

## Factors that Influence Colostrum Yield: Hormones

*This is the third article in the series.*

Hormonal changes are an important component in the development of colostrum and eventually milk. The purpose of this review is to go over some basic hormonal changes that must occur for colostrum yield to be increased.

### What is happening?

Starting with a gestating cow or heifer, estradiol and progesterone emanating from the fetus or the ovaries act by forming mammary tissue resulting in the mammary gland having the ability to accumulate colostrum components. Around 150 days of gestation, estrogen begins to increase and a few days later milk producing and storage tissue (alveoli) begin to form<sup>1</sup> and the development of oxytocin receptors in the gland occurs.

As the cow nears calving, corticoids increase along with the hormone prolactin while progesterone drops.<sup>1</sup> This hormonal change is essential for colostrum production. It appears that the spike in prolactin near calving is essential for colostrogenesis to shift to lactogenesis (milk synthesis). When this occurs the contents of the udder become more fluid-like probably because lactose production occurs and the more lactose in the glands the more water is brought in. If prolactin does not spike lactogenesis will not occur rapidly.

You may have noticed that cows that do not produce any colostrum appear to have a full udder. The problem is that the milking machine cannot



get the colostrum out because it is likely too thick. Later, the prolactin concentrations increase resulting in a more colostrum-like substance, however, by then it is too late. This effect is probably due to low environmental temperatures (less than 41°F). It has been shown that prolactin is temperature-dependent and remains low when it is cold. This will not affect the cow's ability to produce milk as she progresses through her lactation.

There is not much one can do in this situation. Therefore, it is important to have a colostrum-based colostrum replacer or another cow's colostrum available.

### What about oxytocin injection?

There has only been one study evaluating oxytocin injection to increase colostrum yield even though many farms practice this way of harvesting colostrum.<sup>2</sup> This study indicated that first-calf heifers provided with 40, 20, or 0 IU oxytocin 45 seconds before harvesting colostrum resulted in the 40 IU treatment producing more colostrum

than the other two treatments (11.9, 8.8, and 8.4 pounds respectively). There was no difference in colostrum production in older cows (2+ lactations) that underwent the same treatments.

## Take Home Messages

Cows calving during the winter months may have reduced colostrum yield probably due to failure of prolactin increase because it is environmental temperature-dependent. It is advised to have ample frozen colostrum or a colostrum-based replacer available. Oxytocin injection only benefited first-calf heifers in the study reported.

## References

<sup>1</sup>Delouis, C. 1978. Physiology of colostrum production. Ann. Rech. Vet. 9:193-203.

<sup>2</sup>Mann, S., R.M. Bruckmaier, M. Spellman, G. Frederick, H. Somula, and M. Wieland. 2024. Effect of oxytocin use during colostrum harvest and association of cow characteristics with colostrum yield and IgG concentration in Holstein dairy cows. J. Dairy Sci. (In Press).

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