Repeat Breeding in cattle and buffalo: New concepts in diagnosis and therapy

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Artificial insemination services are provided in India through 71,341 AI stations clocking 52 million inseminations with overall conception rate of 35% in bovine and buffalo population (Singh and Balhara 2016)
A manifestation by the animal due to multifactorial etiology

Global Problem

Modern day high producing Holstein cows due to intensive selection for high yields have reduced fertility (Dobson et al., 2007)

Incidence: 06 to 35%

2nd most common reproductive disorder

More common in cows vs buffaloes
ETIOLOGY  Failure of Fertilization & EED

Predisposing Factors

Nutrition  
- Negative energy balance  
- High protein changes uterine pH & decrease P4  
- Micronutrients deficiency Ca, P, Mg, Cu, Zn, Vit A, E, Se

Endocrine dysfunction (suprabasal P4)  
Infection/reproductive tract abnormality  
Poor semen quality  
Age  
Genetic  
Immunologic Antisperm antibody  
Peri-Parturient disease  
Stress  Heat most important
Services required per conception is the standard for assessment of the problem

- At conception rates of 70, 60, and 50 percent 2.7, 6.4 and 13.0% of healthy cows require 4 services to conceive.

- Low conception rates could be because of sub-optimal semen quality, faulty AI, poor hygiene and with poor CR the number of services required may further increase hence it remains difficult to define the repeat breeding problem for individual cows however, in herds-------------
Diagnostic Methods

- Record Analysis

- Visual
  - Proper estrus detection
  - Proper mating events
  - Colour, consistency of cervico-vaginal mucus

Vaginoscopic examination to exclude growths, adhesions

Uro-vagina uncommon can spoil semen
Transrectal palpation

- Uterine tone at AI - subjective
- Follicle at AI
- Ovulation depression
- Early CL day 5 Sub-optimal
- Early Embryonic deaths
  Not possible to be detected as most deaths occur before day 20
Vaginoscopy

- Helpful in detecting scars, adhesions, growths and the cervical condition.

- Metricheck helpful in detecting vaginal secretions.
Tests to evaluate uterine health

- Uterine pH: Catheter electrode inserted into the uterus or pH of CVM
  - Normal pH 7.3
  - 6.9 and 8.0 suggest endometritis
- White side test to detect metritis
  - Cervical mucus + NaOH, Boil
  - Yellow colour indicates metritis
Uterine Microbiology
Uterine biopsy and cytology

- Biopsies must be reserved for growths only
- Uterine cytology performed using cytobrush or low volume flush can be useful for evaluating herd uterine health
- PMNs in cytology samples would depend on the days post partum
- 5% PMNs are considered for repeat breeding cows with sub-clinical endometritis
In Vivo imaging techniques
Ultrasonography

- Luteal ovarian cyst
- Follicular ovarian cyst
- Uterine fluid accumulation
- Mucometra
**Colour doppler**

- Determines echogenecity and blood flow and hence can determine physiological status of follicles/CL etc.
Magnetic Resonance Imaging Prototypes for Transrectal imaging under development

Magnetic resonance imaging is based upon relaxation of hydrogen protons in a large magnetic field after a radio-frequency pulse (RF) has deflected the proton spin transversely.

- Three dimensional images can predict ability of follicles to produce steroid and ovulate and hence can predict the exact physiology.
CT Scan (Computer assisted tomography)

- Uses X-Rays for diagnostic purposes

Only in the developmental stage in veterinary medicine
Hysteroscopy / Laparoscopy

- Evaluates morphology of live tissues
- Received little attention in bovine because of the cervix
- Flexible hysteroscopes more common
Tubal Patency testing

• phenol-sulphon-phthalein (PSP) test Urine color changes within 30-45 min of infusion of dye in the uterine horn by a cathetor
• A recent study found 44 of the 50 cows evaluated to have some degree of oviductal obstruction

• Contrast Sonography
Hormone Assays

- RIA
- ELISA
- ECLIA

Immunosorbent assay
  Progesterone assay
  LH
Diagnosis of herd problem can be attempted but the diagnosis of cause of repeat breeding in an individual animal is extremely difficult.

