

# REPRODUCTION AND INFERTILITY IN FEMALE BUFFALOES



For details refer Bubaline Theriogenology Editor  
Prof G N Purohit, Veterinary College, Bikaner at  
[www.ivis.org](http://www.ivis.org)

# Buffalo Types-- Wild



Syncerus caffer caffer African wild buffalo 52



Bubalus arnee 48



Syncerus caffer nannus 54



Tamarraw Bubalus mindorensis 46





Mountain anoa *Bubalus quarlesi* In the IUCN Red List

Lowland anoa *Bubalus depressicornis* 44-48

Tedong bonga -Sulawesi

## Domestic buffalo

River buffalo



Swamp buffalo



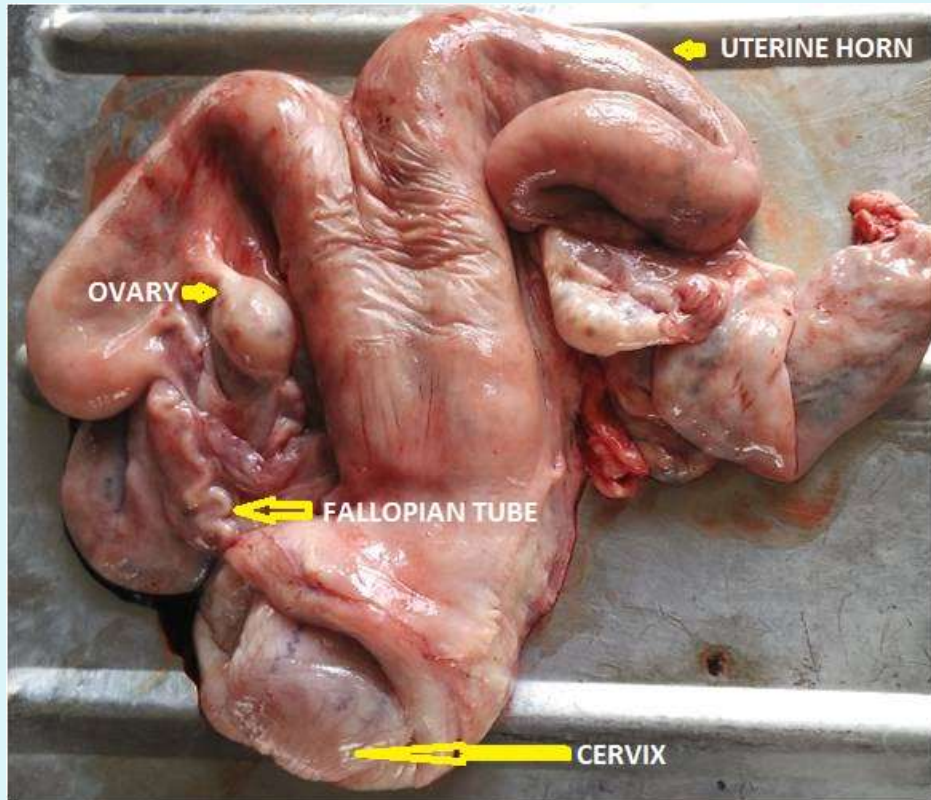
# SEASON

- Season and the photoperiod has a profound effect on reproduction in river buffaloes around the world except those located near the equator where rainfall and fodder availability appear to be more important





# Anatomy of Reproductive organs



- The ovaries are smaller than in cattle and contain fewer primordial follicles.
- The follicle diameters are also smaller Size of ovulatory follicle 12-13 mm
- The CL is more embedded in the ovarian stroma and less projecting on the ovarian surface

## Age at Puberty and Age at First Calving in Buffalo Heifers

Breed	Country	Age at Puberty	Body Weight at Puberty	Age at First Calving
Egyptian	Egypt	15-24.7 m	200-310 Kg	36-43 m
<b>Murrah</b>	<b>India</b>	<b>16-40 m</b>	<b>300-355 Kg</b>	<b>37-57 m</b>
Murrah and crossbreds	Ceylon	24-30 m	-	37-86 m
Surti	India	30-36 m	319-413 Kg	33-56 m
Bhadawari	India	28-32 m	346-467 Kg	48-50.7 m
Nagpuri	India	42-48 m	-	-
Mehsana	India	-	335-567 Kg	46.8 m
Kundi	Pakistan	28-32 m	320-575 Kg	-
Indigenous	Bangladesh	48 m	-	-
Jaffarabadi	India	-	-	1642+283 d
<b>Nili Ravi</b>	<b>Pakistan/India</b>	<b>23-36 m</b>	<b>450-419 Kg</b>	<b>40-42 m</b>
Iranian	Iran	-	-	36-39 m
Iraqi	Iraq	-	-	36 m
Bulgarian	Bulgaria	-	-	34-37 m
Venezuelan	Venezuela	-	-	48 m
Brazilian	Brazil	18 m	-	28-46 m
<b>Mediterranean</b>	<b>Italy</b>	<b>21-24 m</b>	<b>359-390 Kg</b>	<b>28-45 m</b>
Vietnamese swamp	Vietnam	30-36 m	-	-
Australia Swamp	Australia	14-30 m	318 Kg	-
Philippine swamp	Philippines	26-39 m	-	-
Swamp	Cambodia	36 m	-	-

# Reproductive Physiology

- Estrus cycle The **estrous cycle** of the female **buffalo** is approximately 21 days in **length**, ranging from 17 to 24 days. The **duration** of **estrus** ranges from 19 to 24 hours
- Ovulation occurs 24-48 h (mean 34 h) after the onset of estrus or 12-18 h after end of estrus.
- Buffaloes have 2-3 follicular waves with 2-wave being common



