

Understanding How Photoperiod Manipulation Enhances Milk Production

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Photoperiod, or day length, varies naturally based on season and latitude, but can also be artificially manipulated to increase livestock production. In dairy cows, photoperiod can be manipulated to increase milk yield, improve animal health, and enhance efficiency. Cows exposed to short days during the dry period produce ~3 kg per day more milk in the ensuing lactation. The objective of our research is to understand how photoperiod affects the mammary gland with the goal of increasing milk production. One method of approaching this objective is to measure changes in gene expression as a result of photoperiod treatment. We compared long and short day photoperiod treatment and found differential expression of ~1200 genes in the mammary gland. The gene expression profiles indicate that photoperiod treatment regulated growth of mammary cells, which is likely to be tied to the subsequent increase in milk yield. We also observed that many genes associated with immunity were differentially regulated in response to photoperiod treatment. This suggests that altered immunity may play a role in enhanced mammary function after photoperiod treatment.

Implications: By determining which genes respond to photoperiod treatment we can identify key regulatory pathways that control milk yield and develop methods to enhance milk production and improve profitability in the dairy industry.