**Therapy**

- Evaluate semen
- Evaluate cows for anatomic defects
- Evaluate for nutrition and management and advice appropriate measures of correction
- Evaluate reproductive hygiene and insemination procedures and adopt corrective measures
• **Herd**
  - Correct deficiencies
  - Treat Bulls for minor problems
  - Change Bulls or evaluate semen
  - Vaccinate for infectious disease

**Individual animal**
- Combating Uterine Infection
- Monitoring for Ovulation/Cysts
- Therapy of luteal insufficiency
- Improving AI techniques
- Improving management
Specific corrective measures

- Genital tract infection
  Intrauterine/parenteral antibiotics

Prostaglandins

Immunomodulators
  Oyster glycogen 500 mg in 50 mL PBS I/Ut.
  LPS 100 µg in 30 mL PBS I/Ut
  Intrauterine infusion of autologous or heterologous serum

Agents to alter Uterine environment
  Antioxidants: 4mM Taurine + 50 mM fructose in PBS before AI
  Vitamin C Inj Ascovet 20 mL before AI
  Enzymes: Trypsin, Chymotrypsin, papain I/Ut.

  Acetylcysteine 600 mg in 50 ml of distilled water intra-uterine

Uterine motility stimulants
  Mifepristone, clitoral massage
Hormonal therapy

- Correction of Ovarian dysfunction
  - Delayed ovulation
    - hCG Injection Pubergen/Chorulon 1500-3000 IU at AI
  - GnRH 100 µg IM at AI
  - PG at AI
  - Antiprolactin Bromocryptine 10 mg orally 12 h before and at AI
  - Dextrose 500mL IV at AI plus Bovine insulin 0.2 IU/Kg IV
  - Clomiphene 300 mg orally
  - Metformin 2000-4000 mg orally
Ovarian Cysts

Single IM injection of Progesterone
Vaginal progesterone implants
100 Ug GnRH
Ovsynch protocol
PG + GnRH (day 0) + PG (day 14)
Transvaginal US guided aspiration

Mucometra
Pott Iodide 10-15 gm daily with feed for 5-7 days
Ifer-H 2 mL SC
Luteal Insufficiency

- hCG injection at 4-5 days of AI
- Progesterone injection 500 mg at 5 days of AI
- Progesterone vaginal implants.
- Recombinant Bovine Somatotropin 500 mg SC at AI
- Antiestrogens Tamoxifen citrate ??
- GnRH at AI and at day 14-16
- Bovine insulin on day 8,9 and 10 of estrus
- Letrozole administered IM (1mg/kg in oil) on Day 3 of ovulation
- Feeding of fish oil/Linseed oil
Nutritional Management

- Management of dry cows important
- Advice not to feed more than 10% of rumen degradable proteins
- Dry cows should be fed low energy high fiber diet with more of chopped straw
- Feeding of anionic salts with Ca and P
- Injections of vitamin A, E and C important
Timing of AI/ Semen deposition

- Multiple AI in long estrus periods
- Training of AI Personnel
- Deep Intrauterine AI

Avoiding Periparturient disorders
  - Metabolic diseases Ketosis/milk fever
  - Parturient problems

Immuno-infertility
  - More anecdotal
  - Give vitamin C, E and dexamethosne
  - Change the bull or semen
Other therapies: Acupuncture and Intraperitoneal AI or embryo transfer.

- Repeated inseminations
- Mineral vitamin supplements
- Cooling of heat stressed cows/buffaloes
- Adequate hygiene at parturition & at AI
- Regular and frequent check of semen
- Addition of sperm motility enhancers when liquid semen is used eg. caffeine
- Prevention of natural mating with scrub bulls
Repeat breeder cow/buffalo → Exclude effects of season

**Herd**

**Female**
- Investigate and advise
  1. Nutrition (preparturient)
  2. Collect samples for investigation of infectious disease
  3. Reduce stress
  4. Metabolic profiles

**Male**
- AI
  1. Evaluate semen and AI techniques

**Natural mating**
- Investigate and advise
  1. Infectious disease
    (i) Trichomonas
    (ii) Campylobacter
  2. Semen evaluation
  3. Age of bull

**Individual**

1. Investigate for abnormalities of genital organs like ovaro-bursal adhesions, cystic ovaries, tumours, stenosis, etc.
2. Investigate for subclinical endometritis. When no tests possible, treat on presumptions if there is a history of periparturient disease.
3. Monitor ovulations/oestrus cycle length
   (i) Provide ovulation induction treatments at AI
   (ii) Repeat AI/consider I/U AI
4. If animals do not settle, treat for luteal insufficiency.
5. Supplement with vitamins A, E and C and Ca, P and Se.
6. PSP dye test – if both fallopian tubes occluded. Exclude such animals.
7. Cytogenetic-karyotyping
Thank You