

Fertility Management in Dairy Cows: A Sure Way to Enhance Profits

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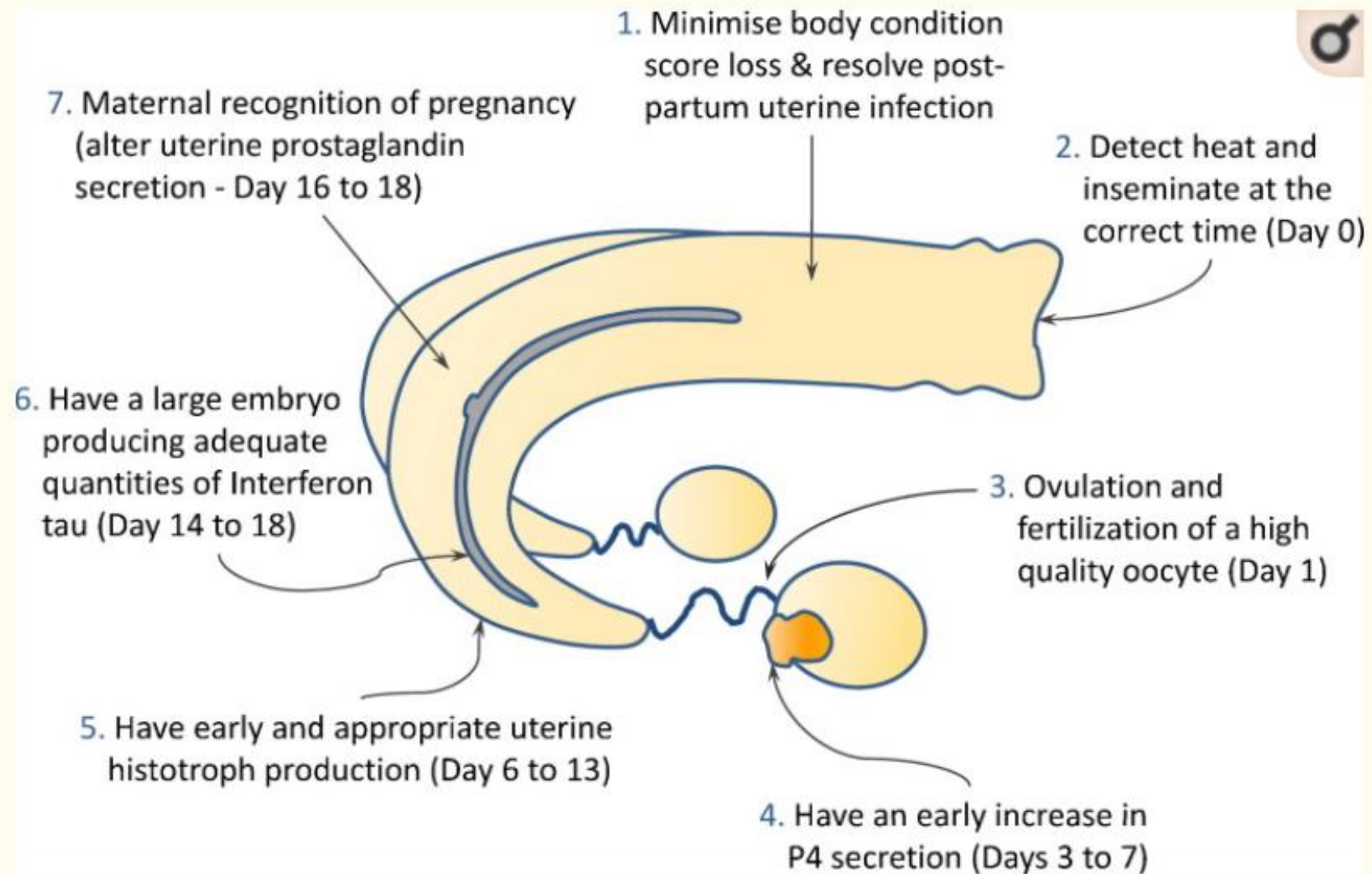
Importance of Fertility Management

