J. and Slater, J.S. (1971). Daily changes in amniotic and allantoic fluid during the last three months of pregnancy in conscious, unstressed ewes, with catheters in their foetal fluid sacs. *J. Physiol.* 217: 573-604.
- Morgan, B.B. and Whitehair, C.K. (1943). The hydrogen ion concentration of bovine foetal fluids *Cornell Vet.* 33: 273.



## Studies On Heteroplasmic Preservation Of Buck Semen

M.A. MALIK, BALRAJ SINGH, C.S.P SINGH and B.K. SINGH

Department of Gynecology and Obstetrics,  
Ranchi Veterinary College, Ranchi—834007, BIHAR

### ABSTRACT

Addition of 50% bull seminal plasma to buck semen increased the percentage of progressively motile spermatozoa and live sperms. Abnormal sperm percentage was also decreased. It increased the "heteroplasmic vigour" of buck spermatozoa, the range was between 11.15 (reduction in percentage of abnormal spermatozoa) and 32.33 (percent increase in progressive motility) in Black Bengal bucks and in Barbari 10.85 (live sperm percentage) and 28.32 (progressive motility percentage). A rough estimate of overall superiority of treatment over control in Black Bengal and Barbari was 23.40 and 19.59 respectively.

\* \* \*

Successful preservation of semen is essential for the implementation of any breeding programme. Heterospermic preservation has been reported to increase the keeping quality of semen (Narayan and Singh, 1971 and Sinha, 1981). This study reports the results of an experiment conducted to estimate the effect of bull seminal plasma used as an additive in the buck semen.

### Materials and Methods

Eight bucks (Four of Black Bengal and four of Barbari) and two Holstin Friesian bulls maintained at Ranchi Veterinary college, Ranchi were used in this study. Semen was collected from the bulls on alternate day at about 6.30

A.M. by the artificial Vagina method. Soon after collection the seminal plasma was separated by centrifuging it for 15 minutes at the rate of 3000 RPM.

The Egg-yolk-citrate (Salisbury *et al*, 1941) was used as semen dilutor.

Bull seminal plasma (BSP) and Egg-yolk-citrate dilutor in the ratio of 1:1 (50% BSP) were mixed. This was prepared by mixing 4 ml each of bull seminal plasma and Egg-yolk-citrate.

Each prepared sample was divided into two equal halves in order to dilute the semen of two bucks (Black Bengal and Barbari). Egg-yolk-citrate constituted the control for both the bucks.

Bucks were maintained under the similar managemental conditions throughout the period of the experiment. Collections were obtained from one Black Bengal and one Barbari buck, on every alternate day at about 7.30 A.M. by means of artificial vagina method. After evaluating the quality of the ejaculates collected from bucks, the semen was diluted with the prepared dilutors. Thus, there were two samples from each collection i.e. control (Containing EYC as dilutor) and treatment (containing 50% BSP and 50% EYC). The samples were stored in 8 pint wide mouth thermoflask filled with ice. Stored semen samples were evaluated at 24, 48, 72 & 96 hours of preservation for the following parameters:



TABLE 1. Average values of seminal attributes in black bengal and barbari bucks at different hours of preservation.

Breed and Treatment	Progressive motility percentage					live sperm percentage					Percentage of abnormal spermatozoa				
	24 Hr.	48 hr.	72 hr.	96 hr.	overall	24 hr.	48 hr.	72 hr.	96 hr.	overall	24 hr.	48 hr.	72 hr.	96 hr.	overall
Black Bengal															
Control	64.71 <sup>a</sup>	53.48 <sup>a</sup>	45.02 <sup>a</sup>	34.73 <sup>a</sup>	49.48	84.42 <sup>a</sup>	78.80 <sup>a</sup>	74.18 <sup>a</sup>	66.62 <sup>a</sup>	76.00	12.67	14.39 <sup>a</sup>	15.71 <sup>a</sup>	17.86 <sup>a</sup>	15.15
	±0.889	±1.175	±0.979	±1.253	±1.411 (32.33)	±0.685	±0.985	±0.958	±1.369	±0.922 (14.46)	±0.677	±0.696	±0.734	±0.751	±0.412 (11.15)
Treatment	73.58 <sup>b</sup>	68.73 <sup>b</sup>	64.77 <sup>b</sup>	60.77 <sup>b</sup>	66.96	90.30 <sup>b</sup>	88.16 <sup>b</sup>	86.06 <sup>b</sup>	83.44 <sup>b</sup>	86.99	11.64	12.71 <sup>b</sup>	14.01 <sup>b</sup>	15.51 <sup>b</sup>	13.46
	±0.494	±0.515	±0.505	±0.396	±0.068	±0.604	±0.522	±0.528	±0.446	±0.387	±0.602	±0.559	±0.577	±0.583	±0.332
Barbari															
Control	64.86 <sup>c</sup>	56.65 <sup>c</sup>	48.39 <sup>c</sup>	37.32 <sup>c</sup>	51.80	85.48 <sup>c</sup>	82.13 <sup>c</sup>	77.41 <sup>c</sup>	70.44 <sup>c</sup>	78.85	12.27	13.70 <sup>c</sup>	15.59 <sup>c</sup>	18.15 <sup>c</sup>	14.92
	±0.684	±0.688	±0.715	±1.150	±1.273 (28.32)	±0.713	±0.858	±0.751	±2.207	0.916 (10.85)	±0.686	±0.730	±0.772	±0.871	±0.456 (11.05)
Treatment	73.31 <sup>d</sup>	68.67 <sup>d</sup>	63.84 <sup>d</sup>	60.08 <sup>d</sup>	66.47	90.71 <sup>d</sup>	88.44 <sup>d</sup>	86.28 <sup>d</sup>	84.23 <sup>d</sup>	87.41	11.42	12.68 <sup>d</sup>	13.75 <sup>d</sup>	15.25 <sup>d</sup>	13.27
	±0.496	±0.528	±0.563	±0.526	±0.640	±0.512	±0.503	±0.470	±0.474	±0.360	±0.718	±0.662	±0.679	±0.694	±0.374

Figures bearing different superscripts in a column within a breed differed significantly. Values in parentheses indicated percent superiority of treatment over control.



1. Motility percentage of spermatozoa.
2. Live percentage of spermatozoa and
3. Percentage of abnormal spermatozoa.

Motility percentage of the diluted and stored semen samples was studied according to slightly modified method described by Lasley (1951). The live percentage of spermatozoa in each of the samples was estimated by using Eosin-Nigrosin staining technique mentioned by Swanson and Bearden (1959). Percentage of abnormal spermatozoa was determined from the same slides used for determination of live spermatozoa percentage.

The data recorded on different parameters were subjected to statistical analysis according to Snedecor and Cochran (1968).

### Results and Discussion

Average values of seminal attributes in Black Bengal and Barbari bucks at different hours of preservation have been shown in Table I.

Addition of bull seminal plasma increased the percentage of progressively motile spermatozoa and live sperms in the semen during different hours of preservation. It also decreased the abnormal sperm percentage, thus increasing the quality of semen in both the breeds. Analysis of variance indicated significant effect of treatment on all the attributes.

Addition of 50% BSP increased the "heteroplasmic vigour" of buck spermatozoa, the range was between 11.15

(reduction in percentage of abnormal spermatozoa) and 32.33 (percent increase in progressive motility) in Black Bengal bucks. The corresponding values in Barbari were 10.85 (live sperm percentage) and 28.32 (progressive motility percentage).

A rough estimate of overall superiority (Taking average of the percent superiority of treatment group over control for progressive motility and live sperm content) of treatment over control in Black Bengal and Barbari was 23.40 and 19.59 respectively.

These results indicate that increased quantity of bull seminal plasma possibly supplemented both quantitatively and the biochemical ingredients required for enhancing and maintaining the activity and life span of buck spermatozoa for a longer period, as well it checked an increase in their morphological abnormality during preservation. Biochemical analysis of semen, seminal plasma and sperm cells of different species/breeds of livestock separately and in different combinations may be helpful in explaining the heteroplasmic superiority of "heteroplasmic vigour".

### Acknowledgement

The authors are very much thankful to the Dean, Ranchi Veterinary College and ICAR for utilising the data from AICRP on goats, chotanagpur unit, Ranchi. The first author is thankful to the government of Jammu and Kashmir for financial assistance.



## REFERENCES

- Lasley, J.F. (1951). Spermatozoa motility as a measure of semen quality. *J. Anim. Sci.* **10**: 211-218.
- Narayan, A.D. and Singh, G. (1971). Studies on heterospermic semen in Murrah buffaloes: Effect of mixing ejaculates, resistance to hypertonic sodium Chloride solution and cold shock treatment. *Indian J. Anim. Sci.* **41**: 1022-1025.
- Salisbury, G.W.; Fuller, H.K. and Willet, E.L. (1941). Preservation of bovine spermatozoa in yolk-citrate diluent and field results from its use. *J. Dairy Sci.* **24**: 905-910.
- Sinha, M.P. (1981). Studies on preservation of heterospermic buck semen. M.V.Sc. Thesis, Birsa Agricultural University, Ranchi.
- Snedecor, G.W. and Cochran, W.G. (1968). Statistical Methods. 6th Edi. Iowa state University, Press, Ames, Iowa (U.S.A.).
- Swanson, E.W. and Bearden, H.J. (1951) An Eosin — Nigrosin stain for differentiating live and dead spermatozoa. *J. Anim. Sci.*, **10**: 981-987.



## Studies On Inter-Lambing Period In Indian Breeds Of Sheep

C.V.S. RAWAL, R.C. GARG and S.N. LUKTUKE

Indian Veterinary Research Institute,  
Izatnagar, Uttar Pradesh 243 122

### ABSTRACT

A study on inter-lambing period was carried out to determine the effects of seasons and breeds on this trait in four breeds of sheep-Bikaneri, Nali and Hissar Dale at Hissar farm and Muzaffarnagri at the I.V.R.I., Izatnagar farm. Inter-lambing period averaged  $335.73 \pm 7.17$  days in Bikaneri,  $341.31 \pm 4.62$  days in Nali,  $434.70 \pm 13.92$  days in Hissar Dale and  $330.48 \pm 8.34$  days in Muzaffarnagri. Hissar Dale had significantly longer inter-lambing period than that of the other 3 breeds which were not significantly different from each other. Analysis of variance further revealed that seasons had significant effect on interlambing period in Bikaneri and Nali breeds. Seasonality did not seem to have significant effect on inter-lambing period in Hissar Dale and Muzaffarnagri breeds.

\* \* \*

Inter-lambing period is an important trait which has a bearing on the reproductive and productive life of sheep. Studies on factors affecting inter-lambing period in sheep are important but such studies are few. Sahni and Roy (1967) reported that tropical sheep, Bikaneri is non-seasonal in their sexual activity. In 1972 they further reported that the monthly distribution of lamb births in a flock of Bikaneri ewes in which rams were run continuously for several years showed lack of seasonal variation in concentration of lamb births in tropics. Taparia

(1972) reported non-seasonality of oestrus activity in Sonadi sheep.

Further studies were required on other Indian breeds of sheep on inter-lambing period. In the present investigation, these have been carried out in four breeds of sheeps, namely Bikaneri, Nali, Hissar Dale and Muzaffarnagri.

### Materials and Methods

Inter-lambing period was studied on 202 Bikaneri, 176 Hissar Dale and 581 Nali ewes at Hissar Farm. Two hundred fifteen ewes of Muzaffarnagri breed maintained at the Indian Veterinary Research Institute (I.V.R.I.), Izatnagar farm were also included in this study. Most of the ewes of different breeds were recorded for single inter-lambing period. However, two or more than two inter-lambing periods per animal were also recorded in few animals. The climate at Izatnagar (U.P.) and Hissar (Haryana) was divided into four seasons on the basis of humidity and temperature as follows:

#### *Izatnagar Climate*

1. Cold season (second half of November to February)
2. Temperate season (second half of September to first half of November and March to first half of April)
3. Hot dry season (second half of April to first half of June.
4. Hot humid season (second half of June to first half of September).



### Hissar Climate

1. Cold season (November to January)
2. Temperate season (second half of October, February and March)
3. Hot dry season (April to June)
4. Hot humid season (July to first half of October)

TABLE 1: Interlambing period in different breeds. (days).

Bikaneri	Nali	Hissar Dale	Muzaffarnagri
357.73 <sup>a</sup>	341.31 <sup>a</sup>	434.70 <sup>b</sup>	330.48 <sup>a</sup>
±7.17	±4.62	±13.92	±8.34
(332)	(960)	(243)	(264)

Averages with the same superscript are not significantly different at 5% probability level from each other. Figures in parentheses are number of observations.

For seasonal calculation the inter-lambing period was considered as the lambing in that particular season from there the time taken by lambs again. Standard statistical procedures were used for analysis.

Observation on inter-lambing periods available for study in different breeds were as follows:

Bikaneri 332, Hissar Dale 245, Nali 960 and Muzaffarnagri 264.

### Results and Discussion

#### INTER-LAMBING PERIOD

The inter-lambing period averaged  $335.73 \pm 7.17$  days in Bikaneri,  $341.31$

$\pm 4.62$  days in Nali,  $434.70 \pm 13.92$  days in Hissar Dale and  $330.48 \pm 8.34$  days in Muzaffarnagri breeds of sheep, respectively (Table 1). It was longest in Hissar Dale which differed significantly from other three breeds. However, the difference in the inter-lambing periods of Bikaneri, Muzaffarnagri and Nali was not significant (Table 1). Incidentally, Hissar Dale breed had the maximum age at first lambing which also indicated sexual maturity in this breed at a slower rate as compared to other breeds of sheep studied.

Analysis of variance (Table 2) revealed that the seasons had a significant ( $P < 0.01$ ) effect on inter-lambing period in Bikaneri and Nali breeds. Season 2 appeared to have favoured the inter-lambing period while season 1 adversely affected this trait and it differed significantly from the other three seasons in Bikaneri breed (Table 3). Seasons 1, 3 and 4 did not vary significantly from each other in Bikaneri breeds. The inter-lambing period during season 2 was significantly shorter than that during seasons 1, 3 and 4 in Nali breed (Table 3). Averages of inter-lambing period for seasons 1, 3 and 4 did not differ significantly in Nali breed. The inter-lambing period was shortest during season 2 in both the breeds i.e. Bikaneri and Nali. Seasonality did not seem to have significant effect on inter-lambing period in Hissar Dale and Muzaffarnagri breeds (Table 3). Breed differences were highly

TABLE 2: Inter-lambing period for different seasons within breeds.

Source of variation	ANOVA							
	Bikaneri		Nali		Hissar Dale		Muzaffarnagri	
	df	MS	df	MS	df	MS	df	MS
Seasons	3	108323.8**	3	291771.9**	3	55503.3	3	12387.7
Within seasons	328	16276.8	956	19674.9	239	46969.9	260	18436.0

\*\*  $P < 0.01$



TABLE 3. Inter-lambing period (days) for different seasons within breeds.

Seasons	Breeds			
	Bikaneri	Nali	Hissar Dale	Muzaffarnagri
1. Cold	373.36 <sup>a</sup> ±11.96 (125)	360.66 <sup>b</sup> ±6.96 (323)	459.79 ±18.53 (104)	321.75 ±19.01 (66)
2. Temperate	300.28 <sup>b</sup> ±16.36 (82)	298.32 <sup>a</sup> ±7.81 (301)	429.80 ±24.35 (86)	311.26 ±24.85 (35)
3. Hot dry	329.82 <sup>b</sup> ±11.98 (85)	368.41 <sup>b</sup> ±9.02 (265)	371.00 ±72.86 (13)	329.82 ±17.35 (75)
4. Hot humid	300.35 <sup>b</sup> ±14.28 (40)	334.48 <sup>b</sup> ±22.62 (71)	400.70 ±39.09 (40)	345.23 ±10.46 (88)

Seasons averages with the same superscript are not significantly different at 5% probability level. Figures in parentheses are number of observations.

significant ( $P < 0.01$ ) for inter-lambing period studied for Hissar Dale, Nali and Bikaneri breeds which were located at the same farm (Hissar) (Table 4).

The ewes in the present study were at different stages of parity. It was not possible to determine the intervals between first and second lambing, second and third lambing and so on. Data, therefore, were analysed for intervals between lambing and those for subsequent ones.

The results revealed that in the Hissar Dale breed, inter-lambing period was the longest and the differences were significant ( $P < 0.05$ ) as compared to other three breeds. Differences among

the other two breeds at Hissar farm and Muzaffarnagri breed at Izatnagar farm were not significant.

Narayanswamy *et al.* (1976) reported lambing interval in Bannur (Mandya) sheep which averaged  $304.42 \pm 11$  days. This value is quite lower in comparison to the values observed in the present study. This might be due to breed difference or by virtue of its being controlled and influenced by the factors other than genetic ones and can be reduced through improved managemental practices.

Sex of the lamb had no effect on any of the inter-lambing periods, which is not in agreement with the findings of Narayanswamy *et al.* (1976) who reported that

TABLE 4: Inter-lambing period for Bikaneri, Nali and Hissar Dale breeds

Source of variation	df	MS
Breeds	2	923274.9**
Within breeds	1532	23982.1

\*\*  $P < 0.01$



ewes carrying male lambs had longer lambing interval by 4.3 days than the ewes carrying female lambs and this difference due to sex was highly significant.

#### **Acknowledgement**

The first author is thankful to the Director, Indian Veterinary Research Institute for research facilities and to Indian Council of Agricultural Research for financial assistance.

#### **REFERENCES**

- Narayanswamy, M., Balaine, D.S. and Balbir singh (1976). A note on studies on age at first lambing and lambing interval in Bannur (Mandya) sheep. *Indian J. Anim. Sci.* **46**: 47-49.
- Sahni, K.L. and Roy, A. (1967). A study on the sexual activity of Bikaneri sheep (*Ovis aries L.*) and conception rate through artificial insemination. *Indian J. Vet. Sci.* **37**: 327-334.
- Sahni, K.L. and Roy, A. (1972). Post-partum conception in Bikaneri sheep. *Indian J. Anim. Sci.* **42**: 1038-41.
- Taparia, A.L. (1972). Breeding behaviour in Sonadi sheep. *Indian J. Anim. Sci.* **42**: 576-579.