## Estrous cycle length and the duration of estrus in buffaloes in different studies

Breed	Country	Cycle in Length in Days		Duration of Estrus (hours)
		Range	Mean	
Murrah	India	28-41	21-22	17-29
Nili Ravi	Pakistan	20-39	22.1±2.9	21
Kundhi	Congo	-	21	-
Egyptian	Egypt	11-30	21	12-36
Bulgarian	Bulgaria	12-28	21	24-34
Transcaucasian	Azerbaijan, USSR	15-30	21.6±0.23	30-40
Chinese	China	18-28	-	<b>2-3 days</b>
Philippine Carabao	Philippines	27.6-46	<b>33.6</b>	24
Malaysian Swamp	Malaysia	-	20.4±2.3	-
Thai swamp	Thailand	-	22.1±2.9	-
Surti	India	15-29	21.77±0.16	-
Swamp	Japan	11-38	21.5±4.7	9-27 (19.9±4.4 h)
Brazilian	Brazil	18-28	21.5	18-41
Mediterranean	Italy	20-27	-	12-48

# Signs of estrus

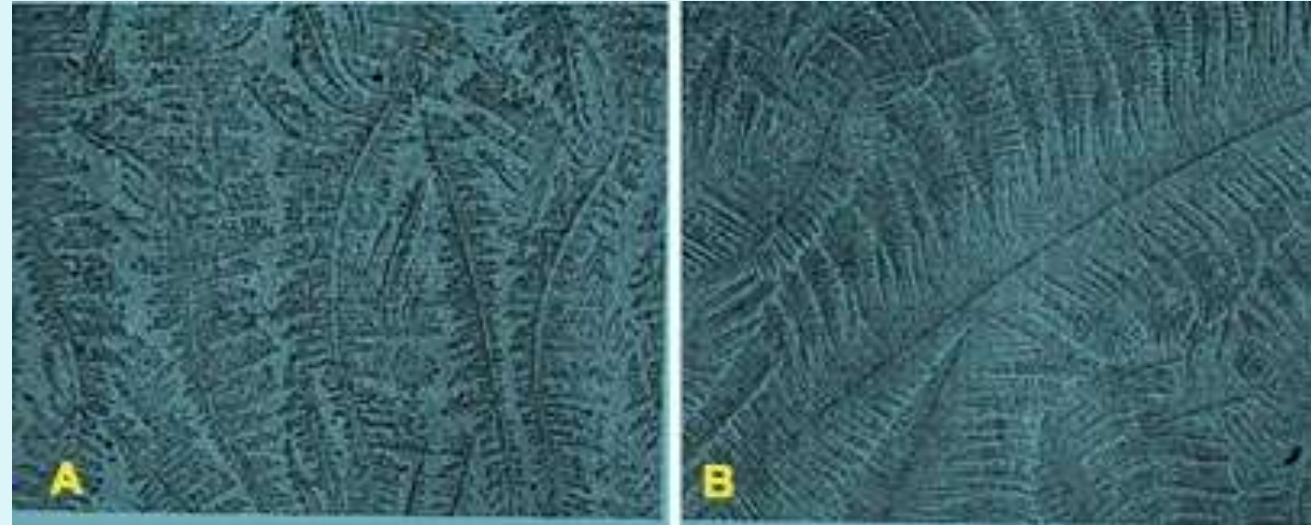
Signs of Estrus in Buffaloes in Different Studies	
Estrus Behavior Parameter	Range of Animals Expressing Estrus Behavior (%)
Standing to be mounted by teaser bull	84-96
Tail raising	10-93
Frequent micturition	24-90
Bellowing/Vocalization	25-80
Flehmen reaction/Cajoling by teaser along with sniffing and licking by teaser	41-92
Chin resting	18-90
Tumefaction of vulva	67-89
Reddening of vulvar mucosa	65-91

# Temporary teat engorgement



# Estrus detection

- Visual observation
- Cervical mucus fern pattern
- Transrectal palpation
- Transrectal ultrasonography
- Plasma progesterone
- Pedometers
- Pheromones
- Teaser buffalo bull



Cervical mucus fern pattern



# VISUAL OBSERVATIONS Early morning and late evening



Transrectal palpation- Intense coiling of uterine horns is palpable at estrus in buffalo





# Teaser buffalo bull



# Pedometers





# Vaginal electrical resistance



# Breeding methods

- Natural mating with buffalo bulls
- Artificial insemination



# Semen collection from buffalo bulls



Buffalo bull semen is always white  
AI is done twice at 12 h intervals starting from  
12-18 h after estrus onset



Recorded Transport of Riverine Frozen Semen to South East Asia				
Country	Year	Origin	Breed	Number of Straw/dose
-	1983	Pakistan	Nili-Ravi	1000
Pakistan	1987	Pakistan	Nili-Ravi	1000
Pakistan	1982	India	Murrah	1000
India	1984	India	Murrah	1000
India	1985	India	Murrah	1000
India	2013	India	Murrah	1000
Italy	2013	-	Italian Mediterranean	5000
Thailand	1978	India	Murrah	1000



# Fertilization and associated events

- Buffalo sperms require 4-6 h for capacitation
- Buffalo embryos enter uterus by Day 4-5
- Buffalo embryos reach blastocyst stage by Day 6.5-7
- Buffalo embryos elongate between Day 14-20
- Interferon-tau is the signal for maternal recognition of pregnancy followed by PAGs