- Milk Production depends on cows giving births hence maintenance of calving cycles is critical
- Most of the farms close down because of fertility issues
- A veterinary consultant must make efforts to prevent fertility problems
- What is feasible breeding parameters to follow?
 - First heat in heifers – At what age, when to serve – very important
 - First heat after calving – 30 days after calving – important to note
 - Voluntary wait period - Critical to follow- there are variations
 - Calving to conception interval - ???
 - Optimum open period – 80% cows less than 120 days- others consider culling and replacement
 - AI per conception

Artificial Insemination Vs Natural Service

- Let us be practical
- This depends on number of cows in the farm and the breeding policy
 - Is achieving genetic gain objective of the farm? In that case the farmer must use genomic or progeny tested bull- preferably the later.
 - Is the farmer selecting female calves to rear replacement heifers?
 - If the above answers are in negative, a farmer may get benefit using a bull to attain 80% pregnancy and narrower calving to conception interval
 - For long term benefit of the farmers it is better to switch to AI
 - Genomic testing is not enough as this is done using the population framework of western countries for ranking -

Event	Time	Issue	Incidence	Reasons
Parturition	0	Uterine contamination ↑ ↓	99%	Unavoidable, normal
		Uncoupling of GH IGF1		Liver GH-R low, Insulin low, Negative Energy Balance
	7	Metritis	50%	Heifer, dystocia, Assistance, Retained Placenta
	14	Severe BCS Loss		NEB- Low Appetite----- High BCS at parturition - High Milk Yield
	21	Endometritis	20%	Pathogens, low immune response
	30	Culling	6%	Disease, deaths
	40	Failure to resume cyclicity	30%	Low LH, low oestradiol, IGF1- Prolonged NEB
Move to positive EB	45	Failure to resolve uterine inflammation	20%	Metritis, endometritis
Start of Breeding Season	60	Culling	3%	Death or disease



For Efficient Breeding

- Minimise negative energy balance and resolve any infection of the post partum uterus.
- Expression and detection of oestrus followed by insemination with high quality semen (day 0)
- Ovulation and fertilisation of a high quality oocyte (day 1)
- An early increase in progesterone secretion from the corpus luteum (days 3–7).
- The uterine endometrium must produce an early and appropriate environment to stimulate embryo development (days 6–13).
- A large embryo producing adequate quantities of interferon tau (days 14–18) that alters uterine prostaglandin secretion and signals maternal recognition of pregnancy (days 16–18).

Post-parturient Issues

- Uterine contamination at parturition or in the following days is unavoidable and normal with 80–100% of animals having bacteria in the uterine lumen in the first 2 weeks postpartum
- Escherichia coli,
- Arcanobacterium pyogenes,
- Fusobacterium necrophorum,
- Prevotella melaninogenica and
- Proteus species and these are associated with increased endometrial inflammation and purulent vaginal mucus
- Many cows successfully deal with this bacterial contamination; however, at least 20% of cows develop metritis within 21 days postpartum.
- **(Observing first heat for purulent discharge is important)**

Taking care of Uterine Infection

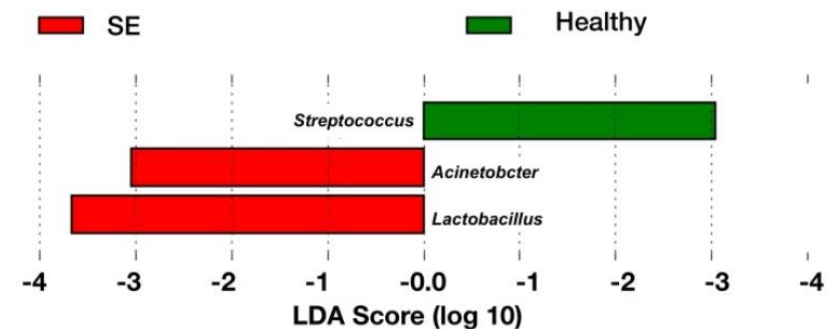
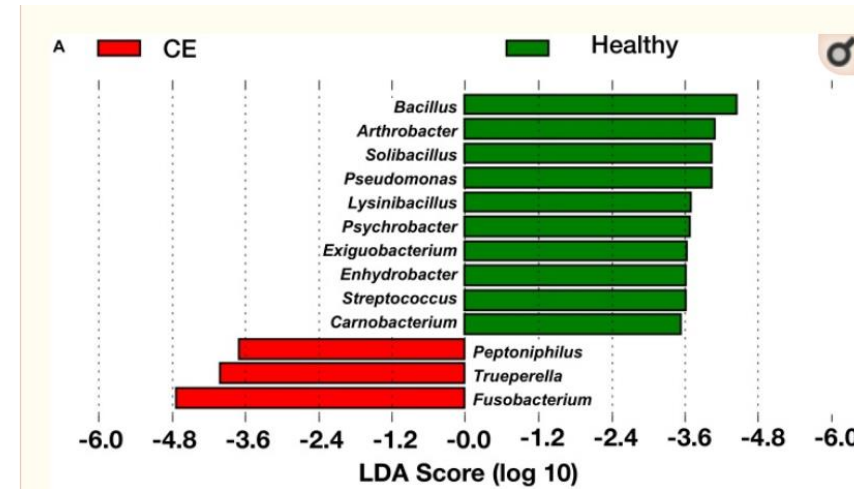
- Endometritis increased mean days open by 15, decreased the relative risk of pregnancy at 150 days in milk by 31%, and reduced the rate at which cows became pregnant by 16%
- Even cows that are treated successfully for clinical endometritis have conception rates 20% lower and an extra 3% of animals infertile and are culled
- **Strategy: In case the cases of metritis post-calving are more than 15%, strategic treatment with antibiotic helps.**
- **Injection Ergotamine- in case the animal has been handled also helps in controlling bleeding and early involution**

