
DAIRY NEWSLETTER

THE IMPORTANCE OF PROGESTERONE

Progesterone is a natural steroid hormone that is secreted primarily by corpus luteum (CL) on the ovary of all cycling cows, and the placenta of all pregnant cows. Adequate concentrations of circulating progesterone (P4) in the blood are essential for establishing and maintaining a pregnancy. The importance of progesterone has never been overlooked, but with a heavier reliance on the use of reproductive synchronization programs, like Ovsynch, its effects should be re-evaluated to ensure there is optimum performance of both the cows and the programs.

It is quite clear that reproductive efficiency on our modern dairy farms is dependent on the optimization of herd management, animal health and cow physiology. As mentioned above, progesterone is produced by the CL and is metabolized (broken down) by the liver. If a cow can achieve an increase in luteal tissue, there will be a corresponding increase in circulating progesterone. Unfortunately, anything that increases blood flow to the liver will speed up the metabolism of progesterone, therefore lowering its concentration in the blood. Increased feed intake is a prime example of what can cause a clear increase in blood flow to the digestive tract, an increase in liver blood flow and a corresponding decrease in circulating progesterone. When matched for weight and age, high producing lactating Holstein cows had more than twice the liver blood flow as found in non-lactating cows¹. This is another reason why high producing herds require more concentrated efforts on reproduction to keep pregnancy rates up.

Importance of high Progesterone before AI (during follicular growth period)

Over 80% of progesterone production during the estrus cycle occurs during the “luteal phase”. This phase is dominated by a large CL and waves of follicular growth. The use of a progesterone releasing device (ie. CIDR) is commonly used to supplement the amount of progesterone circulating during this luteal phase and it has been shown to improve conception by 5-7%.² Cows with low circulating progesterone concentrations in the luteal phase have an increased rate of double ovulations that are less fertile. This leads to more inaccurate inseminations as the hormone profile is off. Cows with lower progesterone concentrations in the luteal phase actually had much lower fertility compared to those with high progesterone concentration (37% vs. 51% conception rate) and there is also an increased rate of pregnancy loss in cows with low progesterone concentration in the luteal phase, prior to breeding.³

From a practical standpoint, this reinforces the importance of ensuring cows are cycling well prior to the initiation of an Ovsynch program and only starting cows that have a large, functioning corpus luteum. This is why the “Ovsynch Plus” program is necessary for cows that are not cycling or those that do not

¹ Wiltbank et.al 2006 Changes in reproductive physiology of lactating dairy cows due to elevated steroid metabolism. Theriogenology, 65:17-29.

² Stevenson et.al 2008 Detection of anovulation by heatmount detectors and transrectal ultrasonography before treatment with progesterone in a timed insemination protocol. J Dairy Sci, 91:2901-2915.

³ Wiltbank et.al, P4 Effects during FTAI protocol in dairy cows. 2012

have a CL, as the administration of an additional GnRH product 6-7 days prior to the start of Ovsynch should lead to CL development, and thus higher progesterone concentrations. Conversely, the process of giving prostaglandin (PGF) without checking to see what structures are actually on the ovary, as is the case with pre-synch, may not always be helpful to keep progesterone concentrations up and regular. Routine checking of fresh cows prior to breeding can lead to more appropriate hormone selection and less overall hormone administration.

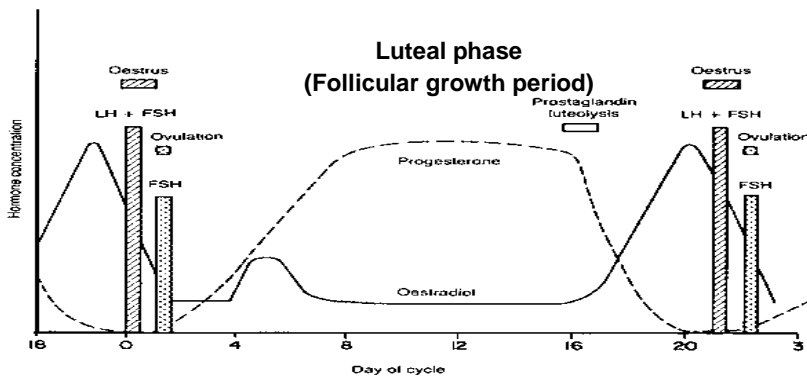


Figure 1: Estrus cycle hormone profile, bovine

Importance of Low Progesterone near the time of AI

The rapid drop in progesterone at the end of a cow's estrus cycle is necessary to induce the hormone cascade that results in ovulation. Inadequate breakdown of the CL will result in progesterone concentrations that remain too high at this time and will result in a reduction in fertility. An additional treatment of prostaglandin (PGF), 12 hours after the first PGF injection in an Ovsynch program may help to improve this luteolysis and has been showing tremendous success in some of our herds that are utilizing the program. Speak with your herd health veterinarian for proper timing and to see if this Ovsynch program modification will work for you.

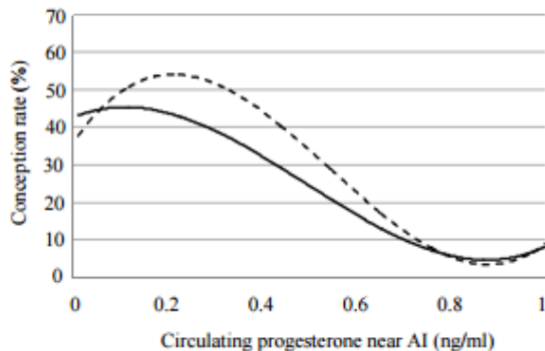


Figure 2: Effect of circulating P4 near AI on fertility of primiparous (n=458, dashed line) and multiparous (n=1081, solid line) dairy cows receiving Ovsynch

Soua et al. 2007

Importance of High Progesterone after AI

Progesterone produced from an active CL is necessary for embryo growth and to maintain a pregnancy. Some research has suggested ways of inducing small changes in circulating progesterone and increased fertility, but more research is needed to determine the cause of low progesterone post-AI and ways to manage it.

Speak with your herd health veterinarian to discuss protocol changes that will optimize circulating progesterone concentrations and produce the best fertility rates on your farm!