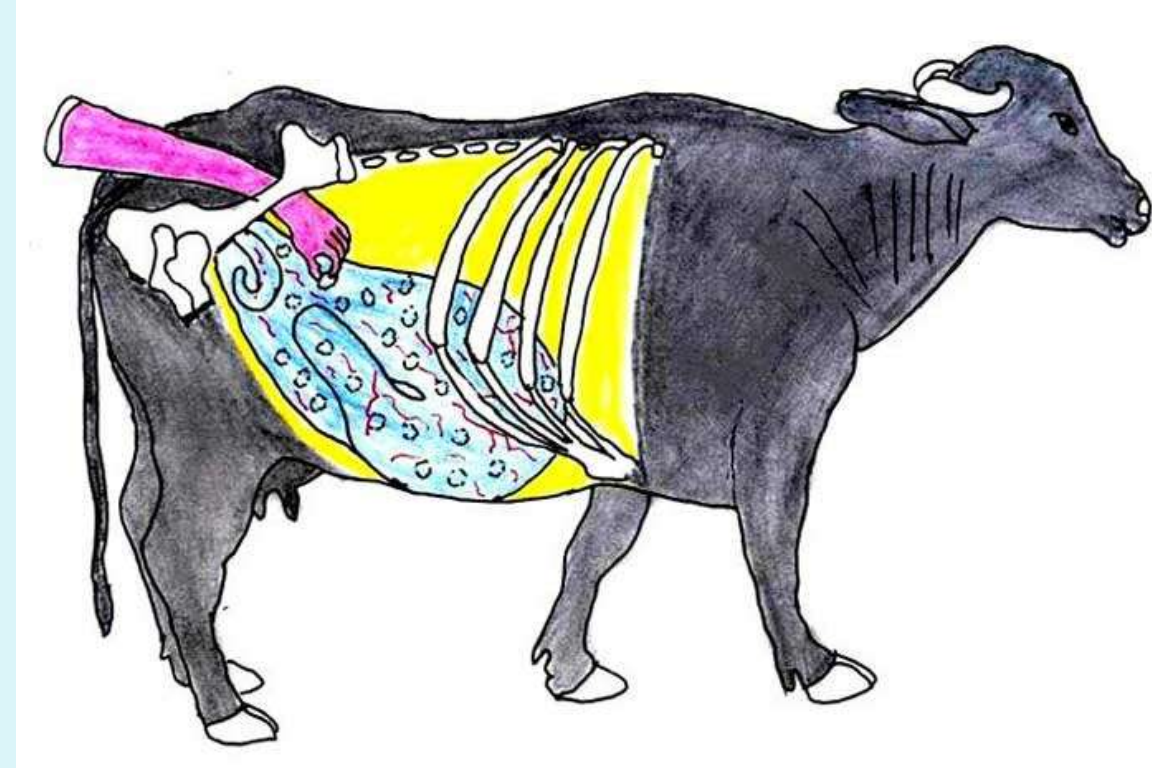
# Implantation and placenta development

- Implantation in buffalo is similar to cattle with centric and non-invasive implantation.
- Placentomes are spherical and flat
- Twins are rare in the buffalo species with only 0.01% of the pregnancies resulting in twins