Vaginal Mucous Discharge Vs Uterine Discharge

- Sometime farmers confuse / even vets
- Cow is pregnant but there is discharge – may not be abortion
- In case of abortion the discharge will be copious due to opening up of the cervix
- Mild discharge due to vaginitis – need not treat if it is minor
- Check of viral vaginitis (Herpes)- treat with povidone iodine / silver nano-particles spray

Treating endometritis

- **There are two options**- Parenteral antibiotic, intrauterine administration- I prefer parenteral –
- **Intrauterine** – Barrier Type Sol-gel-coats the endometrium and does not allow attachment of the bacteria – I prefer
- Metranidazole – Not preferred –more harm as good bacteria are eliminated
- Leugol's iodine – No rationale- inflammation
- Barrier Technology- endometrium is coated with sol-gel-polymer that has pore size less than 0.22 micron



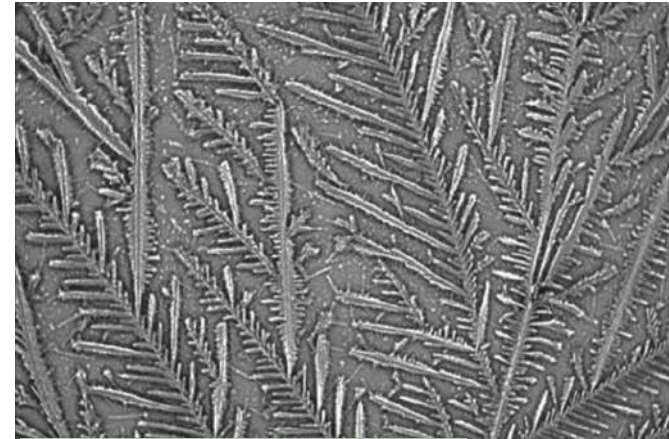
When to start breeding?

- The breeding season needs to commence 60 days postpartum and the cow needs to conceive by 83 days postpartum
- Heat Detection- Standing heat , tail paint
- Studies that investigated oestrus detection rates using pedometers reported efficiencies between 80 and 100
- Concrete floor heat period is reduced
- Heat stress – deleterious to fertilization Factors such as, oocyte quality, sperm characteristics, reduction in oocyte quality and early embryo development
- Consequence of altered biochemical composition in follicular fluid (lower glucose, IGF-I and cholesterol and higher NEFA and urea)



Following Correct Time of Insemination

- Insemination time to be parallel to evolution
- There are two tests that can be done:
 - Vaginal discharge – crystallization ,Saliva examination – crystallization
- Cell phone based system- can be done at the time of insemination
- Insemination within 12 hours after heat detection
- In case of sexed semen it should be 18 hours
- Less stress to cow at the time of insemination
- Detection endometritis at the time of insemination- Trypsin inhibitor test



