When should I use Fixed Time AI?

THE MOST PROFITABLE PREGNANCY IS THE EARLIEST PREGNANCY

Some of the biggest costs associated with any dairy herd can be attributed to open cows and non-cyclers. Higher rates of empty cows lead to increased culling and replacement heifer costs, therefore, the goal is to achieve 1 calf per cow, per year and maximise the lifetime milk production of each animal. On may farms this simply does not happen due to high levels of anoestrus at MSD.[1]

So how can we use FTAI to our advantage?

Traditionally, many farms have used FTAI **after** heat detection or bull cover, however, this is not an economically viable method, particularly on farms with high numbers of non-cyclers. When using FTAI like this, you are only treating animals with proven low fertility that have either failed to express heat or ovulate for a number of weeks or months and therefore, your results vs. the time, labour and cost of running a program, will be poor. Instead, FTAI is best used at the **START** of joining to maximise the benefits to non-cyclers, improve follow up cycle conception and tighten your calving window.[3]
**This means more days in milk, lower culling rates and reduced on farm costs.**

COMPARISON OF PROGRAMS IN A BREEDING SEASON

Four (4) different breeding strategies were compared over a 90 day joining window in mature, lactating cows.[2]
1. Heat detection AI (HD and AI - grey)
2. FTAI followed by heat detection AI (FTAI + HD and AI - Green)
3. FTAI followed by bulls (FTAI + Bull - Blue)
4. Bulls (Bull - Orange)

Even though the 90 day pregnancy rates only differed slightly, the time it took cows to get pregnant was significantly different between groups.
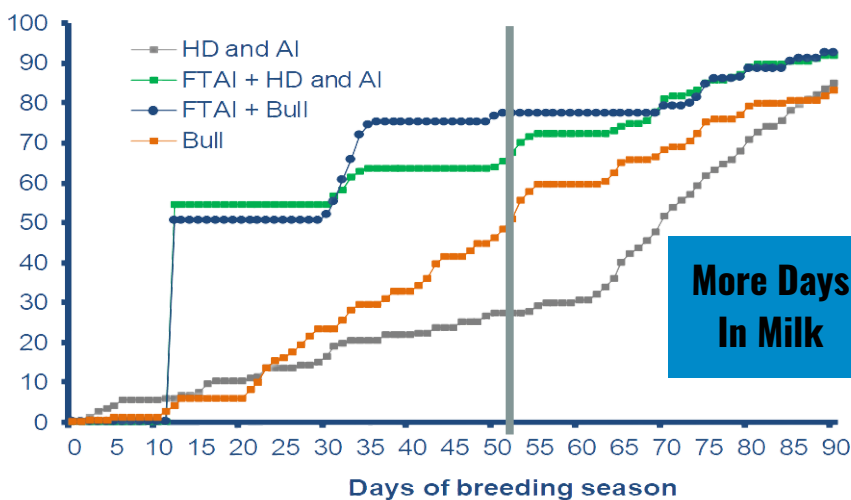
More Days In Milk

1. Plozza, DS Beggs, PD Mansell, MA Stevenson, CB Blackwood and MF Pyman 2016, 'Postpartum anoestrus in five seasonally-calving dairy farms in Victoria, Australia', Australian Veterinary Journal, v. 94, no. 8. 2. Manoel F.Sá Filho, LucianoPenteado, Everton L.Reis, Tomás. A.N.P.S.Reis, Klibs N.Galvão and Pietro S.Baruselli (2013), 'Timed artificial insemination early in the breeding season improves the reproductive performance of suckled beef cows', Theriogenology, v. 79, no. 4. 3. Pietro Sampaio Baruselli, Alexandre Henryli de Souza, Manoel Francisco de Sá Filho, Marcio Oliveira Marques, Jose Nélio de Sousa Sales (2018), 'Genetic market in cattle (Bull, AI, FTAI, MOET and IVP): financial payback based on reproductive efficiency in beef and dairy herds in Brazil', Proceedings of the 32nd Annual Meeting of the Brazilian Embryo Technology Society (SBTE): Florianopólis, SC, Brazil, August 16th to 18th, 2018.