## Studies on the Regeneration in *Macrostomum orthostylum* (BRAUN) (Turbellaria: Macrostomida)

B.S. INGOLE and G.A. SHIRGUR

Marine Biological Research Station, K.K.V. Ratnagiri 415612

### ABSTRACT

The regeneration process was observed in the laboratory cultured macrostomid turbellarian, *Macrostomum orthostylum*. Recovery of cut portions was very fast at the anterior region as compared to the posterior region. The average regeneration rate observed was 0.069 mm/day. However, regeneration was not observed in the region anterior to the cerebral ganglion.

\* \* \*

Information available on the regeneration in free-living Turbellaria indicates that acoelid turbellarians have limited power of regeneration (Ghild, 1907; Peebles 1913 and Keil 1929). In the case of alloecocoels and macrostomid, Ruhl (1927) has reported that the former are incapable of any regeneration and the latter whilst incapable of a sequel reproduction, can regenerate, particularly towards the tail portion.

Keeping in view the paucity of information on the regeneration in *M. orthostylum* (BRAUN), the present studies was undertaken and results are reported here.

### MATERIALS AND METHODS

A culture of *Macrostomum orthostylum* was maintained in the laboratory in glass beakers following the method described by Shirgur (Shirgur 1980). For the present study, healthy adult specimens of uniform

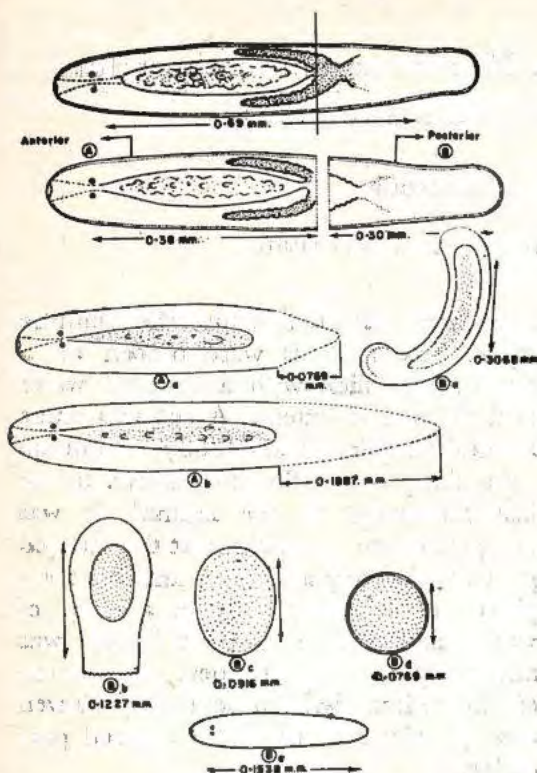
size, were isolated from the culture stock. The animals were placed on a microscopic slide with a drop of water and allowed to extend. A cut was made at desired part of the body of animal by a sharp razor. Sometimes due to the fast movement of the animal, it was not possible to make a cut at the desired part of the body and thus, animals were placed on a cavity slide in a drop of water, and then a drop of  $\text{PHCl}_3$  was added by a fine dropper. Movement of the animal was subsequently slowed down, making a cut at the desired part easier.

Cut portions were immediately transferred into separate glass cavity block (2 ml capacity) having culture media of 9‰ salinity. Observations on the cut portion were carried out every day under a low power dissecting microscope. The figures, of different developmental stages of the cut portion, were made using a camera lucida, while all measurements were taken by a micrometer.

### RESULTS AND DISCUSSION

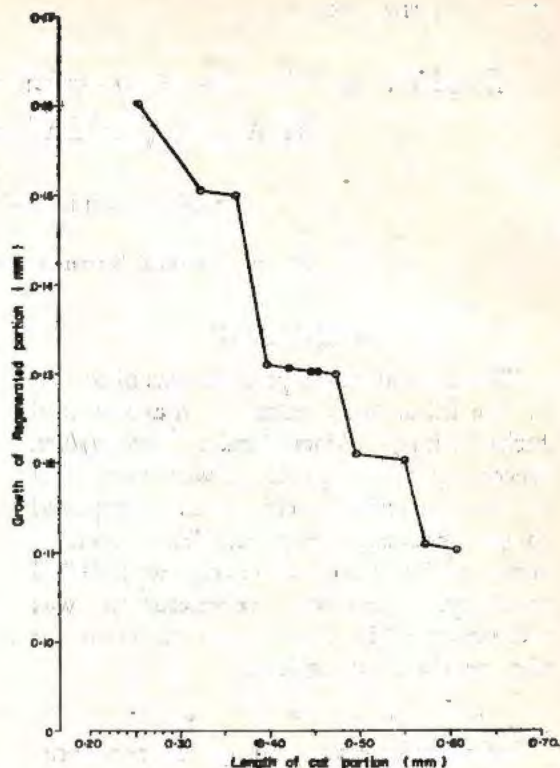
*Macrostomum orthostylum*, an easyhaline turbellarian, recorded first time from Indian water (Shirgur 1980) and cultured in the laboratory for nutritional requirements of hatchery level prawn seed production (Shirgur and Ingle 1983). It has been observed in the mass culture of *M. orthostylum* that sometimes the tail portion of the animal gets detached in





**Fig. 1** Epimorphosis and morphallaxis regeneration  
**1A** Anterior cut portion  
**1Aa** Anterior portion regenerating its lost portion  
**1AB** Anterior portion completely regenerated  
**Fig. 1B** Posterior cut portion  
**1Ba** Posterior cut portion changed into curve shape  
**1Bb** Curve shape changed into cap like structure  
**1Bc** Cut portion transformed into spherical shape  
**1Bd** Egg-shaped cut portion  
**1Be** Newly hatched youngone

the course of laying of subitaneous eggs and regenerates to a new young animal. Specimens below 0.4 mm length were immature and did not show morphallaxis type of regeneration. Therefore, only the adult specimens measuring more than 0.4 mm, which were found to undergo



**Fig. 2** Growth of regenerated portion

epimorphosis and morphallaxis regeneration, selected in the present study.

#### *Process of Regeneration*

The animal measuring 0.69 mm (Fig. 1) was cut into two portions — an anterior portion of 0.38 mm and a posterior portion of 0.30 mm (Fig. 1, A & B.)

The regeneration of the lost portion at the anterior end was epimorphosis type. Growth in tissue mass was very fast resulting in the formation of complete animal after five days (Fig. 1A a; and 1A b).

To study the regeneration of posterior portion, the cut part was kept in a separate cavity block in fertilized culture media, where it showed circular movements



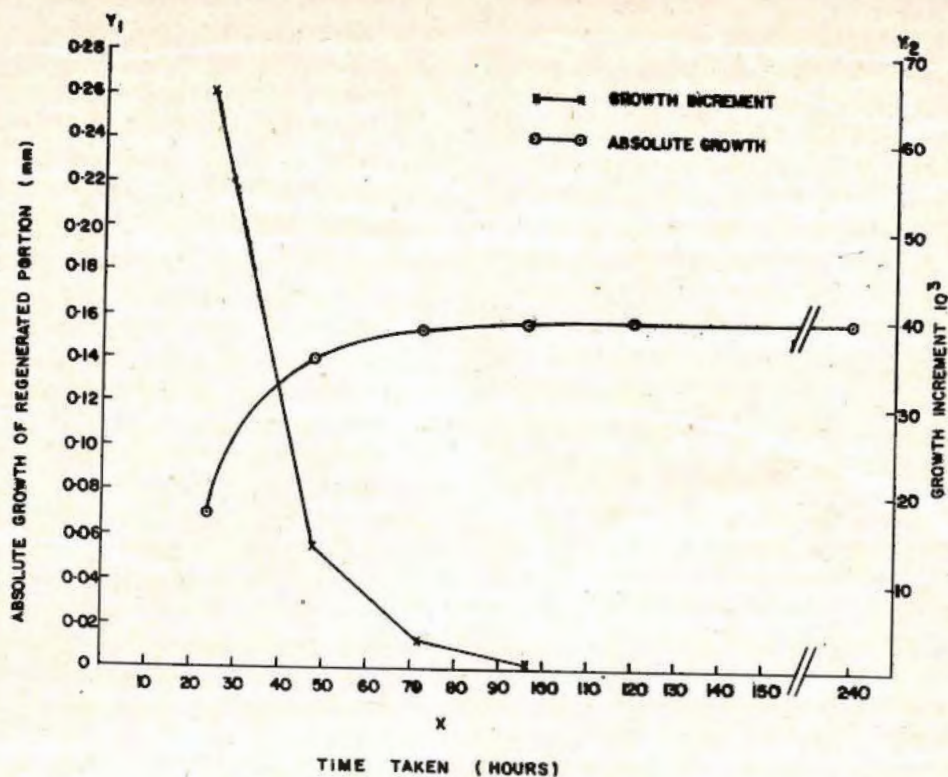


Fig. 3 Absolute growth and growth increment of regenerated tail portion.

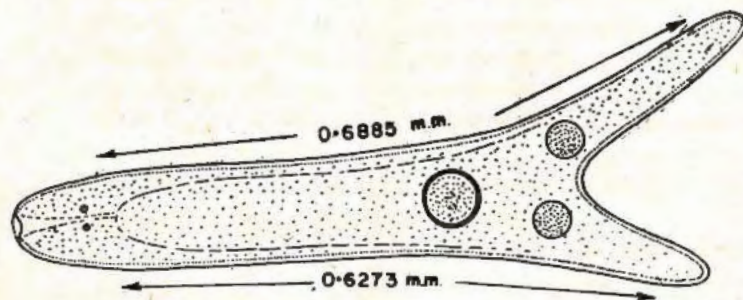


Fig. 4 Animal with bifurcated tail portion

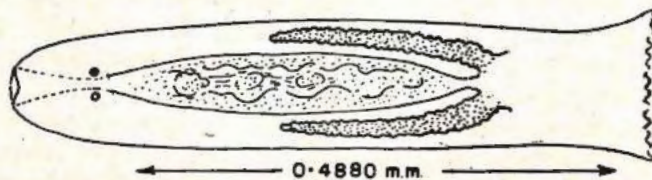


Fig. 5 Animal with severed tail portion



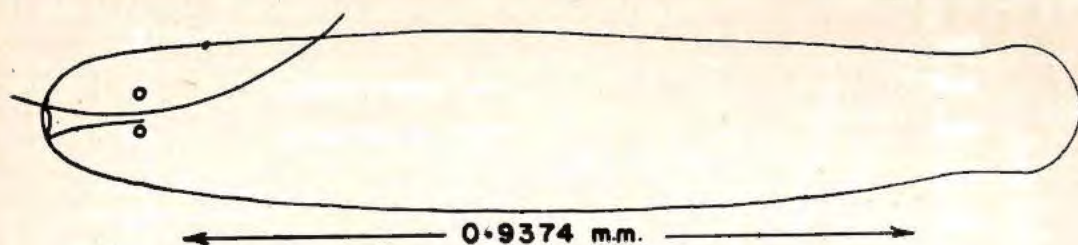


Fig. 6 Cut showing removal of eye.

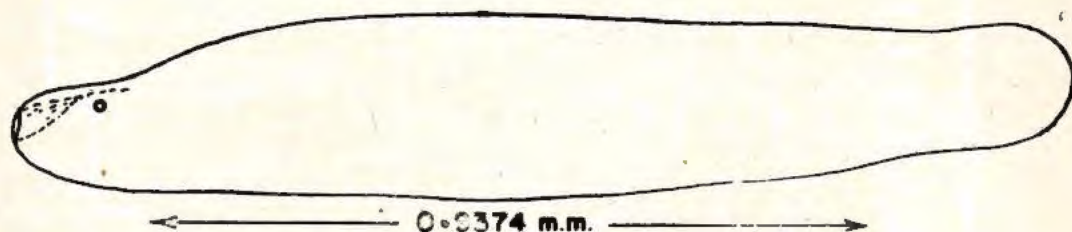


Fig. 7 Regeneration at head region.

at first and then finally settled at the bottom of the cavity block. One end of the portion was attached to the bottom and undulation of the body occurred. The type of regeneration in this portion was totally morphallaxis type. At first, the cut portion drummed to a curve-shaped structure measuring 0.3068 mm in length (Fig. 1B a). At the end of 4th day of observations, the curve-shaped portion changed to a cap like structure at the distal end with a length of 0.1227 mm (Fig. 1B b). However, no change was observed on the 5th and 6th days. The entire portion was transformed into a egg shaped structure having diameter of 0.0916 mm, at the end of 7th day (Fig. 1B c). At the end of 8th day, the shape of the cut portion became exactly similar to that of a subitaneous egg with a diameter of 0.0765 mm (Fig. 1B d) and then a single young animal was hatched out at the end of 11th day of

observation (Fig. 1B c.) Discussing the similar type of regeneration in other species Hyman (1951) and Pascolini (1968) have reported that a piece of moderate size from any level forms a complete new worm. While discussing the process of cell totipotency in *Digesia gonocephalla*, Gremigni (1972) has reported that a single cell of somatic tissue develops a complete organisms.

#### *Absolute growth and growth increment of the regenerated tail portion.*

It was observed that an anterior portion normally regenerated its lost portion within five days some observations were made making cuts at different body line towards the anterior end. The pattern of regeneration was observed in twelve successive experiments and the average rate of regeneration calculate. In the case of an anterior cut portion of 0.25 mm in length, the length recovery



of the regenerated portion was 0.16 mm at the end of 120 hours (Fig. 2). In the third experiment of the series, in a cut portion of 0.45 mm length; the regenerated part was 0.13 mm, while 0.11 mm in the case of a 0.60 mm cut portion, at the end of 120 hours.

Absolute growth was 0.07 mm after 24-hour interval and 0.14 mm after a 48-hour interval. At the intervals of 72 and 96 hours absolute growth were 0.15 mm and 0.16 mm respectively, while at the end of 120 hours an average growth of 0.16 mm was observed which remained constant subsequently. Average growth rate was 0.069 mm/day, whereas the growth increments calculated from 12 experiments were 0.0681 mm, 0.0139 mm, 0.0037 mm and 0.0035 mm at the end of 24, 48, 72 and 96 hours, respectively (Fig. 3). It was found that the growth rate of the regenerated portion was faster at first (0.24 hours) in the anterior region. Fast growth rate of this portion may be due to the presence of extraordinary high number of undifferentiated cells in the parenchyma. Germigni and Banchetti (1972) have also reported the presence of extraordinary cells in the parenchyma of *Dugesia gonocephala*. Fast growth increment indicates the high activity of regenerating cells within a determined period. It is also reported in *Dugesia mediterranea* and *Dugesia tigrina* that the rapid accumulation of neoblast cells at the beginning of regeneration and a decrease after 2-3 days (Baguna and Romero, 1981).

#### *Bifurcation at tail portion (Fig 4)*

The bifurcation of a tail portion was

usually noticed in the case of an individual which sustained a severed tail portion during the release of large subitaneous egg (Fig. 5). Further observations on such animals show that they reproduce normal hatchings (without biaxial tail). However, some observations were also made in case of the selected adult specimens by making cuts in the tail region. It was observed that their tails regenerated into normal form, without bifurcation.

#### *Observations at the head region*

Cuts were made at the anterior end to observe the power and pattern of regeneration of structures in the head region. A cut just posterior to the eyes, was observed to replace its lost portion within few days. However, when a portion of head with one eye of the animal was detached (Fig. 6), it was observed that the animal grew to a normal size without further replacement of detached eye (Fig. 7). This is further supported by Peebles (1913) finding, where he has reported that the portion removed anterior to the cerebral ganglie replaced perfectly but without replacing the cerebral ganglia and stylocyst.

#### **Acknowledgement**

The authors are thankful to late Dr. M.R. Ranade, Associate Dean, Marine Biological Research Station, K.K.V. Ratnagiri, for facilities. Thanks are extended to Dr. A.H. Parulekar and Dr. Anil Chatterji, Scientists, NIO, Goa, for going through the manuscript.



## REFERENCES

- Baguna, J. and Romero, R. 1981. Quantitative analysis of cell type during growth, degrowth and regeneration in the planerians. *Dugesia mediteranea* and *Dugesia tigrina*. *Hydrobiologia*, 85: 181-194.
- Child, C.M. 1907. The localization of different methods of form regeneration in *Polychoerus candatur*. *Arch. Entomoch. Org.* 23.
- Germigni V and Banchetti, R. 1972. The origin of hyperplasia in the ovaries of ex-fissiparous individuals in *Dugesia gonocephala*. *S.I. Accad. Naz. Lincei*, 53: 477-485
- Germigni, V, 1981. The problem of cell totipotency differentaiton and transdifferentiation in turbellaria. *Hydrobiologia*, 84: 171-179.
- Hyman, L.H. 1951. *The Invertebrates: Vol. II. Platyhelmenthes and Rhynchocoela, the acoclomate Bilateria*. McGraw-Hill Book Company, Inc., New York, Toronto, London, 182. pp.
- Keil, E. 1929, Regeneration in *Polychoerus*. *Biol. Bull.* 57.
- Pascolini, R., 1968. Further studies on regeneration of the Pharynx in Planaria. *Arch. Zool. Ital.*, 53: 11-18
- Pechles, F., 1913. Regeneration acoler Plattwurner. *Bull. Inst. Oceanogr. Monaco*, No. 263.
- Ruhl, L., 1927. Regeneration serscheinungen an Rhabdocoelen. *Zool. Anz.* 72.
- Shirgur, G.A. 1980. (a). Observations on mass culture of a euryhaline Macrostomid turbellarian *Macrostomum orthostylum* (BRAUN 1885). in relation to reproductive behaviour under optimum salinity and temperature. *Symp. on Coastal Aquaculture Cochin Jan.* 1980.
- Shirgur, G.A. and Ingole, B.S., 1983. b. Further observations on artificial mass culture of Macrostomid turbellarian *Macrostomum orthostylum* (BRAUN 1885), under varying salinities and feeding conditions.



## SHORT COMMUNICATIONS

IJAR 6: 1: 79-80 1985

### Phosphatases In Seminal Plasma Of Buffalo Bulls

R.S. DHANOTIYA and R.K. SRIVASTAVA

Department of Biochemistry  
College of Veterinary Science and Animal Husbandry Mhow (M.P.)

Bovine semen contains high concentration of Acid phosphatase but comparatively low concentration of Alkaline phosphatase. The acid phosphatase in mammalian semen is produced by the prostate gland. (Mann, 1964).