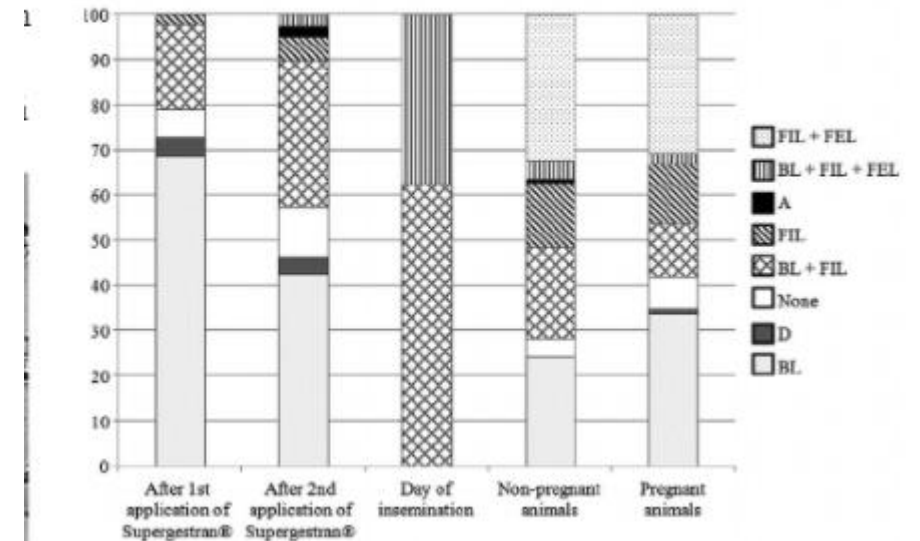
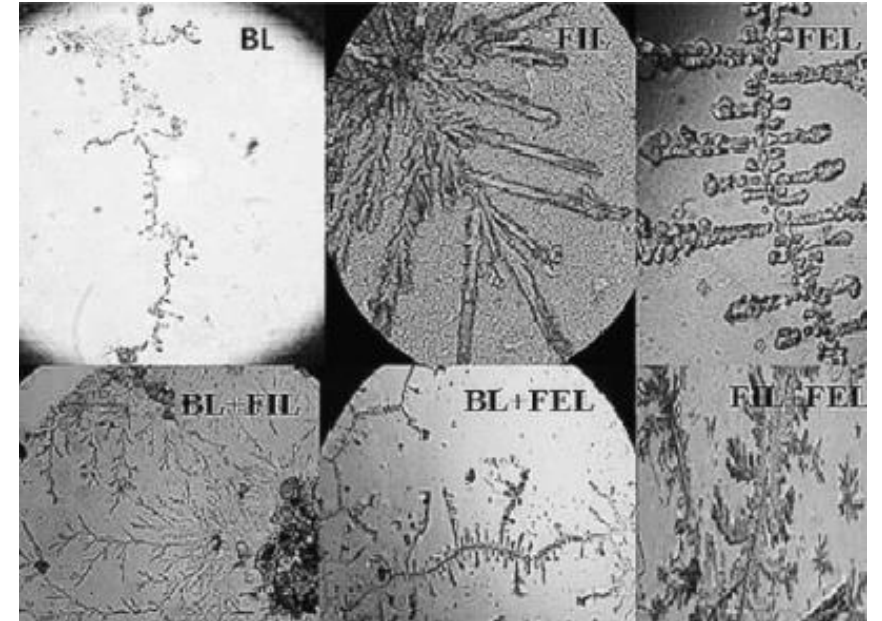
Selection of Sire

- Our data shows that sire and inseminator factors are major causes compared to cow factors
- 6,50,000 inseminations –
 - 25% conceived to 1 AI, 55% - 2 AI, 70% - 3 AI – 25% more than 5 AI
 - Out of 110 sires, only 8 sires gave > 60% pregnancy rate and these were used in only 15% inseminations
 - Sire selection is important
 - Sire ranks varied from area to area, hence analysing sire data for allocation is an important exercise
 - 25% inseminations did not report for PD check – non-compliance
 - Abortion rates were 0.8% Early abortion and 0.2% late abortion



Pregnancy Diagnosis

- Ultrasonography – 32-35 days, handling of genitalia- not preferred unless timed AI and you want to see ovulation
- Per rectal examination – 45-90 days, depends on skill, stress, milk yield is affected
- Milk / Blood tests for pregnancy-associated proteins- Specificity is good but sensitivity low
- RIA- progesterone assay- preferred as a service – milk progesterone
- Urine-based tests – Abscisic acid detection , PAP-detection