# Pregnancy diagnosis

Transrectal  
palpation

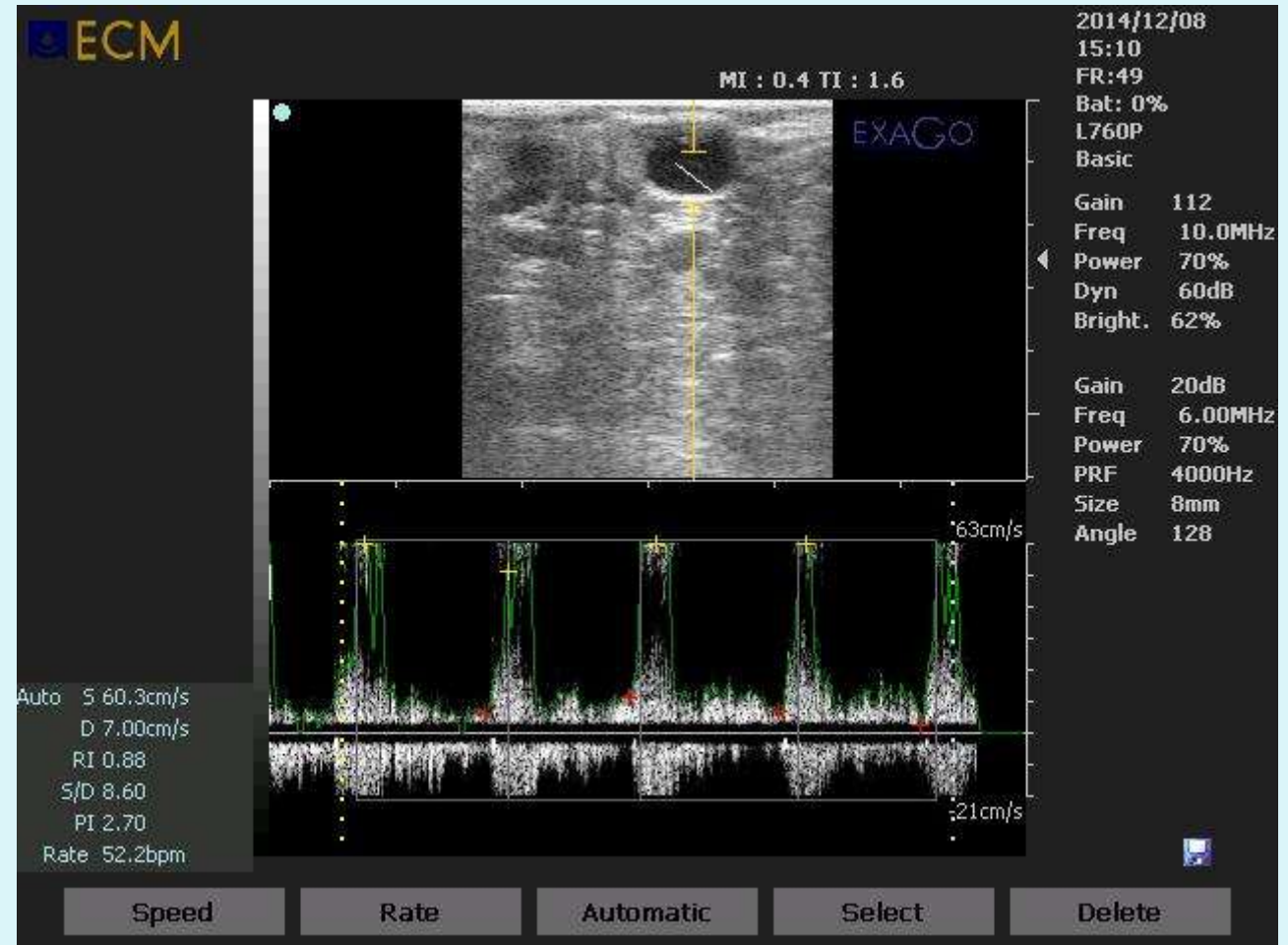
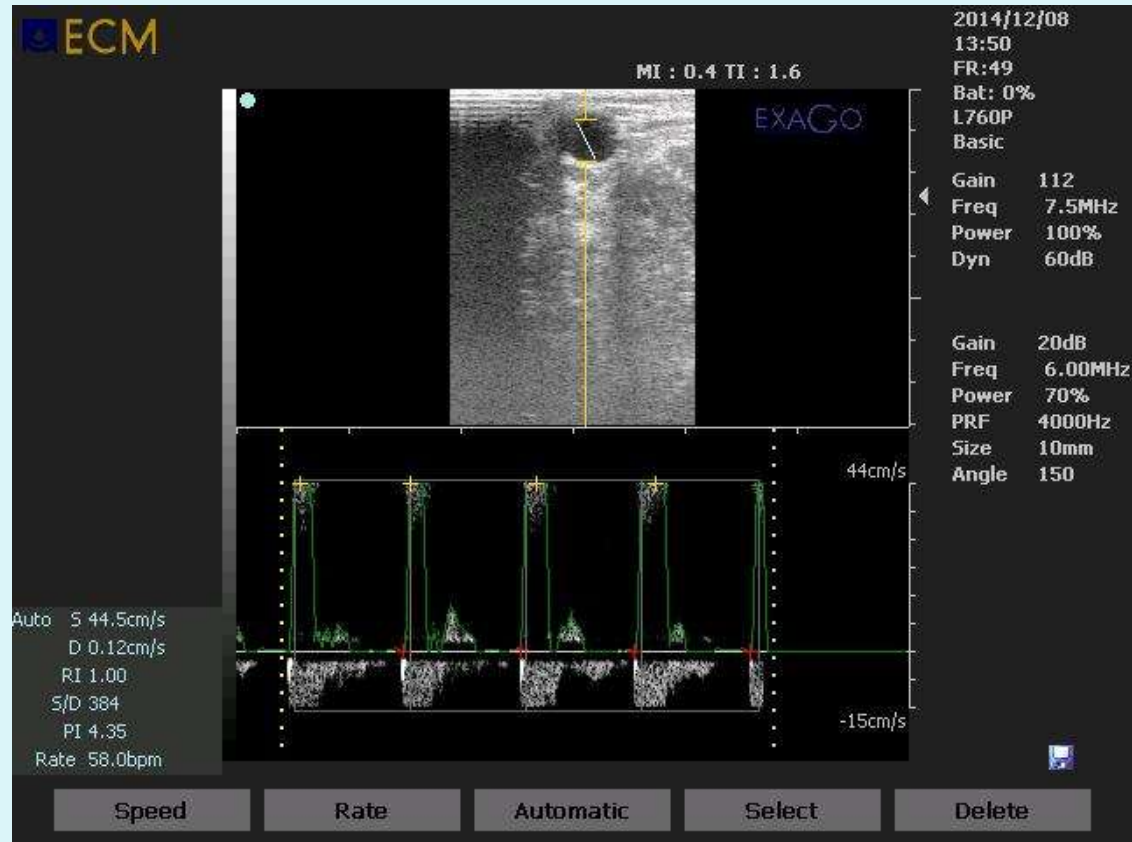


Size and Characteristics of the Bubaline Fetus and Uterus during Pregnancy						
Day of gestation	Length of gravid horn (cm)	Length of non-gravid horn	Weight of gravid uterus (g)	Weight of non-gravid uterus (g)	Length of greater curvature of gravid horn (cm)	Length of fetus CR (cm)
30	25.25	22.28	420.25 -517.5	225.0-385.0	-	0.5
40	33.86	20.93	635.43	457.0	-	-
50	34.0	21.15	722.50	451.0	-	-
60	37.60	26.21	795.73-977.43	461.0-533.0	48.97 ± 3.83 - 63.47 ± 70.7	4.26-4.9
70	41.94	22.30	1243.38	538	-	7.7
80	44.87	26.30	1337.33	524	-	9.50
90	45.60	24.72	1532-1591	600	-	10.7-14.3
120	71.85	35.85	2596.30	-	-	17.90
150	-	-	5129.28	-	-	24.92-34.5
180	-	-	14266.0	952.0	-	41.50
210	-	-	16433- 17075.0	1050	163.67 ± 1.20	52.6-54.75
240	-	-	-	-	-	-
270	-	-	-	-	-	83.4