Although the enzyme Alkaline phosphatase and Acid phosphatase in buffalo semen have been studied extensively by various workers (Chauhan and Srivastava, 1973; Mishra et al., 1969 and Sen Gupta et al, 1963), there are no reports on the activity and kinetics of Fructose 1:6 bisphosphatase (FruP2ase) and Glucose 6 Phosphatase (G6Pase) in buffalo seminal plasma. Sheth and Panse (1979) have reported the effect of antiandrogens on FruP2ase in rat caudal spermatozoa.

The present communication reports the activity and kinetic properties of these enzymes.

Buffalo seminal plasma was obtained from four bulls by centrifuging the semen samples at 1400xg and the experiments were replicated. Acid and Alkaline Phosphatase was assayed with the beta glycerophosphate substrate by the method of Bodansky (1932) Glucose 6 Phosphatase and Fructose 1:6 bisphosphatase were assayed by the method of Swanson (1950) and Pogell and McGilvery (1952) respectively, Pi liberated was estimated by the method of Chen et al (1956) and Protein by the method of Lowry et al. (1951). The specific activity of the enzyme is expressed as micromoles of

piliberated per mg of protein per hour at 37°C. No experiment was done on the pH optima of G6Pase.

The activity and kinetic properties of the phosphatase in the seminal plasma are presented in Table 1.

It is clear from the table that acid phosphatase activity was very high as compared to alkaline phosphatase.

The FruP2ase activity was considerably low as compared to acid and alkaline phosphatase. G6Pase, was comparatively extremely low. The lowest Km was observed in case of G6Pase and FruP2ase. The pH optima of the FruP2ase and alkaline phosphatase were similar whereas acid phosphatase showed a pH optima of 5.0.

In order to verify whether the enzyme present in the seminal plasma is specific for the catalytic hydrolysis of FruP2ase does it represent conventional alkaline phosphatase activity the Fru2P in the reaction mixture was replaced by F6P and the rate of hydrolysis was measured. It was observed that the rate of hydrolytic rate of Fru2P.

That the specific phosphatase FruP2ase and G6Pase do not represent the generalized alkaline phosphatase is also confirmed by the low Km value as compared to the high Km of acid and alkaline phosphatase.

A high level of alkaline and acid phosphatase has been reported in buffalo



**TABLE 1 Activity and kinetic properties of phosphatases in Buffalo seminal plasma**

Enzyme	Activity	Km	pH
Acid Phosphatase	68.0	4.0 mM	5.0
Alkaline phosphatase	18.5	6.4 mM	10.0
FruP2ase	3.78	9.9 UM	9.5
G6Pase	0.40	6.6 UM	—

semen. (Chauhan and Srivastava, 1973). It is well known that high level of inorganic phosphorus inhibited the respiration and viability of the spermatozoa which may be one of the factor for the poor preservation and freezability of buffalo semen. (Srivastava 1979)

The enzyme FruP2ase is a pacemaker in gluconeogenesis and involved in second stage to overcome energy barrier in formation of carbohydrate from non carbohydrate precursors, suggests the operation of gluconeogenesis. Further, Sheth and Panse (1979) have shown the enhancement of FruP2ase activity in rat caudal spermatozoa by administration of antiandrogens, thereby inhibiting glycolysis. Mohri et al. (1975)

have reported that the flux of carbon ceases due to inhibition of some of glycolytic enzymes by male antifertility agent alpha chlorohydrin in ram spermatozoa. Due to the lack of sufficient energy gained from the carbohydrates, the ram is therefore unable to ejaculate spermatozoa for its essential activities, such as motility in the femal tract. This may render them infertile. It appears that the glycolytic-gluconeogenic enzyme play a significant role in the fertility of spermatozoa.

#### Acknowledgement

Our thanks are due to Dr. M.R. Patel the ex. Dean of veterinary college, Jabalpur for providing the facilities and keen interest in the work.

#### REFERENCES

- Bodansky, A. (1932) J. Biol. Chem. 99,197  
 Chauhan, R. AS. and Srivastava R.K. (1973) J. Reprod. Fert. 34,165  
 Chen, P.S. Jr., Toribara, J.Y. and Werner, H. (1956) Anals Chem. 28,1756  
 Lowry, O.H. Rosebrough, N.S., Farr, A.L. and Randall, R.J. (1951), J. Biol. Chem. 193, 265  
 Mann, T. The Biochemistry of semen and male reproductive tract H.Y. John Willey and Sons INC 1964.  
 Mishra, B.S., Singh, B.P and Tomar, B.S. (1969), Indian J. Dairy Scin. 16, 150.  
 Mohri, H.S. D.A. I. Brown Woodman, PDC White, I.G. and Ridley D.D. (1975) Nature 75, 255.  
 Pogell, B.M. and McGilvery, R.W. (1952) J. Biol. Chem., 197. 293.  
 Sen Gupta, B.P. Mishra, M.S. and Roy, A (1963) Indian J. Dairy Sci. 16, 150.  
 Sheth, A.R. and Panse, G.T. (1979). Indian, J. Med. Res. 642.  
 Srivastava, R.K. ICAR Report, 1977.  
 Swason, M.A., (1950) J. BIOL. Chem., 184, 647.



## Anoestrus In Buffaloes—Treatment With “Estrona”

I.M. SHAH and H.J. DERASHRI

Key Village officer, Directorate of AH Ahmedabad

### ABSTRACT

The present trials were undertaken to study the efficacy of “Estrona” Capsules in induction of oestrus and fertile oestrus in buffaloes. Out of a total of 40 animals, oestrus was induced in 27 (67.50%) animals of which 18 (66.6%) animals conceived. The mean time interval for oestrus induction was  $15.14 \pm 2.68$  days and for conception it was  $31.9 \pm 5.37$  days. Among control group of 10 animals, 3 (30.0%) came in oestrus and only One (10.0%) conceived. The mean time interval for exhibition of oestrus was  $36.5 \pm 7.83$  days, and the only animal conceived took more than 90 days for conception.

Both the doses (2 capsules/day for 5 days and 3 capsules/day for 3 days) tried were found effective for induction of oestrus and fertile oestruces in buffaloes.

\* \* \*

Anoestrus is one of the most common problem encountered in buffaloes which affects the farmers economy by reducing calf crop and milk yield. several indigenous drugs have been tried to induce oestrus and fertile oestrus in anoestrus animals (Galhotra *et al.*, 1970; Porwal *et al.*, 1976; Kodagali *et al.*, 1981; Shah and Kodagali, 1984) but literature on the use of ayurvedic product like “Estrona” is very scanty. Hence the present study was undertaken to assess the efficacy of “Estrona” in induction of oestrus and conception in anoestrus buffaloes and buffalo heifers.

### Materials and Methods

A total of 50 true anoestrus buffaloes maintained by farmers of Vatva Village of Ahmedabad district were included in this study, out of which 40 animals were involved in treatment trials (with Estrona capsules) and 10 animals were kept as control group. The buffaloes were considered to be true anoestrus based on two gynaecological examination at 8 days interval confirming the absence or lack of Graafian follicles or corpus luteum on the ovaries.

The composition of Estrona capsule is as follows:

1. Loha Bhasma	50 mg,
3. Rubia Cardifolia	100 mg,
2. Myrsh	50 mg
4. Aloes indica	50 mg
5. Harmal	50 mg,
6. Magella Sativa	50 mg
7. Gogul	50 mg.

This is an ayurvedic product of Rakesh Pharmaceuticals, Ahmedabad.

### CLINICAL TRIALS:

Estrona capsules were administered orally at random in 40 animals confirmed to be true anoestrus.

### DOSE EFFECT:

Two different doses were tried, 2 capsules/day for 5 days and 3 capsules day for 3 days. Vaginal inspection and rectal palpations were made at an interval of 8-10 days and findings were recorded.



**TABLE 1 Results of Estrona for oestrus and fertile oestrus induction in treatment vs control group of buffaloes.**

Sr. No.	ITEM	Group			
		Treatment		Control	
		No.	Percent	No.	Percent
1.	No. of total Animlas	40	100	10	100
2.	Oestrus induced/occured	27	67.5	3	30.00
3.	Pregnancy	18	45.00	1	10.00
4.	Pregnancy rate among served —	—	66.60	—	33.30
5.	Interval in days for oestrus induction	15.14±2.68		36.50±7.83	
6.	Interval in days for fertile oestrus induction	31.9±5.37		>90	

**TABLE 2 Comparison of results with two different doses of Estrona capsules**

Sr. No.	Item	Group			
		2 Cap/day		3 cap/day	
		No.	Percent	No.	Percent
1.	No. of animals in trials	18	100	22	100
2.	Oestrus induced	12	66.6	16	72.7
3.	Pregnancy	7	37.0	11	50.0
4.	Pregnancy rate among served	—	58.33	—	68.78
5.	Interval in days for oestrus Induction	17.73±2.54		14.50±2.32	
6.	Interval in days for fertile oestrus	40.14±3.71		28.50±5.26	

The experimental work was carried out for the period of 6 months. On expression of oestrus, the animals were served either by natural services or by A.I. and regular rectal examinations were made for pregnancy after 6-8 weeks of service.

### Results and Discussion

The details of results regarding oestrus induction and pregnancy have been furnished in Table 1. Out of total 40 animals under treatment trials, in 27 (67.50%) animals oestruces were induced and 18 (45.00%) animals conceived. The mean time interval for oestrus induction was 15.14±2.68 days and for conception it was 31.9±5.37 days.

Among control group of 10 animals, 3 (30.00%) animals came into oestrus and only one (10.00%) conceived. The mean time interval for exhibition of

oestrus was 36.5±7.83 days and conception took more than 90 days.

Chi Square test revealed significant difference ( $P < 0.05$ ) between treatment and control group as regards oestrus and fertile oestrus induction.

The results of oestrus and fertile oestrus induction nearly agree with the results reported by Galhotra et al. (1970), Kodagali et al. (1973) and Desphande and Sane (1977) who tried the indigenous drugs.

The details of results on dose effect have been illustrated in table 2.

It can be seen from the above figures that apparently better results were observed with the dose of 3 cap/day but statistically there was no significant difference. Thus both the doses (2 cap/day and 3 cap/day) are effective in induction of oestrus and pregnancies.



## REFERENCES

- Deshpande, B.R. and Sane, C.R. (1977). Indian Vet. J. 54: 63.  
Galhotra, A.P., Bhaskar, V.V. and Gautam, O.P. (1970). Paper read at 19th Indian Vet. Conference.  
Kodagali, S.B., Bhavsar, B.K. and Kavani, F.S. (1973). Guj. Coll. Vet. Sci. Magz. 6: 80.  
Porwal, M.L., Saxena, H.K. Srivastav, A.M. and Karandikar, G.W. (1976). Indian Vet. J., 53: 485.  
Shah, I.M. and Kodagali, S.B. (1984). Indian Vet. J., 61: 794.



## Reproductive-Performance of $F_1$ & $F_2$ Crossbred Buffaloes (Swamp $\times$ Murrah) in Vietnam

R.P. VERMA, C.V. TRIEU, N.V. DUC and D.V. CAI

Buffalo Breeding and Research Centre, BenCat,  
SongBe, Socialist Republic of VietNam.

### ABSTRACT

The present preliminary study revealed values of certain reproductive-parameters of Swamp  $\times$  River Crossbreds ( $F_1$  &  $F_2$ ) in VietNam and suggested for further detailed study in this direction.

\* \* \*

Swamp buffaloes are often slow in coming into heat and that their reproductive-attributes, like gestation-period, post partum oestrus period and calving interval are long with little milk leading to low return. Hence, the introduction of exotic (river buffalo, Murrah) germ plasm in "VietNamesetrau" (Swamp) is accepted as a tool to bring about rapid improvement in milk-production and also to maintain its superior draughtability in rich paddy-area of SouthEast Asia. However, no report is seem to be available on the said reproductive-attributes of  $F_1$  and  $F_2$  Swamp Crosses in VietNam. The present paper is an attempt to put on record in this direction.

### Materials and Methods

The breeding data in two different genetic groups of Swamp Crosses namely Group-I: 1/2 Swamp  $\times$  1/2 Murrah ( $F_1$ ); and Group-II: 1/4 Swamp  $\times$  3/4 Murrah ( $F_2$ ) were collected from Buffalo Breeding and Research Centre, Song Be (BenCat). The overall macro-environment of BenCat is "Monsoon-Tropical" climate due to

its heavy rain (Yearly Rainfall 2028.96 mm) alongwith high ambient temp. (Yearly Average Temp. 28.58°C) as reported earlier by Verma *et al.* (1984). The ability to adopt the "Monsoon-Tropical Climate" of VietNam was evaluated on the reproductive-attributes like gestation-period, postpartum oestrus interval and calving-interval. The results were presented in Table 1.

**Gestation-Period:-** Table 1 indicated that the overall average gestation-length of crossbred-buffaloes irrespective of grade was  $308.0 \pm 1.2$  days in VietNam. In Philippines, Villegas (1959) has reported a little higher values (316.2 days) of the average gestation-period in river  $\times$  swamp type crosses (Philippine  $\times$  Murrah Crosses, their various grades), which probably might be due to variation of the strain of swamp from location to location.

During the present study, it was observed that the average gestation-length of  $F_1$  ( $308.1 \pm 1.6$  days) was found to be slightly higher than  $F_2$  Crosses ( $307.8 \pm 1.8$  days), which might be due to higher blood level of Swamp in  $F_1$  than  $F_2$  Cross. Because the gestation of Swamp is more than the gestation period of Murrah (Fahimuddin, 1975).

**Postpartum-oestrus interval:** The mean postpartum oestrus interval of  $F_2$  ( $60.5 \pm 8.3$  days) was comparatively less than



TABLE 1. Reproductive-estimates of  $F_1$  and  $F_2$  Crossbred-buffalo at BenCat (VietNam)

Estimates (days)	$F_1$	$F_2$	Overall
Gestation-period	$308.1 \pm 1.6$ (10)	$307.8 \pm 1.8$ (4)	$308.0 \pm 1.2$ (14)
Postpartum-oestrus interval	$78.8 \pm 10.0$ (5)	$60.5 \pm 8.3$ (4)	$70.7 \pm 7.0$ (9)
Calving-interval	$574.0 \pm 93.6$ (9)	$360.0 \pm 0.0$ (1)	$520.5 \pm 85.1$ (4)

Note: Figures in parentheses indicate number of observations.

$F_1$  ( $78.8 \pm 10.0$  days). The overall average postpartum oestrus of crossbred buffalo was  $70.7 \pm 7.0$  days in VietNam. In Philippine the postpartum oestrus in Swamp X River Type Crosses (Philippine X Murrah Crosses) were reported to be 44 (Ocampo, 1939) and 45.8 days (Villegas, 1959). The variations might be due to variations in the strain of Swamp, blood-level of swamp in Cross etc.

**Calving Interval:** The calving interval was found to be minimum in  $F_2$  Crossbreds ( $360.0 \pm 0.00$  days) against  $F_1$  Crossbreds ( $574.0 \pm 93.6$  days). However, overall calving interval was  $520.5 \pm 85.1$  days in River X Swamp Crossbreds in VietNam. In Philippine, Villegas (1959) has reported 429.2 days for calving

interval in Swamp X River Type Crosses (Philippine Carbao X Murrah Crosses). The differences of finding probably might be due to difference of strain of Swamp, blood level of Swamp in its Crossbreds, location, number of observations etc.

### Acknowledgement

Authors are thankful to the Govt. of Socialist Republic of VietNam and Govt. of India for taking their interest in dairy-industry through development of Murrah buffaloes in VietNam. Authors are thankful to Dr. N. V. Thuong, Director, Dr. N. D. Thac, Head, Buffalo Breeding Research, AHRI, Dr. N. V. Vuc, Director, and all staff members of SongBe-Centre, Mr. N. M. Dung, Mrs. L. N. Van, interpreters for their help.

### REFERENCES

- Fahimuddin, M. (1975). *Domestic Water Buffalo*, Oxford & IBH Publishing Co., New Delhi.  
 Ocampo, A.R. (1939). *Philipp. Agric.*, 28: 286.  
 Verma, R.P., Trieu, C.V., Cai, D.V., Quang, D.V. and Thin, C.X. (1984). *Inter. J. Biomet.* (Under Publication).  
 Villegas, V. (1959). *Philipp. Anim. Indus.*, 20: 89.



## Gynaeco-clinical Investigation of Repeat Breeder Cows and Buffaloes

F.S. KAVANI, H.J. DERASHRI and S.B. KODAGALI

Gujarat Veterinary College,  
Gujarat Agricultural University,  
Anand Campus, Anand

### ABSTRACT

The detailed gynaeco-clinical examination of 318 repeat breeder buffaloes and 81 repeat breeder cows revealed detectable problems in the genital organs to the extent of 40.67 per cent and 49.15 per cent, respectively as a possible aetiology. The over all incidence of vaginitis (1.88% and 28.39%), kinked cervix (19.38% and 25.92%), uterine affections (5.01% and 4.93%), salpingitis (1.88% and 1.23%), ovario-bursal adhesions (4.08% and 4.93%) and cystic ovaries (0.94% and 3.70%) was noted in buffaloes and cows respectively. It was revealed that with critical and careful clinical examination of repeat breeders, major disorders of genital tract were detectable. The disorders like vaginitis, mild kinked cervix and low grade infections could be managed, whereas severe fibrosed cervix, salpingitis, ovario-bursal adhesions and chronic cases of cystic ovaries were the extreme conditions found in chronic repeat breeders in which chances of recoveries were remote.

\* \* \*

Detailed clinical examination of the reproductive system is possible in most bovines and this provides the valuable information about reproductive status of the individual animal. With the emphasis to ensure optimum reproductive efficiency, especially in dairy herds,

routine examinations are frequently performed for which an appreciation of the normal genital organs is important.

The cyclic, functional or pathological changes and congenital or hereditary defects can be detected relatively easily by gynaecological examination. For this a clinician must be familiar with the anatomy, physiology and pathology of reproductive organs as well as he should possess sufficient clinical experience. Many of the changes can be ascertained if daily gynaeco-clinical investigations are made. However, following a single examination accurate diagnosis is not always possible.

### Materials and Methods

The Gynaeco-clinical investigation was carried out on 318 repeat breeder buffaloes (273 buffaloes and 45 heifers) which attended the college A.I. clinic during the period of three years (January 1980 to December, 1982). Eighty-one repeat breeder cows (58 cows and 23 heifers) were also investigated for genital abnormalities.