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Why do we get more pregnancies, earlier with FTAI?

It's all about the submission rate!

There is no magic bullet when it comes to seeking benefits from FTAI, it is simply a game of numbers. The more cows submitted for insemination, the more cows you get pregnant. Why? When inseminating to heat detection, not all animals who ovulate will display heat behaviour, so these cows and those with short term heat expression are missed. This means many animals who could be conceiving are just not given the opportunity to do so. However, when using FTAI, you are firstly reducing labour costs as you do not need to observe heat, but you are also submitting 100% of the group to insemination. This allows all cows an opportunity to conceive if they are able to do so.[5]

Number of Animals	Submitted	Conception %	Pregnancy %
100	50	50	25%
100	80	50	40%
100	100	50	50%

Time (days post calving)
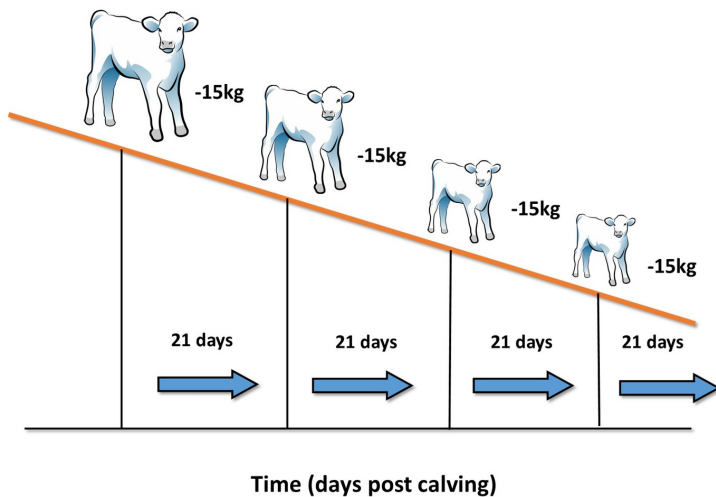
EARLY PREGNANCIES ARE NOT JUST BENEFICIAL FOR THE COW!

Studies have shown that for every cycle a cow misses conception, her calf will be on average, 15kgs lighter. This means smaller weaners and more costs involved with managing replacement heifers to get them to the right weight, prior to them joining the herd.[2,3,4]

Heifers that calve in the first 21 days of the season are also more productive, have longer to recover between re-breeds and have increased longevity in the herd.[1]

1. R. A. Cushman, L. K. Kill, Richard N. Funston, E. M. Mousel and G.A. Perry (2013), 'Heifer calving date positively influences calf weaning weights through six parturitions', Journal of Animal Science, v. 91 2. Data on file. 3. W. H. Johnson and J. T. Elings (1969) 'Earlier calves are heavier claves', California Agriculture pp. 9-10. 4. R. Kasimanickam, J.M. Cornwell,, R.L. Nebel (2005), 'Fertility following fixed-time AI or insemination at observed estrus in Ovsynch and Heatsynch programs in lactating dairy cows', Theriogenology, v. 63 4. Meat and Livestock Australia (2019), 'More beef from pastures: maximise the number of live calves per breeding female', More beef from pastures online manual, MLA Sydney, Australia 5. Manoel F.Sá Filho, LucianoPenteado, Everton L.Reis, Tomás. A.N.P.S.Reis, Klibs N.Galvão and Pietro S.Baruselli (2013), 'Timed artificial insemination early in the breeding season improves the reproductive performance of suckled beef cows', Theriogenology, v. 79, no. 4.

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Fixed Time AI or Heat Detection AI?

Oestrus (heat) detection can be a fantastic tool however, it can also be a limiting factor for many herds. Several things determine the success of heat detection:

1. Accuracy - who is doing the heat detection and their skillset
2. Number of animals in the group - is observation easy?
3. Poor timing - only relying on one or two 'heat' signs or watching for heat at the wrong time
4. Short or no expression of oestrus - common in high producing animals[4]
5. Non-cyclers - no response to some interventions and no signs of heat

These factors mean longer intervals to conception, less days in milk and smaller calves at weaning.