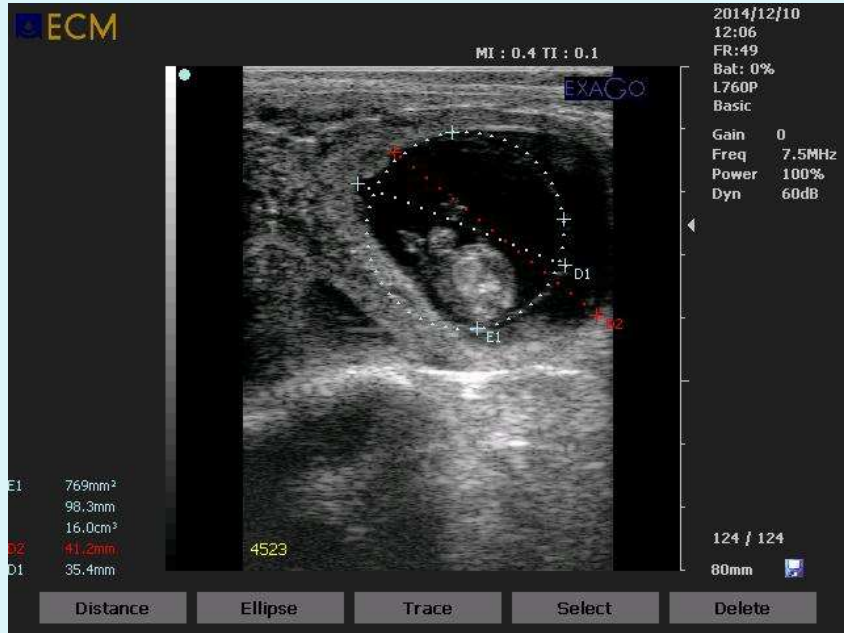
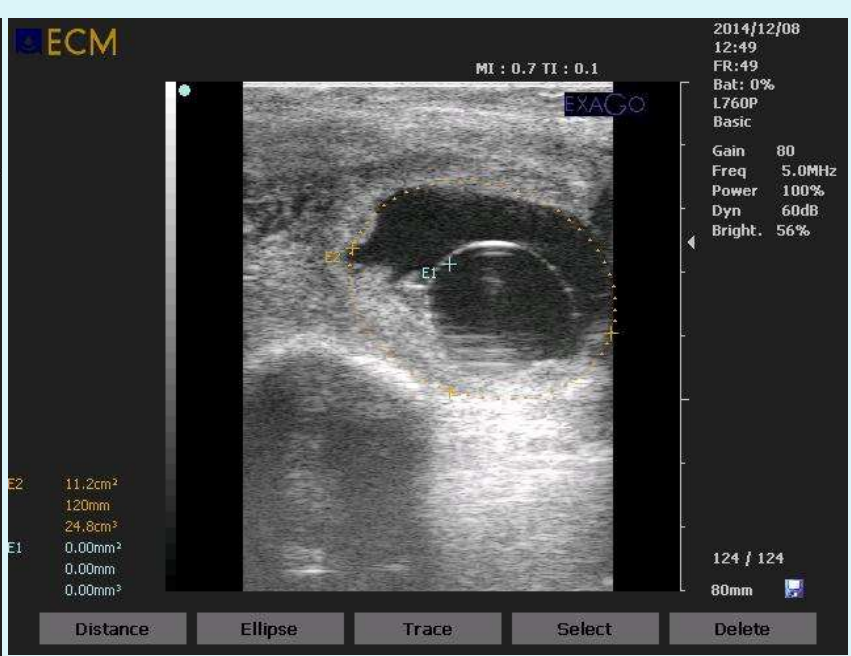