Animals which had completed 4 or more inseminations or natural services without pregnancy were investigated clinically. Breeding records pertaining to these animals were studied. After restraining and cleaning the vulva and perinium region, careful examination of genital organs was performed. Vaginal



**TABLE 1. Results of Clinical Examination of Repeat Breeder Animals**

No. of animals	Abnormalities detected									
	Vagina		Cervix		Uterus		Fallopian tube	Ovary and Bursa		
	Vaginitis (G.V.)	Hypo- plastic	Enlarged and Hard	Kinked	External cysts	Hard ute- rus with watery discharge	Salpin- gitis	Ovario- Bursal adhesions	Ovarian cysts	Para- ovarian cysts
Cows	28.39	1.23	43.20	25.92	1.23	3.70	1.23	4.93	3.70	1.23
(81)	(23)	(1)	(35)	(21)	(1)	(3)	(1)	(4)	(3)	(1)
Buffaloes	1.88	—	5.34	19.18	1.25	3.14	1.88	4.08	0.94	2.93
(318)	(6)	—	(17)	(61)	(4)	(10)	(6)	(13)	(3)	(9)

inspection and rectal palpation for detecting and visual and palpable disorders of vagina, cervix, uterine horns, fallopian tubes and ovaries were made. When detailed inspection was necessary speculum examination was carried out for knowing the changes in vaginal mucus membrane, external cervical os and the nature of the discharge if any.

### Results and Discussion

During the course of study 318 repeat breeder buffaloes and 81 repeat breeder cows were investigated. However, out of 318 buffaloes and 81 cows in 189 (59.43%) buffaloes and 42 (51.85%) cows respectively had no reproductive disorders which could be clinically detected. The abnormalities detected in repeating buffaloes were in the order of 1.88 per cent vaginal, 25.46 per cent cervical, 5.01 per cent uterine, 1.88 per cent tubal and 7.85 per cent ovario-bursal lesions. The details of reproductive disorders detected on clinical examination of repeating buffaloes and cows have been presented in Table — 1.

The frequency of occurrence of different detectable disorders in the reproductive tracts of repeat breeder buffaloes and cows varied considerably. The

granular lesions in the vagina were more marked in cows, whereas the incidence of kinked cervix was high in cows and buffaloes. A very high incidence of hard and fibrous cervix noted in cows was in agreement with the findings of Bhosrekar (1973). This might be due to repeated breedings in these animals.

It can be observed from results (Table 1) that on clinical examination of tubular genitalia (uterus) in the present study in repeat breeders did not reveal any gross changes. Hard uterus with watery mucus discharge was observed in 10 (3.14%) buffaloes and 3 (3.7%) cows, respectively. In all these cases oestrous period was longer than normal. The uterus was slightly enlarged and hard. This may be due to either high estrogenic effect for longer duration or chronic lesions in the uterus. The ovario-bursal adhesions were detected in very low frequency, and this finding is in agreement with the observations made by Bhosrekar (1973), but earlier report of Dawson (1956) showed bursal adhesions in larger percentage of repeat breeder cows.

It is suggested that vaginitis, mild kinked cervix, and low grade infections were the conditions amenable to treat-



ment, whereas severe ovario-bursal adhesions, cystic ovaries and fibrosed hard cervix were the extreme conditions of

chronic repeat breeders in which the chances of restoration of fertility are remote.

#### REFERENCES

- Bhosrekar, M. (1973). Investigation into the incidence and causes of repeat breeding in dairy cattle at N.D.R.I., Karnal. *Indian Vet. J.*, 50: 418-429.
- Dawson, F.L.M. (1956). The incidence of salpingitis and bursitis through a series of 200 permanently sterile cows with notes on its significance and on diagnosis. IIIrd Int. Congr. Anim. Reprod. & A.I. Cambridge, pp. 46-48.



## CASE REPORTS

IJAR 6: 1: 89-90 1985

### Persistent Hymen In A Camel

A.K. SHARMA, A. KRISHNASWAMY, S.K. KHAR, and S.K. VERMA,

Dept. of Veterinary Gynaecology & Obstetrics, Haryana  
Agricultural University; Hissar,  
125004; Haryana, India

Imperforate or persistent hymen—a developmental defect of the tubular genital tract—has been frequently described in cows and mares. The condition may be frequently associated either with segmental aplasia in cows or with an otherwise normal set of genitalia in cows and mares. The present paper records a case of persistent hymen in a camel.

#### CASE REPORT:

A four and a half year old nulliparous, she camel was presented to our clinic with the history of frequent appearance of a distended, glistening mass between the vulval lips, particularly when the animal lied down. The condition had been existing for at least two months and the frequency of its appearance between the vulval lips as well as the degree of distension had progressively increased over this period.

The animal was cast on its abdomen and the fore and hind legs were secured separately. Immediately after casting, a cone shaped, glistening, pink coloured mass appeared between the vulval lips (Fig. 1). The distended mass was soft, firm and fluctuating and easily replaceable into the vagina, but reappeared again with each abdominal contraction. Further examination of the vaginal passage revealed that the vaginal canal was completely obliterated from immediately anterior to the urethral orifice by a tough membranous partition.

Rectal examination revealed a marked distension of the vagina immediately caudal to the cervix and anterior to the membranous partition. No other palpable abnormalities of the cervix, uterus or the ovaries were detected.

#### TREATMENT:

The animal was tranquilized with 60 mg. of Triflupromazine hydrochloride (Siquil) Sarabhai Chemicals, Baroda, India administered intravenous. The tail was secured and the perineal region thoroughly cleansed with weak solution of potassium permanganate. A 2 cm. incision was made over the point of the greatest bulge and about two litres of mucus was seen to escape. A sample of the mucus, collected by aspiration through a sterile needle, was found to be negative for microorganisms on subsequent cultural examination. Complete draining of the genital passage was followed by enlargement of the incision at right angles in all four directions and the membrane was removed in pieces. The vaginal canal was irrigated with antiseptic solution and liberal quantities of Hostacycline Hoechst Pharmaceuticals, Bombay, India. powder (Tetracycline hydrochloride) was applied over the site.

Post operatively the animal received 4 million units of penicillin, intramuscular, for five days. The vaginal canal was examined every day with a vaginal speculum, in an attempt to dilate the





Fig. 1. Completely imperforate hymen in camel.  
The bulging is due to the accumulated fluids.

vulvo-vaginal ring. The animal was discharged after an uneventful recovery.

### Discussion

Imperforate or persistent hymen has been rarely described in camels. The animal presented, to us, had a completely

imperforate hymen with an otherwise normal set of genitalia. The vaginal distension immediately anterior to the hymenal partition indicated that the animal had probably cycled repeatedly with the consequent accumulation of the discharges posterior to the cervix. The age of puberty in female camels, about  $3\frac{1}{2}$  years., and a relatively short breeding season, would perhaps mean that the animal should have been cycling for about four months, during which period the fluid accumulation occurred. The appearance of the bulging hymen between the vulval lips was due to the great distension of the vagina resulting into frequent straining. That the fluid inside the genitalia was sterile indicated that there was no chance of infection setting is due to the complete blockage by the hymenal membrane.

Persistent hymen has been recognised as a development defect of the vagina and may be of hereditary origin. Cases of complete imperforate hymen often require surgical intervention. Although some veterinarians prefer removing the imperforate hymen by circular incision along the hymenal attachment with the vaginal walls., enlarging the hymen by incision at right angles in all four directions, as used in the present case, has been advocated more frequently.

### REFERENCES

- Roberts, S.J.: *Veterinary Obstetrics and Genital Diseases*. CBS Publishers & Distributors. India. pp. 465-466. 1971.  
 Rosedale, P.D.; Ricketts, S.W.: *Equine Stud Farm Medicine*. Bailliere Tindall, London. pp. 102-103. 1980.  
 Vyas, K.K.; Pareek, P.K.: Reproduction in camels: In *Reproduction in Farm Animals*. Sane et al (Eds). Verghese Publishing House, Bombay, pp. 874-883, 1982.



## A Cephalothoracopagus Monster In An Indian Water Buffalo (Bubalus Bubalis)

M.A. NOWSHAHRI, K.S. BEDI and R.D. SHARMA

Department of Obstetrics & Gynaecology  
College of Veterinary Science  
Punjab Agricultural University  
Ludhiana-141004 (India)

Different types of foetal anomalies and monstrosities have been rarely recorded and cited in cattle (Jubb & Kennedy, 1970; Roberts, 1971). Reports on incidence of monstrosities in buffaloes are scarce (Mahalingam, 1968; Sahu, 1968; Bhaskar Singh, 1973 and 1976; Rai *et al.*, 1975; Bugalia *et al.*, 1980; Sreemannarayana *et al.*, 1980; Nowshahri, *et al.*, 1984). The present report records a case of cephalothoracopagus monster in an Indian water buffalo (*Bubalus Bubalis*).

### *Case history, clinical examination and Obstetrical operation*

A pluriparous buffalo at partum after the local quacks had failed to deliver the calf even after amputation of three limbs, was presented to Veterinary College Clinics, Ludhiana. On pervaginal examination two more limbs and a head of quite a large size were discernible. It was diagnosed to be a case of foetal monster. Fetotomy was considered unsuitable and hence caesaritomy was performed and a conjoint twin monster was delivered.

### *General description*

The conjoint twin monster delivered possessed a pair of cranial with complete spinal column's, Four fore limbs (Three of which had already been amputated), Four hind limbs, two vulva and two

tails. Anus was discernible in one twin while there was atresia ani in the other. There was a fusion of the foetus ventrally. The fusion started from the head (Lower jaws) and extended to neck and thorax (Sternum to sternum). Emphysema of the fetus had already commenced.

### *Internal organs*

The Lower Jaw of one twin was complete and was adhered to a thin sheath of tissue and skin representing the lower jaw of the other twin. The buccal cavity of one twin had tongue while only remnant of tongue was present in the other buccal cavity. This buccal cavity ended in a blunt pouch. The trachea and oesophagus opened into the common thoracic cavity of the twins formed due to sternum to sternum fusion. The thoracic cavity also enclosed one heart, two lungs, one oesophagus and a common intact diaphragm. The abdominal cavity comprised of single liver, spleen, pancreas, gall bladder and intestines. Single Female genito urinary tract was present. It was comprised of two kidneys, two ovaries, two oviducts and two uterine horns with cervix and vagina.

### **Discussion**

The monster confirmed typical morphology of cephalothoracopagus as per





Fig. 1. Ventral opposition of crania due to fusion of lower jaws.



Fig. 2. Conjoint twin monster showing fusion of Lower Jaws, neck and thoracic region (Sternum to Sternum).

the classification of Potter (1961) cited by Roberts (1971). Roberts (1971) mentioned duplication of internal organs in such monstrosities as have also been observed by Dhingra *et al.* (1984). However, Arey (1966) stated that duplication of internal organs varies with intimacy

of fusion in twins.

Conjoined twins arise from single ovum and are monozygotic. The present case seems to be a teratologic defect of development arising from interruption of specific developmental stages that lead to incomplete twinning.

#### REFERENCES

- Arey, B.L. (1966). Developmental anatomy. W.B. Saunder's Co., Philadelphia and London and Toppan Co. Ltd., Tokyo, Japan. 197 pp.
- Bhaskar Singh, K.K. (1973). Some developmental abnormalities in domesticated mammals. *Ind. Vet. J.*, **50**, 853-844.
- Bhaskar Singh, K.K. and Christopher, K.J. (1976). Gastrothoracodidymus octipes—A Note. *Ind. J.*, **53**, 302-303.
- Bugalia, N.S., Verma, S.K. and Sharma, D.K. (1980). Amorphus globosus in a Murrah buffalo (*Bubalus bubalis*). *Haryana Vet.*, **19**, 119-120.
- Dhingra, S.O., Hukari, V.B. and Deshpande, B.R. (1984). A study on double monster and its internal organs in a buffalo. *I.V.J.* **61**(4), 346.
- Jubb, K.V.E. and Kennedy, P.C. (1970). Pathology of Domestic animals. Academic Press, New York, 2nd Edn. INC.
- Mahalingam, S. (1968). Conjoint Buffalo Twins. *Ind. Vet. J.*, **45**, 1047-1048.
- Nowshahri, M.A., Pangawkar, G.R., Gupta, P.P., Saigal, R.P. and Sharma, R.D. (1984). Craniofenstria in a twin fetus of Indian water buffalo (*Bubalus Bubalis*) (Under Publication).
- Potter, E.L. (1961). Pathology of fetus and infant. 2nd Edn. Year Book Med. Publisher, Chicago, III. (Cited by Roberts, S.J., 1971).
- Rai, M.T., Sunderavadanan, V.K. and Sastry, K.M.V. (1975). A case of bovine *Schistosomus reflexus*. *Ind. Vet. J.*, **52**, 504.
- Roberts, S.J. (1971). Veterinary obstetrics and Genital Diseases (Theriogenology). 2nd. Ind. Ed., Scientific Book Agency, Calcutta, India, 73 pp.
- Sahu, S. (1968). A Cephalothoracophagus Disymmetros Buffalo Calf. *Ind. Vet. J.*, **45**, 1046-1047.
- Sreemannaryana, O., Christopher, J., Narasimhamurti Raju, G. (1980). Double faced (Diprosopus) Buffalo Calf. *Ind. Vet. J.*, **57**, 512-513.



## Uterine Prolapse In A Mare

A. KRISHNASWAMY, S.K. KHAR, and A.K. SHARMA,

Department of Veterinary Gynaecology & Obstetrics, Haryana  
Agricultural University, Hissar; 125004, India

Uterine prolapse, a common postparturient complication in bovines and ovines, is considered to be rather infrequent in equines<sup>1</sup>. Its occurrence in this species is usually as a sequel to the forced extraction of the foetus or retained placenta<sup>2</sup>. The present report records a case of complete uterine prolapse following mid-term abortion in non-descript draft mare.

### CASE REPORT:

A six and a half year old pluriparous, non-descript draft mare was presented with complete uterine prolapse. The animal had aborted the same morning, a six and a half month old foal, and although the placental membranes were reported to have been expelled immediately after abortion, eversion and prolapse of the uterus occurred which was preceded by mild to moderate straining. The prolapsed organ was fresh and moist (Fig. 1) and no attempts had been made to replace the same. Examination of the prolapsed mass revealed no signs of injury, lacerations or haemorrhage. In spite of the mild recurrent straining the animal appeared alert with normal body temperature and respiration.

### TREATMENT:

The mare was restrained in a chute and tranquilized with Siquil Sarabhai Chemicals, Baroda, India. (Triflopromazine Hydrochloride) 60 mg. I.M. The tail was bandaged and epidural anaes-

thesia induced with 5 ml. of 2 percent Gesicain\*. SG Pharmaceuticals, Baroda, India. (Xylocain Hydrochloride). The perineal region was cleaned and the prolapsed mass was thoroughly washed with ice cold antiseptic solution. Antiseptic cream was liberally applied on the prolapsed mass, which was subsequently replaced by lifting and pushing with palm-pressure as in the bovines. Steclin Sarabhai Chemicals, Baroda, India. (Tetra-cycline Hydrochloride) bolus—2 g. was inserted into the uterine cavity and the vulvar lips were sutured with three zero silk using horizontal mattress pattern, closing 2/3ds of the vulvar opening.

After replacement of the prolapsed uterus, the mare was given 60 I.U. of posterior pituitary extract, three million units of procain penicillin and 1500 units of tetanus antitoxin, intramuscular.

Twenty four hours later, the mare was reported to be eating and drinking normally with no evidence of straining. The animal had also passed a small quantity of blood tinged uterine discharge. The antibiotic therapy and the local dressing of the vulvar sutures was continued till day 5 and the animal was discharged on day 6 after removal of the vulvar sutures and an uneventful recovery (Fig. 2).

### Discussion

Uterine prolapse in equines is considered to be rather infrequent, with most





1. Prolapsed uterus immediately after presentation at the clinic.



2. The prolapsed organ has been replaced and the vulva sutured.

of the isolated cases reported to occur during the immediate post-partum<sup>3,4</sup> period. A long mesometrium and flaccidity of the pelvic viscera and the perineum associated with parturition probably predispose certain mares to prolapse<sup>5</sup>. It has also been suggested that the free portion of the placental membranes, which remains hanging from the external genital orifice, exerts traction on the uterus and invariably leads to the uterine prolapse<sup>2</sup>.

However, in the present case the mare aborted at approximately six and a half

months of gestation and there was no evidence either of forced extraction of the foetus or of the foetal membranes. Therefore, none of the previously reported factors appear to be responsible in the present condition. However, in view of the general condition of the animal, the type of work for which it was used and the relative ease with which the prolapsed mass was replaced, it seems highly probable that the abortion followed by mild to moderate straining, which coupled with the uterine inertia resulted into eversion and prolapse of the uterus.

#### REFERENCES

- Roberts, S.J.: Veterinary obstetrics and Genital Diseases. 2nd Ed. Scientific Book Agency, Calcutta, 1971; p 308.  
 Arthur, G.H. et. al: Veterinary Reproduction and Obstetrics. 5th Ed. Bailliere Tindall, London, 1982; p 257.  
 Hastings, J; Miller, R.: Uterine prolapse in a mare. VM/SAC. 78:1118-1119; 1983.  
 Howlett, J.R.: Complete uterine prolapse in a mare. VM/SAC. 77: 655-656; 1981.  
 Oehme, F.N; Prier, J.E.: Textbook of large animal surgery. 1st Ed. Williams & Wilkins, Baltimore, Md. 1974; p 506.



## Fibro-Adenoma Of Cervix In A Kankrej Cow, A Case Report

H.J. DERASHRI, K.S. PRAJAPATI, F.S. KAVANI, A.J. DHAMI and S.B. KODAGALI

Gujarat College of Veterinary Science & Animal Husbandry,  
Anand Campus Anand-388001

### ABSTRACT

A case of fibro-adenoma of cervix in a Kankrej cow is reported.

\* \* \*

The incidence of pedunculated tumours in the bovine genital system is rare while as the cervical tumours are still rarer. Wadsworth (1952), Cotchin (1956) and Moulton (1961) described fibromas, fibrosarcomas, leiomyomas and carcinomas affecting bovine cervix. Jubb and Kennedy (1970) have reported carcinomas of uterus and cervix. Chenna Reddy (1980) reported a voluminous fibroma of vagina weighing 7 kg in a non-descript cow. Cervical tumour has been reported as a cause of infertility in cow by Chatterjee (1971). Arthur (1975) commented that such tumours of cattle reported were of benign type. Sharma *et al.* (1977) described tumours of cervix in buffaloes, during routine examination of slaughter house material. Kohli and Bishnoi (1980) reported similar tumour in a pregnant Rathi cow while Sindhayee (1982) reported in a cross-bred lactating cow. The authors present here a case of long pedunculated cervical tumour in a Kankrej cow, which was removed successfully by surgical intervention.