It is also important to consider the impact of high lactation on heat expression, follicle growth and ovulation patterns[2] Several studies have shown that as metabolic demands increase in relation to milk output, the duration of heat expression drops. This means that some of the most productive cows in the herd may not be submitted for insemination due to reduced heat behaviour.

FTAI allows for whole herd submission so that **no cows miss an opportunity** for insemination and conception[2, 3]

OESTRUS EXPRESSION IN RELATION TO MILK PRODUCTION

Lopez et. al. 2004
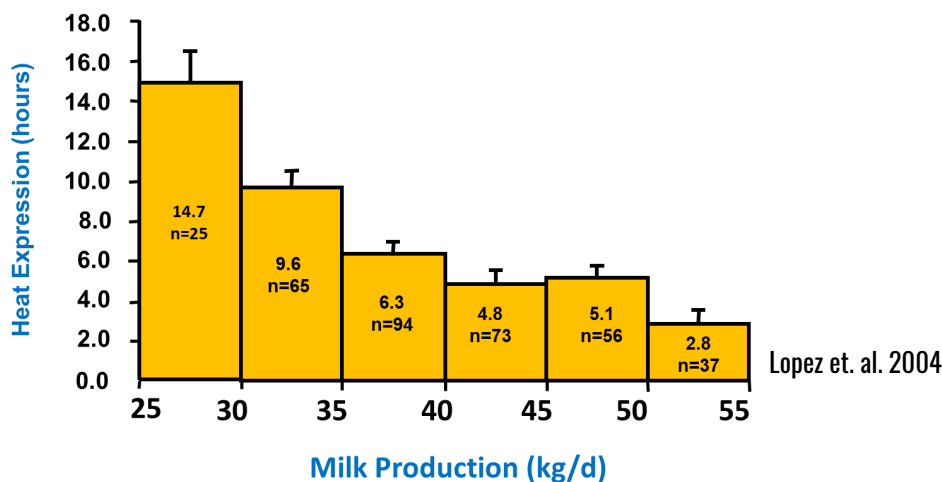
In a trial conducted on Holsteins comparing the duration of heat expression with the volume of milk produced, it was evident that with increasing metabolic demand, higher volumes of circulating oestrogen, and higher total milk solid (kg/day) production, the timeframes in which a cow showed signs of heat dropped significantly[1]

Reduced intensity and length of heat expression can lead to a decrease in submission rates to artificial insemination.

1. Lopez, H., Satter, L.D. and Whitbank, M.C. (2004), 'Relationship between level of milk production and estrous behavior of lactating dairy cows', Animal Reproduction Science, v. 81
2. M.C. Wiltbank, R. Sartori, M.M. Herlihy, J.L.M. Vasconcelos, A.B. Nascimento, A.H. Souza, H. Ayres, A.P. Cunha, A. Keskin, J.N. Guenther, A. Gumen (2011), 'Managing the dominant follicle in lactating dairy cows', Theriogenology, v. 76
3. J. A. Sauls, B. E. Voelz, S. L. Hill, L. G. D. Mendonça, and J. S. Stevenson (2017), 'Increasing estrus expression in the lactating dairy cow', Journal of Dairy Science, v. 100
4. R. Kasimanickam, J.M. Cornwell,, R.L. Nebel (2005), 'Fertility following fixed-time AI or insemination at observed estrus in Ovsynch and Heatsynch programs in lactating dairy cows', Theriogenology, v. 63

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Progesterone devices for dairy herds

Why do we use them?

While heat detection can be a great tool for dairy herds it can be limited by:

1. Cows not cycling by MSD
2. High producing cows not displaying heat behaviour due to higher metabolic requirements[2]
3. Cystic cows

To achieve adequate conception rates, a progesterone device can be utilised to assist with more controlled follicle growth and ovulation patterns, either in a heat detection program or in a Fixed Time AI program.