Problems Related to Conception

- Low concentrations of progesterone and IGFs can create a suboptimal uterine microenvironment that is unable to support early embryonic development
- Uterine function is also compromised by the presence of pathogenic bacteria which can cause embryonic death and abortion
- Pathogens:
- In conclusion, prior uterine infection and the development of small embryos significantly increase the chances of embryo mortality and decrease maternal recognition and the establishment of pregnancy
- I have experienced pathogen as the major cause of early abortion-
- **Strategy: 5 g single injection of Streptomycin or steptopenicillin**

Early Embryonal Deaths

- . Very early embryo mortality (days 0–7)
- Animals that have an earlier increase in progesterone concentrations between days 4 and 7 after insemination have a greater chance of maintaining a pregnancy than animals with a slower rise
- The present thinking is that progesterone has limited or no direct effect on the embryo but that an early rise in progesterone alters endometrial secretions that stimulate embryo development after day 7 leading to a large conceptus that is better able to signal maternal recognition of pregnancy
- Zinc supplementation
- Rumen protected Arginine- Nitrous Oxide – Viagra effect

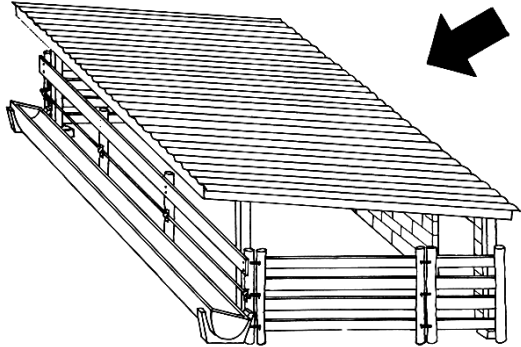
Calving related Problems

- **Dystocia / Uterine inertia**- oxytocin administration, half-life is 6 minutes
- **Retention of placenta**- No need to manually remove
- **Prolapse of uterus / vagina** – High protein, high Urea / BUN
- **Pre-parturient milk let down**- strategies to follow

Managing Negative Energy Balance

- NEB has several cascading effects
 - insulin concentrations remain low which prevents an increase in liver GH receptors and IGF-I secretion
 - Unable to synergise with the gonadotrophins on ovarian cells preventing the dominant follicle from ovulating and delaying the resumption of cyclicity
- Strategy is to feed starch-rich diet initially followed by lipidic feed in breeding season
 - High starch – rumen acidosis – embryo survival- has to be carefully crafted
- The percent of cows ovulating within 50 days postpartum increases from 55 to 90% in cows fed a high starch diet
- VFA increases rumen papillae growth, efficiency of absorption of VFA from rumen
- Promotes greater insulin release in response to feeding
- While an insulin promoting diet has the potential to hasten the onset of cyclicity after calving there is some evidence that maintaining cows on such a diet may have deleterious effects on embryo survival rates
- Cows fed high amounts of well-eared corn silage have their starch needs met. Not only because of the corn grain in the silage, but also because it is more degradable than dry-shelled corn
- **Rumen protected starch – 200 g up to 50 days post-parturient**

Proper Cow-comfort and Housing



Take Home Messages

- Animal Records important to understand issues
- Recording first heat is critical- do not mate
- BCS at the time of calving should be between 3-3.5
- High starch feed in first 50 days leads to better fertility
- For accuracy of time of insemination use devices to examine salivary/ cervical mucous arborization
- Use pregnancy tests that can diagnose within 21-25 days
- Keep an eye on sire fertility and use sire with high ranking in your area
- Strategic treatment post-calving in of high metritis/ endometritis incidence
- Heat detection and right time inseminations are important factors
- 5-10% cows will be problematic- culling pressure



Technologies for Co-commercialization in Bangladesh

- **Country-wide license to our patent:**
- Rumen-protected starch / Glucose and other CHO
- Bovine colostrum free-flow powder using cost-effective decentralized technology
- Rumen microflora encapsulation technology
- Barrier Type teat dip and spray / teat sealant
- Barrier type wound spray
- Tele-veterinary services platform

- THANK YOU**
- Do Share Your Comments**