### CASE HISTORY AND CLINICAL EXAMINATION

An old pleuriparous dry Kankrej cow aged about 10 years (4th lactation) was presented to the Veterinary College, AI

Clinic, Anand (case No. 7987) on 13th of September, 1983 with the complaint that there was a cervico-vaginal prolapse and the animal was straining intermittently since last two days, hence brought for the treatment. The animal had calved two years ago and was served six months previously. There was no estrous exhibited afterwards.

The general body condition of the animal was poor. Visual examination revealed a fleshy mass soiled with dung and having bruised wounds with necrotic shreds hanging out from the vulvar lips (fig. 1). Rectal examination revealed that the cow was non-pregnant, uterine horns were flacid, cervix was enlarged and somewhat hard, and both ovaries were smooth, soft and flabby indicating typical anoestrus condition. A thick long peduncle was felt on ventral aspect of os uteri externus. Cleaning of the hanging mass with savlon solution confirmed that it was a irregular hard tumourous growth, weighing about 2 kg with a long thick peduncular stalk originating from the inner aspect of cervix.

### SURGICAL MANAGEMENT

The cow was restrained in the traxis and the operation was performed in standing position. The tumourous mass was cleaned thoroughly with plenty of savlon solution upto the cervix and was dried. Caudal epidural anaesthesia was induced with Novocain 7 ml injection





Fig. 1



Fig. 3



Fig. 2



Fig. 4. Microphotograph of tumour tissue showing extensive proliferation of fibrous connective tissue with cystic dilatations of the gland. 120 $\times$ H.E. stain.



in the first intercoccygeal space, after giving Siquil 3 ml I/M. After setting of anaesthesia, cervix was everted through vaginal passage along with the tumour (fig, 2). The tumour was found to be supplied with plenty of blood vessels. The prominent blood vessels in the stalk of tumour were ligated with catgut (chromic No. 2/0) at the base of stalk; then stalk was clamped with two artery forceps from both ends of the stalk close to the base. A bold incision was made close to the artery forceps and the pedunculated tumour with stalk was removed. Then the surgical wound was sutured with catgut (chromic size No. 2) to check the bleeding and then artery forceps were removed. The wound was dressed with dusting of 2.5 gm Dicrysticin powder and the everted cervix was placed back in position (fig, 3). Dicrysticin 2.5 gm daily in 20 ml of distilled water was infused in the cervix for consecutive two days. On inquiry after 15 days of

operation the animal had made an uneventful recovery.

## HISTO-PATHOLOGICAL EXAMINATION

Grossly the tumourous tissue when cut showed few cystic spaces of varying sizes filled with mucous like substance. Paraffin sections of tumour tissue were taken and were stained with routine H & E stain (Culling, 1963). On histopathological examination the tumour was identified as fibro-ademoma. Scattered focal areas of glandular acini lined by columnar epithelium were seen amidst extensively proliferated fibrous connective tissue (fig, 4). At places the acini were cystic and filled with mucous. No malignant changes could be noticed.

## Acknowledgement

The authors are grateful to Dr. M. R. Patel, Principal, College of Veterinary Science and Animal Husbandry, GAU, Anand for the facilities provided.

## REFERENCES

- Arthur G.H. (1975) *Veterinary Reproduction and Obstetrics*. IV Ed. The English Language Book Society and Beilliere, Tindall Co. London.
- Chatterjee S.N. (1971) A case of infertility due to cervical tumour in cow, IVRI, U.P. Vet. Magazine III(i) March 1971.
- Chenna Reddy, M.C. (1980) A case of uncommon voluminous vaginal fibroma in a nondiscript cow. *Indian Vet. J.*, 57 (10):861.
- Cotchin (1956) cited by Roberts.
- Culling, C.F.A. (1963) *Hand book of histopathological Technique*. II Sdn., Butterworths, London.
- Jubb, K.Y.P. and Kennedy, P.C. (1970) *Pathology of Domestic Animals*. Vol. I, Academic press, New York and London.
- Kohli, I.S. and Bishnoi, B.L. (1980) Pedunculated tumour (fibroma) of cervix in Rathi cow. *Indian Vet. J.*, 57(6):511.
- Moulton, (1961) cited by Roberts.
- Sharma, G.P., Vikram Reddy, M., Mohd. Hafeezuddin, Sudhir chandra Reddy, V., Sulochana, S. and Mahendrer, M. (1977). A note on fibroma of cervix in a buffalo cow. *Indian Vet. J.*, 54(9): 763.
- Sindhayee V.J. (1982) Cervical fibro-leiomyoma in a cross-bred cow. *Indian Vet. J.*, 59(7): 566-567.
- Roberts, S.J. (1971). *Veterinary Obstetrics and Genital Diseases*. 2nd Edn., Ithaca, New York.



## **Campylorachis Scoliosa—A Fetal Monster Causing Dystocia In Buffalo—A Case Report**

A.S. NANDA, R.D. SHARMA and K.S. ROY

Department of Obstetrics & Gynaecology  
Punjab Agricultural University  
Ludhiana

### **ABSTRACT**

Campylorachis scoliosa—a fetal monster seen very rarely in cattle and swine is reported for the first time in a buffalo. The 12 kg male dead monster, removed by cesarotomy in a buffalo suffering from dystocia, had laterally bent vertebral column, deformed fore limbs and complete ankylosis of all joints. Rest of the body was apparently complete except that testis were retained in abdomen, penis was missing and prepuce closed.

\* \* \*

Fetal monstrosities are quite common in domestic animals. A large number of fetal anomalies and monstrosities of cattle are enlisted by Roberts (1971) and Schistosomus reflexus, double monsters and Persosomus clumbis comprise the commoner gross abnormalities of obstetrical interest (Arthur et al, 1982). Various types of monstrosities of obstetrical interest that are on record in buffaloes include Schistosomus reflexus (Rai et al, 1975; Rao and Sreen, 1984), double monsters (Dingra et al, 1984), and Diprosopus (Sreemannaryana et al, 1980). However, the literature available lacks in reports on campylorachis scoliosa in buffaloes—a monster that very rarely occurs in cattle and swine. The present report puts on record the occurrence of this fetal monster causing dystocia in a buffalo.

### **Materials and Methods**

A five years old primipareus buffalo which had completed gestation period was presented to Veterinary clinics of Punjab Agricultural University for the treatment of dystocia. The water bags were ruptured and partial fetotomy had been done on limbs presented in birth canal by the field veterinarian a day before referring it to our clinics. According to history, this was the fourth such monster from four different buffaloes served by the same bull.

Per-vaginal examination of the case revealed a monstrous fetus with ankylosed limbs. The handling that had already been done caused lacerations and oedema of vulva and vagina. The stenosis of birth canal thus occurred rendered the case unfit for fetotomy. Cesarean was done and small dead monster was removed. The monster was weighed and preserved in 10% formaline for gross dissection. The dam was treated as routine and discharged on recovery.

### **Results and Discussion**

*Clinical Examination and treatment of dam:* Simultaneous presentation of head and hind quarters of a totally ankylosed fetus in an cedematous birth canal made the handling of the case more tedious. Eventually, cesarean section was done





Fig. 1. Laterally bent vertebral column in Campylorachis scoliosa — a buffalo fetal monster.



Fig. 2. Crossing over of fore limbs at the knees.

and the monster removed. Ankylosed monsters often cause dystocia where mutuation, force traction and fetotomy seldom succeed. Bugalia et al (1982) and Nanda et al (1983) also preferred cesarotomy to remove *Schistosomus reflexus*—a monster of similar contour, while Roberts (loc.-cit.) however, could deliver them by force traction and fetotomy.

**Gross Examination of Monster:** The monster was a male fetus weighing only 12 kgs. as against 29 kgs. average weight of a buffalo calf (Gururg and Johar, 1983). The vertebral column was bent laterally over the thorax region making a 'U' shaped curve in a way that head was resting against lumber region and nose was approximating the pelvis (Fig. 1). The pelvis was tapering posteriorly forming a cone and was notably small. The hind limbs were already amputated just below the hocks. The hocks and the rest of the limbs and vertebral column were ankylosed. The fore limbs were crossing over each other over the knees (Fig. 2). The rudimentary scrotum was present but without testis. The prepuce was closed. The rest of the body was apparently complete.

Detailed dissection were performed on the monster. It was found that all internal organs of skull, buccal cavity, thorax, abdomen and pelvis were present and size developed normally appropriate to the fetal size. However, both testicles along with respective epididymii were retained in abdomen. The penis was missing and prepuce was closed. Unlike *Schistosomus reflexus*, where liver is usually oversized and/or cystic, the liver was grossly normal with gall bladder.

Owing to the bend in the vertebral column and ankylosis of limb, this monster resembled with *Schistosomus reflexus* where the vertebral column is sharply bent dorsally and the abdomen is open at linea alba exposing the visceral organs. Unlike *Schistosomus reflexus*, this monster had a laterally bent vertebral column, fore limbs were deformed and *visceras were enclosed in a complete abdomen and was confirming the characteristics of Campylorachis scoliosa as described by Roberts (loc.-cit.).*

Cryptorchidism as seen in this case and ankylosis and death of fetus in last month of pregnancy is transmitted genetically (Thompson et al, 1957).



Nothing is reported about *Campylorachis scoliosa* being genetic or because of some environmental factors. However, the fact that four similar monsters were

born to two sisters and two more buffaloes in the same village when served by the same bull over a period of two years is suggestive of its being genetic.

#### REFERENCES

- Arthur, G.H., Noakes, D.E. and Pearson, H. 1982. Veterinary reproduction and obstetrics. 5th Edition; Bailliere Tindall, London.
- Bugalia, N.S., Verma, S.K., Khar, S.K. and Khan, M.Z., 1982. Haryana Vet. 21:38.
- Dhingra, S.C., Hukari, V.B. and Deshpande, B.R. 1984. Ind. Vet. J. 61: 346.
- Gurung, B.S. and Johar, K.S. 1983. Ind. Vet. J. 60: 205.
- Nanda, A.S., Sharma, R.D. and Bugalia, N.S. 1983. I.J.A.R. 3: 35.
- Rai, M.T., Sunderavadanan, V.K. and Sastry, K.M.V. 1975. Ind. Vet. J. 52: 504.
- Rao, A.V.N. and Sreem, A. 1984. Ind. Vet. J. 61: 80.
- Roberts, S.J. 1971. Veterinary Obstetrics and Genital Diseases. 2nd Edit. Sci. Book Agency, Calcutta.
- Sreemannaryana, O., Christopher, J., Narasimhamurti, R.G. 1980. Ind. Vet. J. 57: 512.
- Thompson, N.R., Cranek, L.J. Sr. and Ralston, N.P. 1957. J. Dairy Sci. 40: 56 (Cited by Roberts, 1971).



## Campylorachis Scoliosa Monster And Spontaneous Vaginal Rupture In A Goat

A.J. DHAMI, S.B. KODAGALI, K.N. VYAS and K. SUKUMARAN

College of Veterinary Science and Animal Husbandry,  
Anand Campus, Anand — 388001

### ABSTRACT

A case of spontaneous vaginal rupture at parturition associated with Campylorachis Scoliosa monstrosity with abnormally long and contracted limbs in a goat has, been reported.

\* \* \*

Campylorachis scoliosa is a foetal monster, rarely seen in cattle and swine, characterised by a lateral curvature of the spine and the limbs are usually deformed and ankylosed (Roberts, 1971). The spontaneous vaginal rupture at parturition due to such monster is uncommon. However, uterine rupture is seen in cases with malpositions which are difficult to correct. Verma and Khar (1972) reported ankylosis of fetal legs as a cause of dystocia and uterine rupture in a cow. Williams (1951) and Roberts (1971) described rupture of dorsal wall of vagina and uterus as a sequelae to foot nape posture, ventro-transverse presentation and dog sitting posture of the foetus. Singh and Purbey (1984) observed 3 cases of curved vertebral spine associated with prolonged deformed limbs in Muzzaffernagari sheep. As there were no reports on Campylorachis scoliosa monstrosity in the goat in the literature reviewed, the present one is reported.

### Case History

A she-goat, aged about 5½ years having delivered normal kids twice previously,

was presented to the Veterinary College, Hospital, Anand on 14th of February, 1985 (Case No. 12371) in the evening at 6.00 P.M. with the complaint that the animal was in full term pregnancy showing labour pain, severe straining and bleating very frequently since last evening without any progress in the process of parturition. The water bag had appeared and ruptured earlier. No efforts or manipulations were made to deliver the foetus.

### CLINICAL EXAMINATION- DIAGNOSIS & TREATMENT

The goat was dull, depressed, anxious and was straining and bleating frequently. Per-vaginal examination, after applying sufficient quantity of Fairginol obstetrical cream on the gloved hand, revealed a transverse tear of about 4-5 inches long on the dorsal wall of vagina just behind the os through which all the four limbs had gone below the rectum, the foetal head could not be located. Cervix was fully dilated and scanty fluid was present in the birth canal mixed with blood. Due to the presence of four limbs simultaneously into the birth canal a double monster or twin pregnancy was suspected.

Further examination by repulsion of the foetus showed that there was a single foetus which was presented in anterior longitudinal presentation, dorso-sacral position and both the hind limbs were extended simultaneously beneath the





Fig. 1

foetal body and into the birth canal along with extended forelimbs. The head was severely deviated downward between the forelimbs reaching the sternum (Fig. 1). The spinal column of the foetus was found to have a "S" shaped dorso-lateral curvature. All the joints and spinal column were very rigid. The limbs were found to be excessively long and rigid. The correction of the deviated head and limbs was tried through birth canal. The head deviation could be corrected with great difficulty but the limbs could not be corrected because of rigidity. The deformed, dead foetus was then delivered by gentle traction on the forelimbs with a hand pressing the hind limbs inside to prevent their simultaneous progression as the repulsion and correction was not possible. The part of the placenta came out immediately behind the foetus but rest of the placenta was not completely separated and a little amount of bleeding was observed. The tear of dorsal wall of vagina was sutured by everting the cervix and vagina through vulvar canal. Injection Caldee-12 10 ml S/C, Oxytocin 25 i.u. I/M and Oxysteclin 5 ml I/M were given to hasten the involution of uterus and to combact infection. Two Furea boluses were inserted into the



Fig. 2

uterus. As there was no bleeding and the animal stopped straining, the animal was not hospitalized but the owner was advised to bring the animal for further treatment.

#### GROSS EXAMINATION OF MONSTER KID

The monster was a male kid with wattles and confirmed the description of *Campylorachis scoliosa* described by Roberts (1971). The kinking and ankylosis of vertebral column with dorso-lateral deviation involving posterior half of thoracic and first two lumbar vertebrae (Fig. 2) was distinctly visible. There was dorsal flexion of fetlock joints due to contracted digital extensor tendons. The radiological findings were confirmed by detailed dissection. The right testis was located in the inguinal canal while left one was fully descended into the scrotum. The head, tail and the other viscera were almost normal. However, due to the vertebral deformity the topography of various thoracic and abdominal viscera, was slightly altered.

#### Acknowledgement

The Authors are greatly indebted to Dr. M. R. Patel, Principal, Gujarat Veterinary College, Anand for the facilities provided.



## REFERENCES

- Roberts, S.J. (1971). VETERINARY OBSTETRICS AND GENITAL DISEASES. 2nd Edn. CBS Publishers — distributors, India. P. 307-308.
- Singh., A.P. and Purbey, L.N. (1984). A study on dystocia, retained placenta and foetal malformations in Muzaffernagari sheep. Indian J. Anim. Reprod., 5(1): 103-105.
- Verma, S.K. and Khar, S.K. (1972). Ankylosis of foetal legs and uterine rupture in a cow. Indian Vet. J., 49(10): 1058-1060.
- Williams, W.L. (1953). VETERINARY OBSTETRICS. 4th Edn. George Banta Publishing Co., Wisconsin.



## Duplication of Right Hind Limb In a Cross Bred Jersey Calf

M.R.K. IYER

Superintendent, District Livestock Farm, Kodappanakunnu, Trivandrum

Developmental anomalies have been reported by Jubb and Kennedy 1963 and Christopher 1971. Since it is a fascinating subject a case of duplication of right hind limb in a cross bred Jersey calf is reported.

A Jersey cross bred cow aged 6 years had normal calvings thrice before and with a gestation period of 290 days was presented with the history that calving did not take place inspite of prolonged straining. The animal was off feed since morning and the temperature was 38°C. Per vaginal examination revealed unruptured bag and breech presentation. On rupturing the water bag the presence of additional hind limb could be felt. Both the well developed hind limbs were corrected and by judicious traction the calf was removed.

The calf was female, fully grown but weak and weighed 28 Kgs. Except for an accessory right hind limb and horny growth measuring 4×1.5 c.m. on the internal aspect of left metatarsal no other defect were visible. The accessory limb was placed posterior to the right hind and the hoof tip was facing forwards. Detailed examination revealed the presence of extra acetabulum, all bones and joints. All the bones compared with the healthy right hind were proportionately shorter and the hoof was placed 8 c.m. above the ground level. All joints except the hock and stifle were well formed. The hock joint was less angular and tubercalcis very short. The two



stifle joints were placed in a line and the distance between the two were 9 c.m. (Photograph of the calf is enclosed).

According to the owner, the calf succumbed suddenly on the fifth day due to convulsions and planned amputation of additional limb at the stifle region could not be carried out.

According to Jubb and Kennedy (1963) the skeleton develops by a complex process from the mesenchyma and hence there is ample opportunity for error. A calf with a parasitic limb was illustrated by Roberts (1956) and an extraneous limb like appendage with a horny clubbed extremity was reported by Misra et al (1984) in a murrha buffalo calf. This case differs significantly from others since the accessory limb has all the bones and joints.

A case of duplication of right hind limb in a cross bred Jersey Calf is reported.



### **Acknowledgement**

The author is thankful to Dr. N. K. Unni, retired Director of Animal Hus-

bandry and Dr. N. Madhavan Nair, Deputy Director for the encouragement.

### **REFERENCES**

- Jubb, K.V.F and Kennedy, P.C. (1963) Pathology of domestic animals Vol. I. Academic press, New York and London.
- Christopher, K.J. (1971) J. Anat. Sci. India. 20.33
- Roberts, S.J. (1956) Veterinary obstetrics and genital diseases, Published by the author Ithaca, New York.
- Misra A.S. and Angelo, S.J. (1984) Indian. Vet. J. 61. 347.