# Transrectal Ultrasonography

## Uterine fluid Day 18-19



# Embryo, Amniotic vesicle and Fetal heart beat Day 26



# Differentiation of fetal limbs Day 36, head and trunk

## Day 38



# Fetal sex Day 51





# Advanced Pregnancy



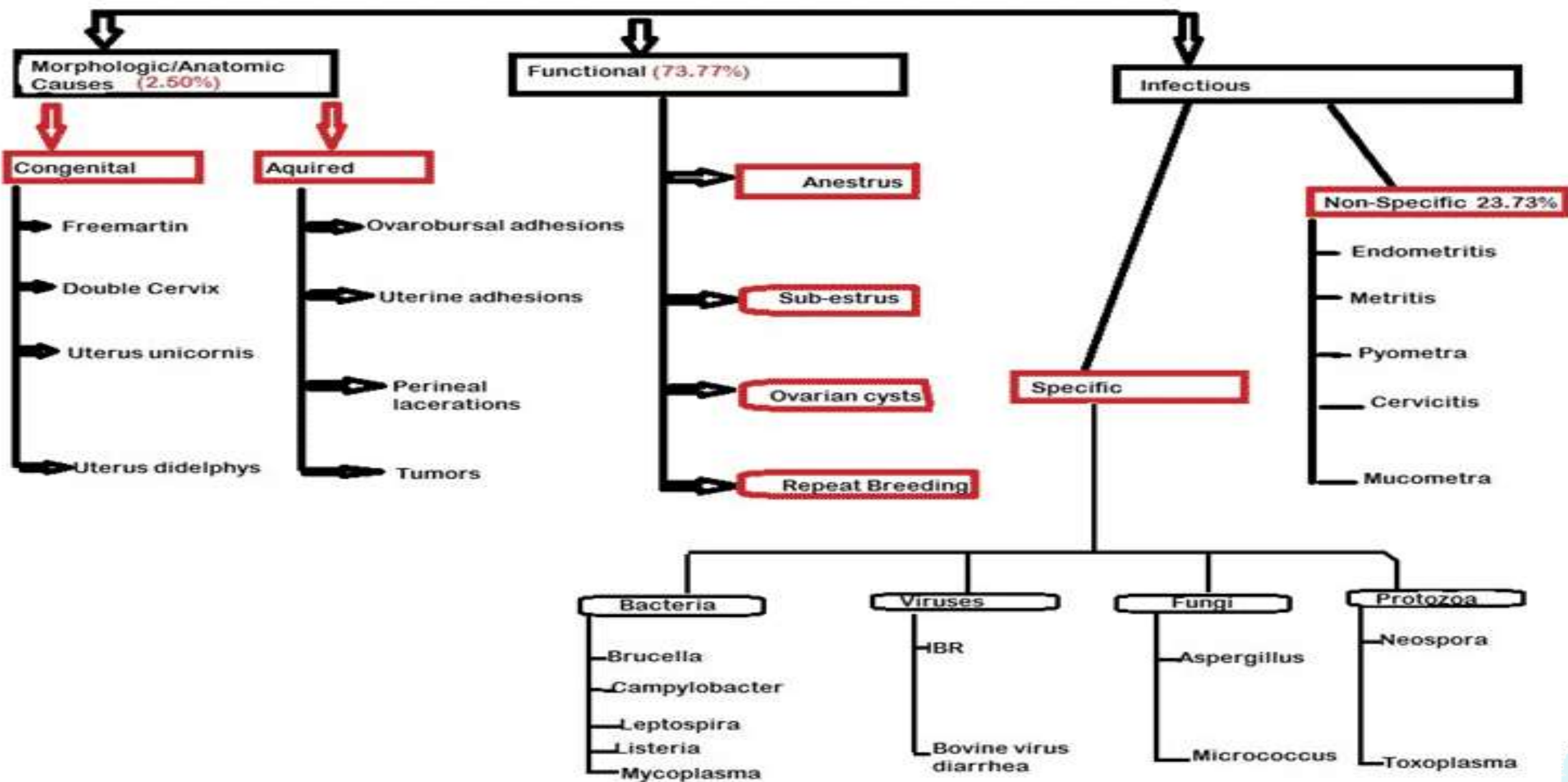
# Pregnancy associated glycoprotein's



# Problems of reproduction in buffalo

- Delayed Puberty
- Silent estrus
- Delayed post-partum estrus

# INFERTILITY





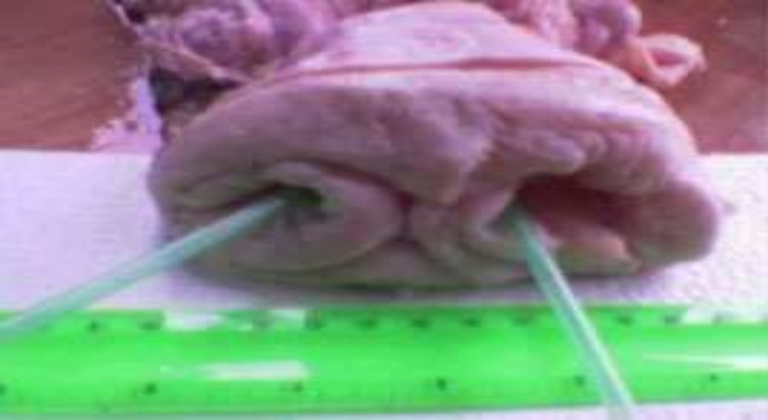
# Freemartin

- Reports of twins and quadruplets seen in buffalo with out freemartin
- Other reports detected freemartin sterile buffalo females by cytogenetic studies
- Ovarian hypoplasia
- misnomer in reports on buffalo

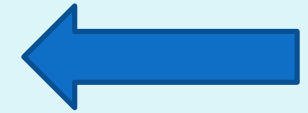
# Other reported anatomic defects

- Male psuedo-hermaphrodite
- Persistent Hymen

# Congenital Anatomic defects



Double cervix



Bilateral hydro-salpinx



Double oviducts

# Acquired defects



Ovarobursal adhesions



# Tumors - Rare

- Ovaries – mostly from abattoir derived specimens
- Cystadenoma, teratoma, dermoids, folliculoids and granulosa cell tumor.
- Uterus
- Rare- include adenoma, fibroma