Considerations when choosing a device

Intravaginal devices are designed to deliver a controlled release of progesterone, over a number of days, to assist with follicle growth. A number of factors influence how a device delivers progesterone[3] and which one will suit your particular program needs:

1. Surface area of the device
2. Dose rate
3. Material the device is made from
4. Length of the synchronisation protocol

DIB-V ® 1.0g Progesterone Device

Containing 1.0g of progesterone, the DIB-V® has a high surface area for optimal progesterone payout and is made from a flexible silicone with soft tips, maximising cow comfort. Studies in lactating dairy herds show that the DIB-V® contains enough progesterone to effectively synchronise cows for timed ovulation in modern FTAI protocols. The 1.0g dose also means that devices are single use, reducing variation in results and improving herd health and biosecurity practices on farm.
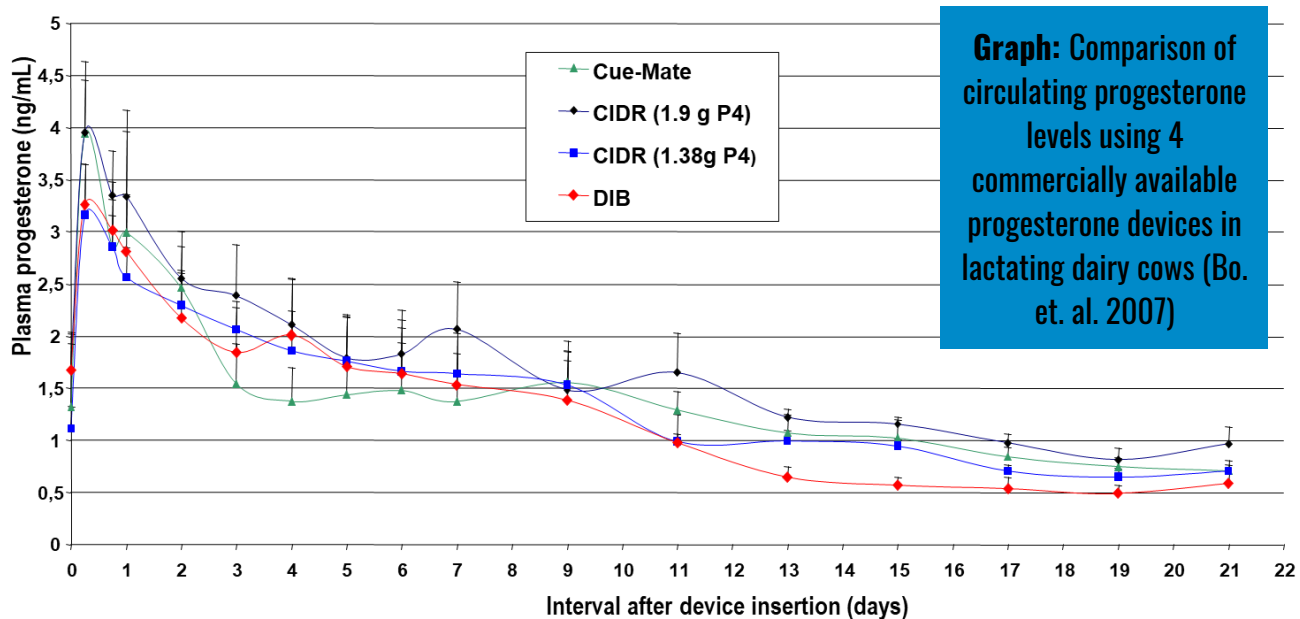
Graph: Comparison of circulating progesterone levels using 4 commercially available progesterone devices in lactating dairy cows (Bo. et. al. 2007)

1. Bo et al, 2007. Systematic Reproductive Management in Dairy Herds. Proceedings of the Society of Dairy Cattle Veterinarians of the NZVA 2007. 155 – 168.
2. Lopez, H., Satter, L.D. and Whitbank, M.C. (2004), 'Relationship between level of milk production and estrous behavior of lactating dairy cows', Animal Reproduction Science, v. 81
3. Ignacio M. Helbling and Julio A. Luna (2017), 'PROGESTERONE ADMINISTRATION IN PLANNED REPRODUCTION OF CATTLE', international Journal of Medical and Biological Frontiers, v. 23, no. 1

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