## Unilateral Orchitis In Bucks

JOSEPH MATHEW, E. MADHAVAN and C.P.N. IYER

Department of Animal Reproduction,  
College of Veterinary & Animal Sciences,  
Mannuthy, Trichur, Kerala

### ABSTRACT

Acute unilateral orchitis noticed in two Alpine bucks maintained in the AICRP on Goats, Kerala is described. In one case unilateral removal of the affected organ was done and in the other only broad spectrum antibiotics and allied treatments were tried. In both the cases the animals died within a short span due to affection of the vital organs like lungs and kidneys.

\* \* \*

Two cases of acute unilateral orchitis noticed in Alpine Bucks belonging to the All India Co-ordinated research project on Goats, Trichur, Kerala are presented in this paper. The therapeutic measures adopted and the gross and histopathological lesions of the condition are also documented.

#### Case 1.

The Buck No. A 58 showed hot and painful swelling on the left side of scrotum (Fig. 1), and was diagnosed as left lateral orchitis. A course of broad spectrum Antibiotics was started for treating the acute inflammatory reaction. On the second day the inflamed left testicle was removed by open method of castration. Antibiotic treatment was continued but the condition of the animal became poor and the animal died three days later.

The affected left testicle together with its tunics removed during the surgical

operation was about 2 to 3 times larger than the right testis. The organ when cut into two longitudinal halves revealed thickening of the parietal layer of tunica vaginalis and a thick gelatinous material between the parietal and visceral layers (Fig. 2). The thickness of this gelatinous material increased to about 3 cm. ventrally near the cauda but it reduced gradually and was almost completely absent on the posterior aspect of the testis. The cut surface of the testicular parenchyma revealed slightly reddish and congested appearance with only poor bulging of the cut surface. While incising the caput epididymis, a cavity, 1.5 cm. in diameter, containing yellowish creamy material was noticed on its lateral side. From the cut surface of the cauda, blood-tinged, thick whitish material oozed out. There was severe congestion and reddening of the cauda.

Histopathological examination of the testis revealed severe degenerative changes characterized by almost complete desquamation of the epithelial lining of the seminiferous tubules. The desquamated cells had highly condensed, hyperchromatic nucleus and vacuolated cytoplasm. Sections of the caput epididymis near the cavity revealed typical granulomatous reaction characterized by the presence of a large number of macrophages and few giant cells, as described by cohns (1967). Sections of the cauda revealed





Fig. 1 Left lateral orchitis

severe congestion and infiltration of neutrophils and few mono-nuclear cells.

The failure to save the life and reproductive capacity of the animal by unilateral removal of the affected testis (Lagerlof, 1934) might be due to primary infection already present in other vital organs as revealed by the presence of nephritis and multiple abscess in the spleen and lungs on post mortem examination.

#### Case 2.

The Buck No. A. 62 developed sudden hot swelling of the right testis. The animal was treated with broad spectrum antibiotics parenterally and application of Mag. Sulp. glycerine externally on the scrotum. Although the swelling was reduced considerably the semen picture revealed continuous deterioration in quality, suggestive of severe degenerative changes in the testis. The animal died 1½ months after the onset of the condition.



Fig. 2 Thick gelatinous natural leturow the layers of tunica Vaginales.

The cause of death was due to acute congestion and oedema of the lungs together with multiple abscesses in the spleen.

The testicles were very hard to feel. On sectioning, both testes revealed numerous whitish gritty areas in the parenchyma. Histopathological examination of the testicles revealed severe degeneration of the seminiferous tubules. The tubules were lined only by a single layer of sertoli cells. Prominent calcification of the desquamated contents was also noticed at many areas. The epididymis revealed chronic inflammatory changes characterized by prominent inter tubular fibrosis with infiltration especially of mononuclear cells around the epididymal tubules. The failure of saving the animals reproductive capacity with antibiotics and allied therapy might be due to the reversion of acute inflammation into a chronic form and extending into both the gonads.

Both the animals in the present study were checked and were found free of *Brucella* infection. It could be presumed from the course of events of the disease



and the post mortem findings that the affection of testicles in both the case could be due to a sequale of generalised infection.

#### Acknowledgement

Grateful acknowledgement is made to Dr. M. Krishnan Nair, Dean, for the facilities provided.

#### REFERENCES

- Cohrs, P. (1966) *Nieberle & coh's Text book of the special Pathological Anatomy of Domestic Animals*. Pergamon Press, Oxford, 1st English Ed.
- Lagerlof, N. (1936) Sterility in bulls. *Vet. Rec.* **48**: 1160-1173.



## A Case Of Bifid Scrotum In A Young Rathi Bull

KOHLI, I.S.

Department of Obstetrics & Gynaecology  
College of Veterinary and Animal Science, Bikaner

Though on the whole quite a voluminous literature is available on the malformation of the genital organs in a bull but not much has been reported specifically on the scrotum. A case of bifid scrotum in a buffalo bull had been reported by Kohli and Rajwanshi (1967).

### *Case Report*

A young Rathi cow bull, aged about  $1\frac{1}{2}$  years was brought to the Gynaecology outdoor clinic of the College along with two cows which the owner wanted to get treated for purperial infections. The young bull was dark brown in colour and its scrotum was bifid (Fig. 1). Both the testicles were well developed and were freely movable in the scrotum.

In this case there was no rotation of the scrotum on its longitudinal axis while the case of bifid scrotum in a buffalo bull reported by Kohli and Rajwanshi (1967) had a rotation of  $90^\circ$  to its left.



### REFERENCES

KOHLI, I.S. and RAJWANSHI D.S. (1967). A case of bifid scrotum in a buffalo bull. Indian vet. J. 44(3):257.



## FARM NEWS

### Timing Of Parturition In Surati Buffalo

LALITA V DESHPANDE and K JANAKIRAMAN

Reproductive Biology Research Unit  
Faculty of Veterinary Science and Animal Husbandry  
Gujarat Agricultural University Anand

At the time of parturition the farm animals deliver a vulnerable young one. Under natural conditions the timing of parturition are so arranged, as to limit the vulnerability of the newborn, hence more births occur during night than during the day (Fraser, 1968). In cattle higher percentage of calvings have been reported during night hours by McDonald (1971). But Edwards (1979) reported equal distribution of calvings throughout the 24 hours.

In buffalo the frequency of calving during various parts of the day has received little attention. The knowledge of the peak hours of calving would help the farm personnel, in giving proper care to the newborn (e.g. timely feeding of colostrum) and assistance required if any, to the dam at the time of calving.

Bhuller and Tiwana (1984) have reported that buffalo calves born during day time are provided with better care by animal house staff, which is reflected by the lower mortality rate in the calves born during day time as compared to the higher mortality rate in the calves born during evening and night hours.

Further weaning of the newborn calf from the dam is being regularly practiced at most of the organized buffalo farms. If the calf suckles the dam, weaning becomes difficult later on. Knowledge

of the timing of parturition especially the peak hours will help personal attention at the required time to wean the calf.

In the present study the data on 94 normal calving with the birth of viable calf in Surati buffalo are reported. The animals included, ranged from primipara to those with 6 calvings. They were maintained under standard managemental conditions. The buffaloes approaching calving were isolated to facilitate better observations. The time of calving was recorded for each birth. All the parturitions were single births and occurred with anterior, normal presentations, except in one case where the presentation was posterior.

When the frequency distribution for calvings during 24 hours of the day was worked out, it pointed out that though the calving frequency is located almost at all hours of the day, the clustering occurred between 2 to 3 (10 calvings) and 20 to 21 (7 calvings) hours.

The data was further grouped and for each 6 hour period, the percentage of calvings was worked out as detailed in Table-1.

In this particular study out of 94 observations maximum (29) number of calvings occurred between 6 to 12 hours, followed by 27 calvings during 0 to 6 hours. Almost equal number of delive-



**TABLE 1: Frequency of calving**

Sr. No.	Hours of the day	Numbers of calvings	Percentage of calving
1.	0 — 6	27	29.0
2.	6 — 12	29	31.0
3.	12 — 18	18	19.0
4.	18 — 24	20	21.0
Total		94	100.0

ries occurred between 18 to 24 and 12 to 18 hours.

The day and night frequencies of calving were equal (50% each). However it appears that the period between 0 to 12 hours is preferred by buffaloes, when 60% of the total calvings occurred.

Interestingly, out of the total 94 calvings, 25 parturitions (27%) occurred on weekends (Saturdays and Sundays), which indicates the need to attend to the animals on odd days also.

Finally, the data makes it evident that in buffaloes the calvings are spread throughout the 24 hours of the day with maximum calvings between 2 to 3 a.m. probably due to least disturbances. And although the frequency of calving is equal during day and night, the period from midnight to midnoon is more favoured making it evident that arrangements must be made, especially during odd hours to attend the prospective calvers, to help proper weaning, reduce complications and calf mortality.

#### REFERENCES

- Bhuller, MS and Tiwana MS (1984). Note on the factors affecting mortality among buffalo calves. Research Report. Dept. Animal Science, Punjab Agricultural University, Ludhiana (April 1982 — March 1984) pp. 42-45.
- Edwards, SA (1979). The timing of parturition in dairy cattle, J. Agric. Sci. 93: 359-363.
- Fraser, AF (1968). Reproductive behaviour in Ungulates. Academic Press New York 1st Ed. pp. 113-131.
- McDonald, LE (1971). Veterinary Endocrinology and Reproduction Lea Febiger, Philadelphia 1st Ed. pp. 402-403.



## ISSAR NEWS

### 1. ANNOUNCEMENT OF THE ASIAN CONGRESS NOTIFICATION

ISSAR is pleased to announce that the FIRST ASIAN CONGRESS ON ANIMAL REPRODUCTION will be organised in association with I.C.A.R. and Konkan Agricultural University, Dapoli at Bombay on 11th., 12th., & 13th. December, 1985. Last date for receiving the abstracts of Scientific articles is 31st. August, 1985 and for full Text of the paper 30th. Sept. 1985. Delegation fee is Rs. 200/- upto 31-8-85 and Rs. 225/- upto 30-9-85 and Rs. 250/- after 1-10-85 (including spot registration).

Scientists from Asian Countries are expected to participate in the congress.

For further details, please contact the undersigned. Venue of the congress:-New Complex of the Bombay Veterinary College, at Aarey Colony, Bombay-400 065.

(Dr. D. P. Velhankar)  
Hon. Sec. I.S.S.A.R. &  
Organising Secretary

2. It is experienced that the journal issues are returned back undelivered. The members are earnestly requested to communicate change in their address to avoid necessary postal expenditure and delay.

Dr. D. P. Velhankar)  
Hon. Secretary ISSAR

3. Prof. C. R. Sane and Dr. B. R. Deshpande were invited for the All India Symposium on Cross Breeding and Embryo Transfer Technology organised by the Rajasthan Cooperative Dairy Federation held at Jaipur on 16th. & 17th. NOV-1984. Prof. Sane delivered the key note address and Dr. B. R. Deshpande chaired the sessions on Panel discussion on A.I. and Embryo Transfer Technology.

It is to the credit of ISSAR that the proposal submitted to the Govt. of Rajasthan for opening one more Veterinary College, has been accepted by the Rajasthan Govt. A communication to this effect has been received from the Director of A.H. Rajasthan State.



#### 4. ISSAR NEWS:

Congratulations to Dr. A. Ramamohana Rao:

ISSAR feels happy that Dr. A. Ramamohana Rao has assumed the charge of the Dean, Post-graduate Studies, Andhra Pradesh Agricultural University, Rajendra Nagar, Hyderabad. On behalf of the members of ISSAR we convey him Hearty Congratulations and Best Wishes.

Dr. D. P. Velhankar  
Hon. Sec. ISSAR

#### 5. LIST OF PARTICIPANTS OF THE 16TH SWEDISH INTERNATIONAL POSTGRADUATE COURSE ON ANIMAL REPRODUCTION- 1985

Otavio Mitio Ohashi	Brasil
Li Chih Fu	China
Eulogio Padron Moreira	Cuba
Merga Bekana Gonfa	Ethiopia
Tapan Kumar Barthakur	India
Ashok Wasudeorao Deshmukh	India
Gurdial Singh Randhawa	India
Logeswaran s/o Vannyasingam	Malaysia
Pedro Henrique Antonio Halar	Mozambique
Angel Alberto Tornamira Romero	Peru
Hussein Mohamed Nur	Somalia
Duwearachchige Ajantha Melani Hewakopara	Sri Lanka
Sunanda Sirimathie Weerathunga Wakista	Sri Lanka
Elamin Dafalla Gasm Elseed	Sudan
Nussara Vadhanakul	Thailand



## **Obituary**

### **Biodata of Dr. Sundaresan**

It is with great measure of shock to learn the untimely passing away on 1st March 1985 of Late Dr. Devadasan Sundaresan who was Director of NDRI, Karnal up to 30th June 1981.

Dr. Sundaresan was born on 10th March 1925. He graduated from the Allahabad Agricultural Institute in 1946. . He obtained his master's Degree from Kansas and Ph.D. in 1959 from Iowa State Univcrsity.

Dr. Sundaresan served as Research officer, Animal Breeding at NDRI, Karnal till 1964. Afterwards he joined the PAU and HAU where he served as Dean and Director of Research between 1964-70. From Nov. 1970 he served as Director, NDRI, Karnal till 30th June-1981. Dr. Sundaresan had number of FAO assignments.

After his retirement from NDRI he had joined Allahabad Agricultural Institute as Director in 1982.

In his passing away the NDRI has lost one of its most distinguished builders. His dedication will long be remembered in the cause of Agricultural Research and and education in India and abroad .

The members of ISSAR share the sorrow and pay their Homage.

May his Soul rest in peace.



## DECLARATION

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

### FORM NO. IV (Rule No. 8)

- |  |   |
|--|---|
| 1. Place of Publication                      | Editorial Office:<br>Dept. of Gynaecology & Obstetrics<br>Gujarat Veterinary College, Anand |
| 2. Periodicity of Publication                | Bi-annual (JUNE & DECEMBER)   |
| 3. Printer's Name<br>Nationality<br>Address  | Anand Press, Gamdi<br>Anand-388 001   |
| 4. Publishers Name<br>Nationality<br>Address | Dr. D. P. Velhankar<br>Indian<br>Bombay Veterinary College, Bombay 400 012                  |
| 5. Editor's Name<br>Nationality<br>Address   | Prof Dr SB Kodagali<br>Indian<br>Gujarat Veterinary College, Anand-388 001                  |

Names and addresses of individual who own the news-paper 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

Regd. No.: Bom. 253/78

Office:

Dept. of Animal Reproduction  
Bombay Veterinary College Parel,  
Bombay-400 012

I Prof Dr SB Kodagali, 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.

PROF DR SB KODAGALI  
Editor

The Indian Journal of Animal Reproduction  
The Indian Society for the Study of Animal Reproduction



FOR HIGHER FERTILITY RATE  
&  
FULL UTILISATION OF MINERALS  
USE  
VITABLEND AD 3  
High Concentrations of Vitamins A & D3



ANIMAL HEALTH DIVISION

Glaxo Laboratories (India) Ltd.,  
Bombay



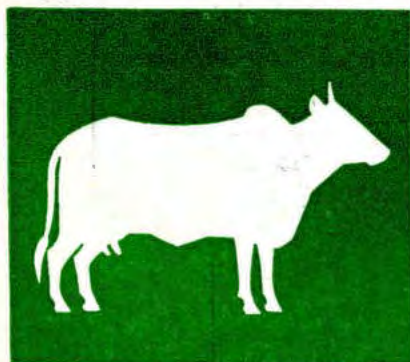
Another versatile product  
from **May & Baker**

# **antrima\*** Bolus

a comprehensive antibacterial

The drug of choice in Calf Scours, Metritis and other bacterial infections.

Antrima bolus is available in two strengths  
1.2 g. and 2.4 g. each bolus containing  
Trimethoprim and Sulphadiazine in  
1:5 proportion.



Marketed by:

**M&B** May & Baker

**MAY & BAKER (INDIA) LIMITED**

Bangalore • Bombay • Calcutta • Hyderabad • Indore • Jaipur • Lucknow  
Madras • New Delhi • Patna

\* Trade mark



**FERTIVET**

(FVT 300) Tablets  
POSTPARTUM  
ANOESTRUM  
Repeat Breeders  
Delayed Puberty  
Ovulatory Heat

**FLUKIN**

Tablets  
Hexachlorophene  
100 mg.  
Liverfluke infections  
in sheep & calf.

**FLUKIN FORTE**

Tablets  
Hexachlorophene 1 G.  
Liverfluke infections  
in Cattle

**MOVIROM**

Ruminal stasis  
Pot. Anti Tartarate  
Ferrous Sulphate  
For Normal ruminal  
movements

**SULPHA-  
DIMIDINE**

BOLUS 5G. Bacterial  
infections. Cattle,  
Systemic Sulpha  
treatment

**FARM ANIMALS****STOPIT**

Triple Carb, Kaolin,  
Tamarind Pectin,  
Sulphaguanidine  
GASTRITIS,  
DIARRHOEA  
GASTRO-ENTERITIS

**PIVIPOL**

Povidine-Iodine wash  
Mastitis, Metritis,  
Skin Burns,  
Dermatitis  
Surgical AID

**THIABEN-  
DAZOLE**

PRODUCTS  
Broad Spectrum  
Anthelmintic

**BONYVET**

Colloidal Calcium Vit  
A, D, B<sub>12</sub>. Calcium  
Deficiency Disease

**DIMDIM**

16% Dry Solution  
Sodium  
Sulphadimidine  
Coccidiostat of  
Choice

**POLMIX-B**

Poultry feed additive  
Chemical Stimulation  
of Hypothalamus.  
Faster growth of  
Broilers 2 Week  
treatment

**POLMIX-L**

Extends Eggs laying  
Peak. 31st & 32nd  
Week (2 week  
treatment)  
Stimulates G n R H

**POULTRY****PIPIROCID**

Piperazine  
Hexahydrate  
Anthelmintic as  
Routine.