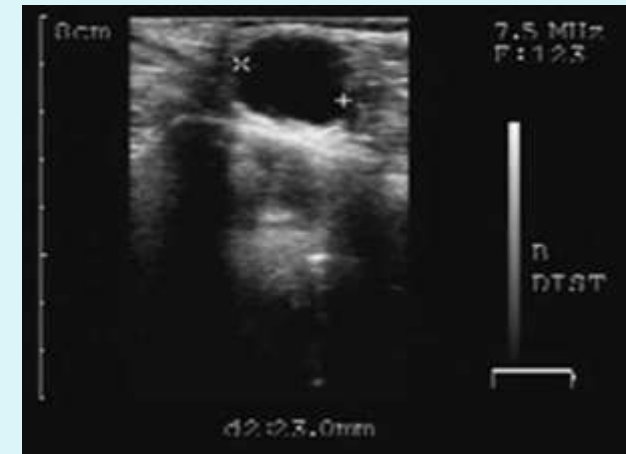
# Functional Infertility

- Anestrus- Delayed puberty  
Season very important  
Ovaries very small and so are ovarian structures  
Therapy Antiprolactins + melatonin, CIDR+eCG

## Ovarian cysts

Rare

Treatment similar to cows



- Repeat Breeding
  - » Less common
  - » Hot summer months
  - » Therapy
- Improving uterine health
- Correcting ovarian malfunction
- Maintaining luteal support
- Improving management

# Non Specific genital affections

## Affections of cervix

- Physiological cervical hypertrophy uncommon in buffalo
- Cervicitis – low incidence 0.5-2%
- Cervical cysts
- Cervical tumors
- Cervical lacerations



# Affections of vagina and vulva

- Vaginitis – has a low incidence in buffaloes
- Muco-Vagina
- Retention cysts, Uro-vagina
- Vulvar lacerations
- Vulvo-vaginitis

# Uterine affections

- Metritis and endometritis
- Pyometra
- Mucometra
- Hydrometra
- Uterine adhesions and cysts

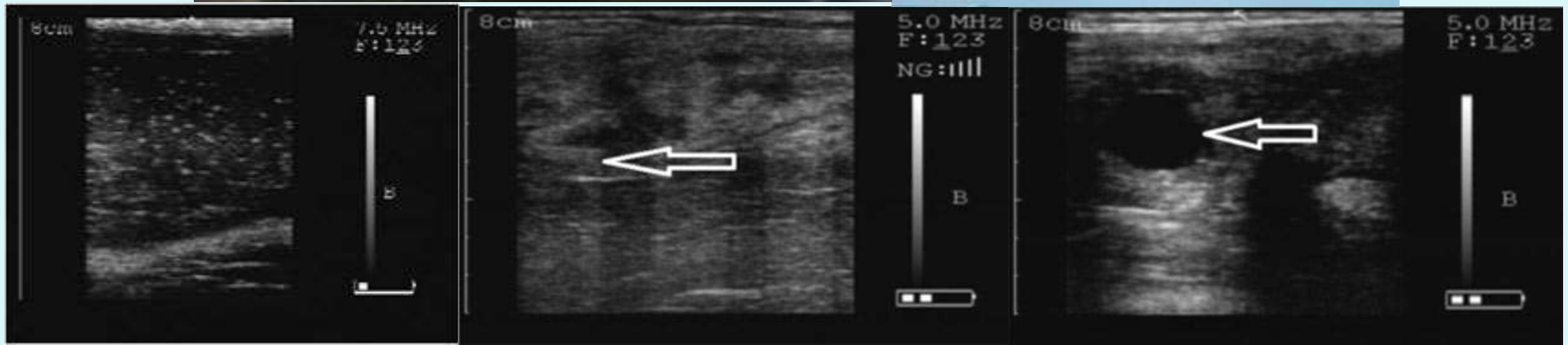
# Metritis and Endometritis

- Common cause of infertility
- Mostly associated with parturition or
- Prolapse of vagina and cervix/uterus
- Repeat breeding in endometritis
- Muco-purulent pus discharge



# Diagnosis

Vaginoscopy, ultrasound, white side test, cytology





# Therapy

- Parenteral antibiotics and fluid replacements, antihistaminics in post-partum metritis
- Intrauterine antibiotics in endometritis
- Non-antibiotic alternatives



Antibiotic	Dosage	Route of administration	Frequency of administration
Oxytetracycline	5-10 mg/Kg	IM	Daily for 3-5 days
	2-3 g	Intrauterine	Daily or alternate for 3 occasions
Tylosin	1 g	Intrauterine	Daily or alternate for 3 occasions
Ceftriaxone	2 g	Intrauterine	Daily or alternate for 3 occasions
Amikacin	-	Intrauterine	Daily or alternate for 3 occasions
Chloramphenicol	-	Intrauterine	Daily or alternate for 3 occasions
Cephalexin	4-10 g	Intrauterine	Daily or alternate for 3 occasions/ Once post AI
Gentamicin	200 mg	Intrauterine	Daily or alternate for 3 occasions
Neomycin	100-500 mg	Intrauterine	Daily or alternate for 3 occasions
Cefotaxime	12 mg/Kg	IM	Daily for 3-5 days
Penicillin + Streptomycin	2.5 g	Intrauterine	Daily for 3-5 days
Furazolidone + Nitrofurazone	-	Intrauterine	Daily for 3-5 days
Metronidazole	0.5% 25-50 mL	Intrauterine	Daily for 3-5 days

