

# Oocyte Development During Negative Energy Balance



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The high producing dairy cow is a marvelous high-octane beast who can turn feed into large amounts of nutritious milk. One downside is it's often harder to get her pregnant compared to her lower producing herdmates and heifers. In this article, we will chat about how the development of the oocyte can be a factor in why high producing cows who experience negative energy balance can be harder to get pregnant.

The oocyte, also known as the ovum or egg, is the female gamete or reproductive cell found in each ovarian follicle. The life of an oocyte begins in the fetal ovary. Only a few are ovulated and most degenerate as the follicle they reside in regresses. Many that are ovulated and fertilized do not survive the early stages of development.

Most early lactation high producing cows are in negative energy balance because the demand for energy exceeds the energy the cow is able to consume. The result is body fat is mobilized to provide the extra energy. Blood concentrations of free fatty acids are elevated when cows are mobilizing body fat to support milk production. Follicular fluid is also higher in free fatty acids in this situation.

One interesting question is what happens to oocytes when the level of free fatty acids in the blood and follicular fluid are elevated. Results of recent research have shown oocytes which mature in a high free fatty acid environment are compromised and result in less robust embryos after fertilization. Less robust embryos could result in lower embryo survival and lower conception rates. One researcher has even suggested this oocyte environment may have persisting negative effects on fetal development and the newborn calf. An interesting side note is Kentucky native, Dr. Jack Britt, hypothesized way back in 1992 that follicles growing in early lactation may contain a compromised oocyte. Well done Dr. Britt!

In conclusion, we need to minimize the magnitude and duration of negative energy balance in the high producing early lactation cow. There are thousands of articles written on how to manage transition and early lactation cows to accomplish this goal, so I will not enter that discussion here.