**AR-EX LABORATORIES PVT. LTD.**

Sitaladevi Temple Road, Mahim, Bombay 400 016





**THIS PACK DESIGN**  
covers  
**Pfizer quality products of worldwide repute**  
for  
**DAIRY ANIMALS**  
in India

.....  
**TERRAMYCIN\* INJECTABLE SOLUTION**

oxytetracycline

**TERRAMYCIN\* Animal Formula TABLETS**

**TERRAMYCIN\* LIQUID**

**TERRAMYCIN\* OINTMENT**

**MASTALONE\***  
.....

**BANMINTH\* II**

**DISTODIN\* TABLETS**

**VERMEX\* LIQUID WORMER**  
.....

**ANOREXON\* TABLETS**

**RUMENTON\* TABLETS**

**DIADIN\* TABLETS**

**MINMIX\***  
.....

**THERE'S A PFIZER PRODUCT TO SERVE YOU — BETTER!**

**pfizer**

\* Trademark of Pfizer Inc., U.S.A.



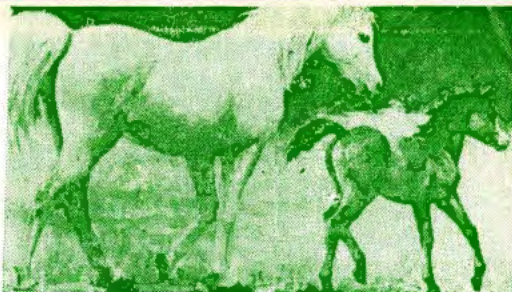
# Liv.52<sup>®</sup>

## AN INVALUABLE SUPPLEMENT TO FOALS' FEED

All weak and some normal foals were kept on Liv.52. There was very satisfactory gain in body weight.

Liv.52 is a most necessary supplement in a foal's diet.

Chenoy D., Manager,  
The Manjri Stud Farm Pvt. Ltd.,  
February 1, 1968.



PIONEERS IN DRUG CULTIVATION AND RESEARCH SINCE 1930



**THE HIMALAYA DRUG CO.**  
SHIVSAGAR 'E', DR. A.B. ROAD, BOMBAY 400 018

<sup>®</sup> Regd. Trade Mark

## The transformation

**From darkness into light...**



**from unbearable heat into cool comfort...**



**arid acres into fertile land...**



**desolate land  
into humming project...**



**Compton Greaves**



*With Best Compliments*

*From*

## **Development Corporation of Konkan Ltd.**

**(Govt. of Maharashtra Undertaking)**

5th Floor Warden House, Sir P. M. Road, Bombay-400 001

Tel: 298834, 298824, 298862

Dairy Project at Unit No. 16, Aarey Milk Colony, Goregaon East,

Bombay-400 065

Tel: 691275

### **Activities :**

- 1) Dairy Project consisting of HF & JY Pure Bred cows from Australia.
- 2) Frozen Semen Bank and Liquid Nitrogen Plants.
- 3) Frozen Semen AI Centres in Konkan Region.
- 4) Undertakes training of inseminators.
- 5) Undertakes training of Farmers in modern husbandry practices.  
Residential accomodation for participants in the project.
- 6) Frozen Semen of HF, JY, Cross Bred, Murrha and Liquid Nitrogen available.



### "VIDEO CASSETTE ON EMBRYO TRANSFER IN SHEEP,"

The Sheep and Wool Research and Development Division of The Raymond Woollen Mills Limited had under-taken pioneering work in Embryo Transfer of Sheep on large scale. With a view to propagate this technology to various educational institutions and Animal Husbandary departments we have prepared a forty minutes Video Cassette on the complete technology of Embryo Transfer in Sheep. The Cassette highlights the various steps involved in the technique of Embryo Transfer such as:

- 1). Synchronization of donor and recipients.
- 2). Collection of semen and surgical insemination in donor ewes.
- 3). Collection of Embryos from donor ewe.
- 4). Morphological Examination of Embryos.
- 5). Transplantation of Embryo in recipient ewes.
- 9). Results.

This Video Cassette was even shown to about 1000 Gynaecologists coming from all over the World at the "Fourth World Congress on Human reproduction," which was held at Bombay from November 26th to December 2nd 1983.

Those who are interested in seeking a copy of this Video Cassette should communicate at the following address at the earliest possible, The cost per copy of this Video Cassette is Rs. 500/-

#### *Address:*

**Dr. S. G. Zawar.**  
**Dairy Development Manager,**  
**Raymond's Cattle Embryo Transfer Centre,**  
**GOPALNAGAR, 495663.**

**Dist: BILASPUR. (MADHYA PRADESH).**  
**INDIA.**



**INNOVATIVE  
ARTIFICIAL INSEMINATION EQUIPMENTS  
BROUGHT TO YOU  
BY  
PLASIKRAFTS**

- \* STRAWS AND SHEATHS MADE FROM LATEST ELECTRONICALLY OPERATED MICROPROCESSOR CONTROLLED FULLY AUTOMATIC PLANT, FOR THE FIRST TIME IN INDIA.
- \* PRODUCTS SUCCESSFULLY IN USE AT SO MANY RENOWNED A.I. CENTRES ALL OVER INDIA.

***FOR MORE DETAILS PLEASE WRITE TO***

**BAL KRISHAN PLASIKRAFTS**

F-4, DSIDC, INDUSTRIAL COMPLEX,  
ROHTAK ROAD, DELHI-41.

GRAM; 'PLASIKRAFTS' DELHI-41

PHONE: 67673



**AROGYA  
PHARMACY  
ANIMAL HEALTH DIVISION**

**MANUFACTURERS OF AYURVEDIC VETERINARY MEDICINES AND  
FEED SUPPLIMENTS**

**OUR PRODUCTS**

**SHAMATONE**

**AROXAR**

**AROLICKS**

**CO-CO-FORTE TABLETS- FOR INFERTILITY**

**AROWORM**

**AROMILK FLOW**

**ARO DIA DYS**

**AFMO OIL**

**ARO TYMPANY**

**ARO LIV-32**

**ARO COUGH CURE**

**SUPRAJANA CAPSULES- FOR INFERTILITY**

**ARO TIC DOG POWDER- FOR TICKS, LICE & FLEECE ON DOGS,**

**TONIC POWDER**

**MINERAL MIXTURE**

**MINERALISED SALT BLOCKS**

**BROAD SPECTRUM ANTHALMINTIC  
FOR ALL TYPES OF WORMS.**

**GALACTAGAUGE**

**FOR NON SPECIFIC DYSENTRY**

**CURATIVE OIL FOR FMD**

**FOR TYMPANITES**

**FOR LIVER TROUBLES**

**FOR COUGH & BRONCHITES**



# SABAR PHARMACEUTICALS

comes in the service of  
Veterinary profession & for CARE & CURE of  
your milch, draft & pet animals.....  
by presenting a wide range of  
renowned **VETERINARY** medicines.

- ♦ **FERTISA non-hormonal** Heat inducing & Fertility Index improving Tablets.
- ♦ **URINO-VET** For Urinary Calculi, Diuretic & Urinary Antiseptic Tablets.
- ♦ **LAXO-VET** Demulcent & Purgative Tablets.
- ♦ **ENTRISA vet** Anti-Diarrhoeal Tablets.
- ♦ **LIVETSA forte** Liver Stimulent Tablets.
- ♦ **DIGESTISA vet** G.I. Tract Tonic.
- ♦ **VETODERM** Antiseptic skin Lotion for MANGE.
- ✱ **PURE AYURVEDIC PREPARATIONS.**
- ✱ **QUITE SAFE**
- ✱ **NON—TOXIC**
- ✱ **NO SIDE EFFECTS OR AFTER EFFECTS.**
- ♦ **VETOCZEM** Germicide & Scabicide Ointment
- ♦ **DERMOCID vet** Antiseptic Dressing Powder
- ♦ **VETODEX** Analgesic Ointment
- ♦ **VETROXIL** Rubefacient

For further details or Therapeutic Index,

Please write to: **SABAR PHARMACEUTICALS**

"Chaitanya-Kunj",  
Near Sonal Park Society,  
P.O. Box No. 19,  
HIMATNAGAR—383 001 (Guj.) (India)

Tel No. 1250

**INQUIRIES FOR DEALERSHIP SOLICITED**



WITH BEST COMPLIMENTS FROM

## FRANCO-INDIAN PHARMACEUTICALS PVT. LTD.

20, DR. E. MOSES ROAD, BOMBAY 400 011

### MARKETING

- |   |   |  |
|---|---|--|
| <b>DEXORANGE</b>                                    | — | Haematinic containing syrup of haemoglobin                                   |
| <b>SORBILINE</b>                                    | — | Choleretic Cholagogue  |
| <b>OMILCAL</b>                                      | — | Calcium suspension containing Vitamins B12, D and A in therapeutic dosages.  |
| <b>GRILINCTUS</b>                                   | — | Non-narcotic, non-addictive, antitussive syrup                               |
| <b>TOPICASONE/<br/>TOPICASONE<br/>with NEOMYCIN</b> | — | Fluorinated topical corticosteroid/with broad spectrum anti-bacterial agent. |
| <b>RELAXYL</b>                                      | — | Topical muscle relaxant  |
| <b>SURFAZ</b>                                       | — | Broad spectrum antifungal Cream/Solution/Powder.                             |

WE DEEM IT PROUD PRIVILEGE TO ANNOUNCE THAT SINCE DECADES WE ARE REGULAR SUPPLIERS OF VETERINARY DRUGS/MEDICINES/INSTRUMENTS TO USEFUL GOVERNMENT INSTITUTIONS LIKE BLOCK DEVELOPMENT OFFICERS, VETERINARY DISPENSARIES DISTRICT ANIMAL HUSBANDRY OFFICERS, POULTRY BREEDING CENTRES, VETERINARY FIRST AID CENTRES, KEY VILLAGE CENTRES, ZILLA PARISHADS, JILLA PANCHAYATS ESPECIALLY IN MAHARASHTRA AND GUJARAT AND THUS SERVE NATIONAL WEALTH OF ANIMALS.

**FOR ALL YOUR REQUIREMENTS KINDLY CONTACT:**

## THE GOLDEN FIBRE & DRESSING SYNDICATE

105 SHAMALDAS GANDHI MARG, DAMODAR BLDG,  
3RD. FLOOR, BOMBAY 2

Phone: 313613

GRAM: FIBREGOLD.

ORDERS, ANNUAL TENDERS & ENQUIRIES SOLICITED.



*We are pioneer manufacturers of:*

### FROZEN SEMEN EQUIPMENT

- AI Gun (S.S.) with Gun Container • Plastic Sheath for AI Gun • Sheath Container. Insemination Glows • Freezing Racks • Aluminium and Plastic Goblets • S.S. Canister
- Plastic Air Bubbler • Air Bubbler S.S. Stand. • Air Bubbler Plastic Dish
- Straw holding Clip • Filling Comb. (Nozzle) Plastic • PVA Sealing Powder
- S.S. Forcep 12" to 15" long • Kit Box for Frozen Semen Equipment

### DAIRY AND VETERINARY EQUIPMENT

All type of milk testing equipment such as

- Milk Collection Tray • Milk Sample Bottle Stand • Milk Strainer • Aluminium Milk Plunger • Sampling Dipper • Buylometer Holding and Shaking Stand
- Milk Pipette stand • Milk Measuring Set (Aluminium) • Galvanised Sample Box
- Milk Fat Testing Centrifuges.
- Artificial Insemination Crates • Artificial Crates Cum Trevis • Service Crate for Semen Collection • Thermocole Insulated Semen Transport Boxes • Lightweight Thermocole Insulated Semen Shipper • First aid Veterinary Boxes • Artificial Vagina Box • Bull Nose Ring. Bull Exerciser.
- Small Animal Cages.

### POULTRY EQUIPMENT

- Hanging Type Feeder • Chick Feeder • Water Fountain • Laying Box Brooder
- Poultry Cages.

**For Further particulars and details, Please write to:**

**PATEL TRUNK FACTORY**

**GANDHI ROAD**

**ANAND 388 001**

**Phone: 1319**



*Improve Fertility in Natural Way*

*By*

## **PRAJANA**

- ❖ Prepared with *natural herbs*, a non-hormonal and safe Drug
- ❖ Induces ovulation alongwith oestrus to ensure conception, in Cows and Buffaloes.
- ❖ Available in easy to administer single piece capsules

*For Post-Parturition Care*

## **REPLANTA**

- ❖ Non-hormonal *Herbal Uterine Stimulant*
- ❖ Safe and dependable *Ecbolic and Cleansing Draught*
- ❖ Ensures smooth expulsion of *retained placenta* completely.
- ❖ Restores *lochial discharge* and helps in *involution of uterus*.
- ❖ Being used extensively without any side-effect.

*Manufacturers :*

**The Indian Herbs Research & Supply Co.,**

P. B. No. 5 Sharda Nagar,

SAHARANPUR-247001 (U.P.)



*With Best Compliments From*



**PANCHMAHAL DISTRICT CO-OPERATIVE  
MILK PRODUCERS' UNION LTD.  
GODHRA (Gujarat)**

AN INSTITUTION WEDED WITH THE IDEAS OF UPLIFTMENT OF 55000  
OF ITS MEMBER MILK PRODUCERS SCATTERED OVER 550 VILLAGES..

- By providing remunerative market for their surplus milk produced from their cows and buffaloes.
- By educating them about the modern Animal Husbandry practices of proper feeding, breeding and management.
- By giving Artificial insemination services using frozen semen from the best pedigreed bulls through its widely spreaded 80 field A.I. Centres.
- By extending Animal health coverage.
- By supplying good quality fodder seeds and balanced cattle feed.
- By involving them in the co-operative movement, leading to creation of a secular society without the caste or creed barriers.

At the same time making available to is consumers the wholesome pasteurized "PANCHAMRUT"  
Milk, pure Ghee and Flavoured milk.

**WITH BEST COMPLIMENTS**

**FROM**

**HINDUSTHAN FEED PRODUCTS**

**Address**

**Opposit Sewree Station (East)**

**BOMBAY—400015.**



## INSTRUMENTS

CONTACT :

**M/s. Idento Pvt. Ltd.,**

8th floor, Harilela House,  
36, Mint Road,  
Bombay - 400 001.

Tel. No. : 26 03 87

Grams : PUNARVASU

Telx : 011-4830

Branches : New Delhi & Baroda

## Laboratory Instruments

All types of Microscopes & Balances

Ultrathermostats

Homogenisers

Centrifuges

Peristaltic Pumps

Dispensers & Diluters

Hair Hygrometers & Thermohygraphs

Anemometers

Rain Gauges & Level Recorders

Bomb Calorimeter

Ultrasonic Viscometers & Disintegrators



**Complete Range  
of  
VETERINARY PRODUCTS**

**DRUGS VACCINES FEED SUPPLEMENTS FOR SMALL & LARGE ANIMALS**

**DISTRIBUTORS OF:**

AROGYA—AREX—BONOLEP—BIOMED—GOKA & CO—G. LUCATOS—  
HINDUSTAN ANTIBIOTICS—HARYANA BIOLOGICALS—HERBAL  
HEALING—I. D. P. L.—INDIAN HERBS—INTERVET—JAGDISH—KENNEL  
DOGY PRODUCTS—ROCHE—M. S. D. Agvet—M. J. PHARMACEUTICALS  
—O. T. S.—PET PRODUCTS—PET SETTERS—RAKESH—RUSOMA—  
SERVIER—SCHIEFF & MEYER—SELEGANCE SERUM INSTITUTE—  
SIRUS—SRINI BIOLOGICAL—WOCKHARDT VETERINARY.

**WHOLESALEERS OF:**

A.C.C.I.—CADILA—CYANAMID—GLAXO—ESKAYEF—HOECHST—  
MEDINEX—PFIZER—S.R. PHARMA—SARABHAI.

**IMPORTERS:**

BAYER'S—ASUNTOL & NAGANOL

**CANINE PRODUCTS:**

TICK POWDER—EDIBLE and LEATHER DOG CHEWS—DOG BISCUITS—  
SHAMPOOS—DOG FOOD—CANNED MEAT—TONICS—DOG BRUSHES—  
CHAINS—CHOKES—LEASHES—COLLARS—HARNESSES—WHISTEES—  
DUMBELIS—NAIL CUTTER ETC.

**CANINE VACCINES:**

PENTADOG—RABIES—PARVADOG—D.H.L. VACCINES

**WATER PURIFIER:**

CHLORINE LIQD—SURGICALS—DISPOSABLE SYRINGES—DEBEAKERS—  
FLATTER VALVE

*Please Contact*

*Akbarallys*

**2/1 KOMJI STREET, FORT BOMBAY - 400001**

Tele No: 256737—311304

Gram: Akbarvet

Telex: 011:2045 Akbr

*also available in retail from our department stores at*

CHEMBUR

SANTACRUZ

FOUNTAIN

PHONE: 521694

6140612

252921

524618

6145886

254213



**When  
danger  
threatens  
animals...**



**who gives protection?**

**HOECHST  
with a versatile range of  
Animal Health Products.**

**And that isn't all.**

Throughout history, Indian cattle have been threatened by the dread Foot-and-Mouth Disease.

To protect them, Hoechst manufactures a world-class vaccine. Today, Hoechst's Foot-and-Mouth Disease Vaccine is the most widely accepted by farmers and veterinarians.

For other animal ailments, Hoechst makes a range of quality products which owners of cattle, dogs, horses, poultry completely trust. The latest among these is Panacur, the best dewormer for domesticated animals.

Hoechst also provides on-the-spot advice on animal health problems through expert veterinary representatives. Everywhere in India.

And Hoechst is busy in other areas too.

Like making internationally-renowned agrochemicals to protect precious crops.



Sterile filling of FMD vaccine.

Or a range of quality medicines doctors, chemists and patients have faith in.

Or producing biologicals and diagnostic reagents which help doctors prescribe accurate treatment.

And Hoechst is the largest exporter of pharmaceuticals in India.

Behind all Hoechst activity are two moving forces: Hoechst's faith in research and Hoechst's commitment to quality.

This is why Hoechst products are among the world's most advanced.

**HOECHST INDIA LIMITED**

(Formerly Hoechst Pharmaceuticals Limited)

Pharmaceuticals • Agrochemicals • Animal Health Products • Biologicals

**A future full of promise...  
in which you can share!**

**Hoechst**





**ARIES  
FLAVOURED  
BOON-O-MILK**

**IMPROVES  
BUTTER FAT  
MILK YIELD  
PALATIBILITY-PROFITS**



ARIES BOON-O-MILK fortified with

- 6 Non-Hormonal Galactogogues to increase Milk Yield - Volatile Fatty Acids - Butyrates & Acetates to increase Butter-Fat content.
- Booster Doses of Trace Minerals, Calcium, Phosphorous & Vitamin D
- Plus a FLAVOUR which makes BOON-O-MILK deliciously Palatable and most welcome to your cattle.