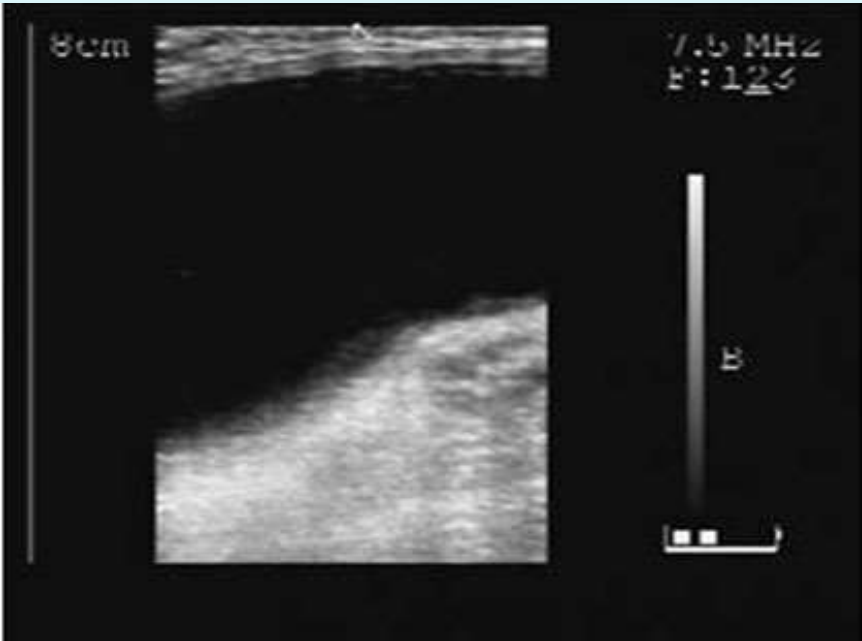
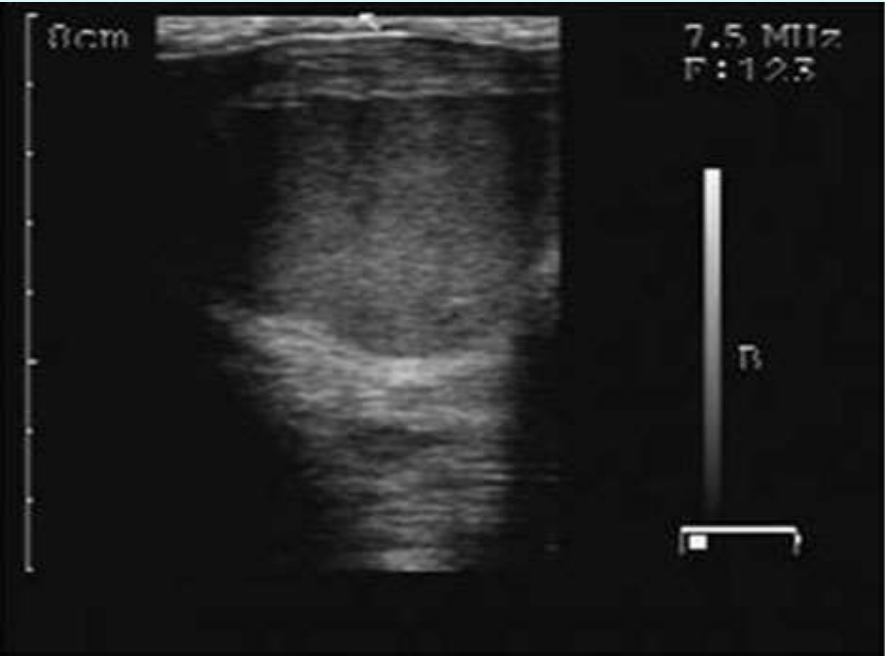
## Non-antibiotic Intrauterine Approaches for Endometritis in Buffaloes

Drugs Used	Dose	Frequency and Time of Administration
Vitamin C	200 mg	Once 1 h before AI
Lugols Iodine (0.5-2.0%)	25-50 mL	Daily for 3 days
<i>E. coli</i> Lipopolysaccharide (LPS)	100 µg	Single infusion
Lysozyme	2 mg	Single infusion
Oyster Glycogen 1%	-	Single infusion
Vitamin E and Selenium	3 mg	Single infusion
Tinospora condiflora	3000 mg	Single infusion
Autologus plasma	150 mL	Single infusion

# Pyometra and mucometra

- Accumulation of pus/mucus in the uterus with a persistent CL
- Diagnosis: Transrectal palpation/Ultrasonography
- Therapy: Administration of prostaglandin/uterine lavage with normal saline





# Specific diseases causing infertility and abortion

- Viral
- BVD- seroprevalence recorded but no abortions
- BoHV/BuHV- seroprevalence high with sporadic abortions

# Bacterial

- Brucellosis
- Prevalent in many countries abortion at 6-8 month
- The incidence of brucellosis has been reported to vary from 0.55 to 6.7 percent
- Diagnosis and prevention similar to cattle

# Campylobacteriosis

- *Campylobacter fetus* has been demonstrated in preputial washings from buffalo bulls, adult buffaloes and buffalo heifers and from buffalo milk, however, their role in infertility or abortions and their venereal transmission is poorly known for the buffalo species.



# Leptospirosis

- Leptospira infections are common in buffaloes
- due to their wallowing habits
- Many species of Leptospira have been isolated and are known to cause abortion in buffaloes including *L. interrogans*, *L. pomona* and many other serovars.
- Incidence 2-7%
- Leptospiral abortions occur from 6 months to term. The affected buffaloes suffer from fever, icterus and have pale yellow colored urine. Aborted fetuses evidence splenomegaly and the tips of their hooves are yellow colored



- Listeriosis: *Listeria* have been isolated from India from buffaloes with reproductive disorders
- **Protozoal causes of abortion**
- Neosporosis has a high prevalence Trichomoniasis – buffalo is resistant

- The above lectures are also explained in video lectures at my YouTube Channel Govind Narayan Purohit
- Kindly share the videos and subscribe to my channel if you like them
- Thanks