**SCIENTISTS CONFIRM:**

- At Pantnagar University - Milk yield increased by 18.33%
- At Aarey Milk Colony - Milk yield increased by 16%
- At Iraq, Dr. S.K.Sharma, College of Vet. Medicine, Mosul.  
"..... milk appeared thicker and fattier ..... thick fat layer on top of cold, boiled milk ....."



**ARIES AGRO-VET INDUSTRIES PVT. LTD.**

Post Bag No. 1 Bombay 400 043.  
Branches: Bangalore, Coimbatore, Hyderabad, Jullunder, Kanpur





**PHILIPS**

## Preserving the prime of life

During the past 25 years, controlled propagation of livestock by means of artificial insemination (AI) has progressed from being a subject of purely academic interest to an extremely reliable, highly effective method of large-scale breeding of healthy cattle.

In this advance, cryogenic storage of spermatozoa has helped considerably. This technique exploits the sub-zero freezing properties of liquid nitrogen to preserve prime bull semen at temperatures down to  $-196^{\circ}$  Centigrade, for virtually indefinite periods.

In fact, perfectly healthy calves have been produced from semen that has been frozen for ten years or more. And considering the fact that as many as 10,000 calves per bull can be produced annually, artificial insemination has become one of the most important methods of meeting increasing world demands for livestock products.

Philips liquid nitrogen plants are in use in artificial insemination stations the world over; in highly industrialised countries as well as in remote regions.

For further details contact:-

**Philips India**

Product Division, Science & Industry  
Shivsagar Estate, Block 'A', Worli  
Bombay-400 018. Telephone: 391431



OBM/3845

**Philips — the trusted Indian household name for over fifty years**

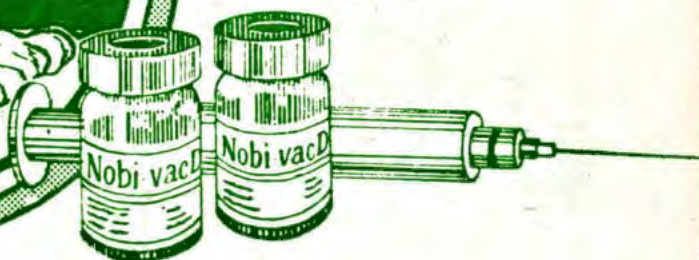




Intervet

# Nobi-vac DHL

effective vaccine  
for canines



Manufactured by  
Intervet International B.V., Holland

Imported & Marketed by

*interCare*  
Limited

38, Chowringhee Road, Calcutta 700 071

For details write to  
Pragati Bhawan, Jai Singh Road, New Delhi 110 001

- **NYMPHOMANIA**
- **ABORTION**
- **ANOESTRUS**
- **LACTATION FAILURE**

Intervet

HOLLAND

## CHORULON

(luteinising hormone)

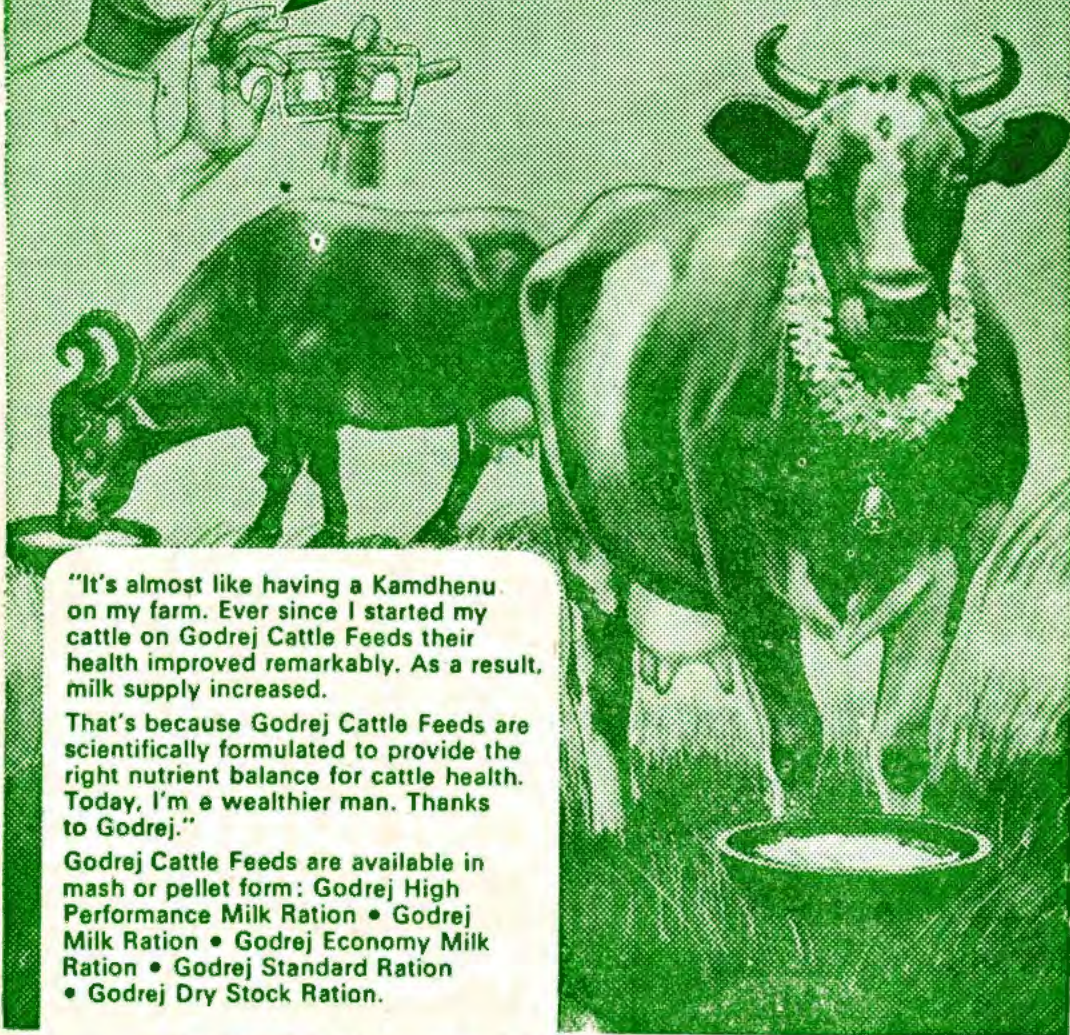
## FOLLIGON

serum gonadotrophin  
(with f.s.h. activity)





**"Health for my cattle.  
Wealth for me."**



"It's almost like having a Kamdhenu on my farm. Ever since I started my cattle on Godrej Cattle Feeds their health improved remarkably. As a result, milk supply increased.

That's because Godrej Cattle Feeds are scientifically formulated to provide the right nutrient balance for cattle health. Today, I'm a wealthier man. Thanks to Godrej."

Godrej Cattle Feeds are available in mash or pellet form: Godrej High Performance Milk Ration • Godrej Milk Ration • Godrej Economy Milk Ration • Godrej Standard Ration • Godrej Dry Stock Ration.

*For details please write or contact:*

**Godrej**

**SOAPS LIMITED**

Animal Feeds Division  
Eastern Express Highway  
Vikhroli  
Bombay 400 079.

**MADRAS FACTORY**

Animal Feeds Division  
Plot No. 1B  
Industrial Estate, Ambattur  
Madras 600 098.



## ALARSIN—Ayurvedic Research Products

• Safe • Simple drugs without drawbacks of Hormones.



in Management of

### • Repeaters • Infertility

exotic, cross or local breeds



### LEPTADEN (Vet) • Helps Repeaters to Settle Down.

When A. I. or Natural Service done during Ovulatory heat

Normalises Uterine & Ovarian functions & Environmental factors for conception, Inhibits Prostaglandin  $F_{2\alpha}$  biosynthesis by uterine tissues. This helps nidation of Zygote & prevents early embryonic death.

Dose: After A.I. or Natural Service 10 tablets daily for 15 days.

### INFERTILITY

Non-pathogenic:

#### ALOES COMPOUND (VET)

Brings the animal into pronounced ovulatory heat: Activates & regularises Uterine & Ovarian functions. No drawbacks of hyperstimulation of ovaries or cystic ovaries, as is usual with fertility promoting agents (hormones, clomiphene).

Dose: 5-10 tablets bd till animal shows pronounced heat/oestrus. Majority of the animals show pronounced ovulatory heat within one or two oestrus cycles.

Note: Treatment to be discontinued once animal comes in heat.

Pathogenic:

#### MYRON (VET)

Acts as an antiseptic, antibacterial, anti-inflammatory & Uterine tonic: In Cervicitis, chronic Endometritis, Parametritis, Pelvic inflammatory diseases and Atonic reproductive tract.

Dose: 10 tabs bd for 15 days.

in Severe & Resistant pathogenic cases with purulent discharge per vagina.

BANGSHIL (Vet) + MYRON (Vet):

5 tabs bd of each for 10 days.

Note: Bangshil (Vet) is anti-inflammatory, antibacterial (Susceptible uropathogens: E. Coli, Pseudomonas, Proteus, Klebsiella, Streptococci, Staphylococci), astringent, diuretic, healing and cooling. It Raises general body resistance and induces muscular and nerve relaxation. Restores normal physiological actions of G.U. System.

### FORTEGE (Vet): IN ALL BREEDS OF BULLS - STALLIONS — BREEDING MALES IN ZOO



for disturbed spermatogenesis & semen defects. hasty coverers, sluggish sex behaviour: reduces reaction time.

SEMEN: Improves motility, density, quality and quantity of semen.

Activates Neuroglandular system and stimulates Metabolism.

Dose: 10 tabs. bd for 15 days and then 10 tabs. a day for one or two months.



### latest research study on ALOES COMPOUND (Vet)

—Paper at: Annual Convention of Indian Society for Vet. Surgeons at Madras, 17-18 Dec. 1979.

Use of ALOES COMPOUND (Vet) in Infertile Brood Mares.

by Dr. M. L. Kudale, MVSc., Reader, Dept. of Surg., Veterinary College, Bombay.

Col. Amarnath (Retd), Sewania Stud Farm, Bhopal, M.P.

### other Research Data

in Management of Repeaters & Infertility

1) A possible Mechanism of LEPTADEN action by inhibiting Prostaglandin  $F_{2\alpha}$  synthesis (Dr. S.C. Sharma, Ph.D., Dept. of Pharmacology, Trinity College, Dublin, Ireland)

2) Clinical effect of FORTEGE (Vet) on Fertility of Murrah Bulls: (Dr. P.V. Naik, MVSc., Dr. V.B. Hukeri, MVSc., Ph.D., Dr. S.S. Mehandale, MVSc., FRVAC, (Denmark) Veterinary College, Bombay)

3) ALOES COMPOUND as an Ovarian activator in

Anoestrus Buffaloes: (Dr. A.D. Deshpande, BSc. (Vet), I.C.D.P. Ahmedabad)

4) Effect of MYRON on Metritis in Cows & Buffaloes: (Dr. Gurmeet Singh, BVSc. & AH, Dr. Sushil Rattan, PVS, ADVS., Amritsar, Punjab.)

5) Clinical trial with ALOES COMPOUND & MYRON in cases of Bovine Infertility: (Dr. B.N. Dange, MVSc., Animal Reproduction, Kolhapur, Maharashtra)

### SUPPLY

for Prescriptions: available at all chemists.

Purchases: Bulk PACKS of 1000 tablets for Govt. Semi-Govt. Institutions, Hospitals, Farms. Supplied from factory only.

Special VET-SETS: for Vet. Colleges & Institutions, for passing out students. Available on request

Therapeutic Index: as reference for prescriptions.

Research Index: Details about research papers published on Alarsin products in Medical, Dental & Veterinary fields.

Please write to

ALARSIN Marketing Pvt. Ltd.,

12, K. Dubhash Marg, Fort, BOMBAY-400 023.

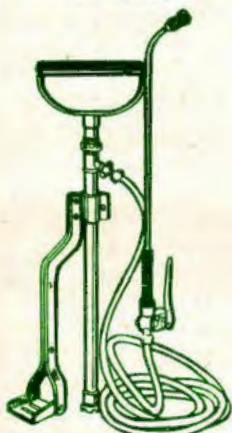


# ASPEE® ~trusted name for Sprayers and Dusters since last 38 years



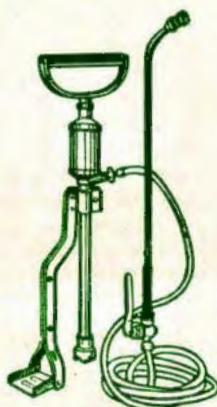
ASPEE Stirrup Pumps  
for Cattle Washing and  
Pest Control Operation  
in Poultry, & Stables etc.

**ASPEE-STANDARD**  
Bucket Sprayer



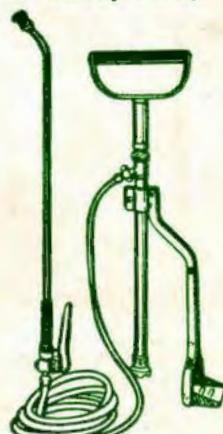
CODE: AP-44

**ASPEE-PV**  
Bucket Sprayer



CODE: AP-52

**ASPEE-LEADER**  
Stirrup Pump



CODE: AP-51

- ASPEE Dusters and Sprayers are fabricated from the best of raw materials.
- After Sales Service available in any corner of the country.

- ASPEE has a wide and efficient marketing network all over the country.

Insist to buy all ASPEE products only from ASPEE Authorised Dealers.

**ASPEE®**

-Where quality  
is a tradition



**AMERICAN SPRING & PRESSING WORKS PVT. LTD.**

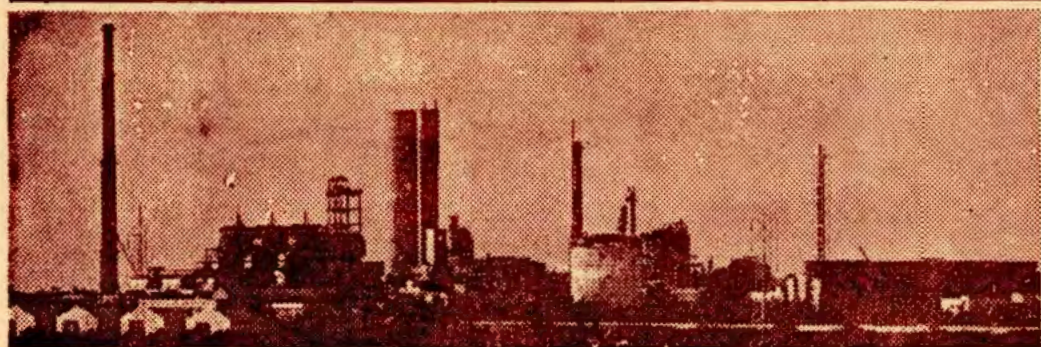
P. O. BOX No. 7602, MALAD, BOMBAY-400064  
TELEX: 011-71094 ASPEE IN • PHONE: 692331 (5 LINES)  
GRAM: 'KILLOCUST' Malad Bombay.



# **GUJARAT NARMADA-The world's largest single stream Ammonia-Urea plant is also**



**the country's most unique Fertilizer plant**



It has dramatically changed the industrial skyline in Gujarat. Promoted by the Government of Gujarat and Gujarat State Fertilizers Company, Gujarat Narmada, with its 4.60 lakh shareholders, is Asia's largest company in respect of public shareholding. 1.30 lakh investors are farmers and their co-operatives.

World renowned experts: Linde of West Germany, Texaco of USA, Haldor Topsoe of Denmark, BASF of West Germany and Snamprogetti of Italy have participated in its making: Based on a zero pollution concept, its electrostatic precipitators eliminate fly ash discharge, and a high stack of 125 metres, 1½ times taller than Qutab Minar, ensures highest dispersion factor of pollutants, if any.

Going on stream in December, 1981 and into commercial production in July, 1982, the plant has a massive production capacity of 1350 tonnes of Ammonia and 1800 tonnes of Urea per day. This goes to the farm sector in Gujarat,

Rajasthan, Madhya Pradesh, Punjab, Haryana and Uttar Pradesh. It helps in increasing food grain production by 28 lakh tonnes with an added income of Rs. 35 crores to the farmers. Gujarat Narmada is already marketing its by product Liquid Nitrogen, Pure Sulphur recovered in its pollution control process, and surplus Ammonia, to industrial users. This results in a large saving of foreign exchange. Gujarat Narmada plans ahead of today's needs, and many more projects are on the anvil. Gujarat Narmada—a growth nucleus for the country.



**Gujarat Narmada Valley  
Fertilizers Company Limited**

Registered Office: P.O. Narmadanagar, 392 015 Dist. Bharuch, Gujarat



**SOME OF OUR SPECIALITIES  
IN THE SERVICE OF ANIMAL HEALTH  
WITH  
HIGH EFFICIENCY AT A LOW COST**

- |                      |       |  |
|----------------------|-------|--|
| 1) Tablet MILKVET    | ..... | Non Hormonal Lactogenic,<br>Galactagogue.  |
| 2) Tablet UTROVET    | ..... | Genito-urinary, Antiseptic,<br>Anti-bacterial, Disinfectant,<br>Anti-inflammatory, Analgesic,<br>Galactagogue, Antipyretic,<br>Sedative, Restorative, Cooling<br>and Cleansing draught |
| 3) Capsule ESTRONA   | ..... | Safe, Oestrogenic, and<br>Ovulatory to induce prolonged<br>heat and regulate oestrus cycle.  |
| 4) Powder RUMENTONIC | ..... | Digestive Stomachic, Stimulant.<br>Carminative, Alterative<br>Aromatic, Anti-spasmodic,  |
| 5) Powder LACTOVET   | ..... | Ayurvedic Lactogenic Product<br>with Mineral Combination to<br>induce milk and Egg Production.   |
| 6) MINAREX           | ..... | A feed supplement, to Provide<br>Minerals & Trace Elements to<br>maintain Health and Production.   |

**Dependable AYURVEDIC MEDICINE  
SAFE AND NON TOXIC**

**MANUFACTURED BY :-**

**RAKESH PHARMACEUTICALS  
POST BOX NO. 359, G.P.O.  
AHMEDABAD-380001 (GUJARAT)**