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### Effects of calving interval and periconception conditions of dairy cows on milk performance and metabolism of their offspring in later life

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#### Introduction

Extending the voluntary waiting period (VWP) for insemination in dairy cows is of interest to reduce the frequency of calving events and inseminate at a moment with better cow conditions around conception. Little is known about the calves in later life born from dams with an extended VWP, and maternal conditions around conception on offspring in later life. The objective of the current study was to identify the effect of extending dam's VWP, and periconception conditions on body condition, metabolic status and milk production of their offspring during the first 100 days in milk (DIM) of the offspring's first lactation.

#### Materials and Methods

Holstein Friesian dairy cows (N = 154) were blocked according to parity, milk yield, and somatic cell count (SCC), and randomly assigned to a VWP of 50, 125, or 200 d. Heifer calves (N = 62) from those cows were monitored from their first calving until 100 DIM. Not all dams were successfully inseminated soon after the planned VWP, resulting in differences between the intended VWP and the actual calving interval (Clnt). Calves were regrouped according to their dam's actual Clnt (Clnt\_1: 324 - 408 d; Clnt\_2: 409 - 468 d; Clnt\_3: 469 - 586 d). Body weight and milk yield were recorded daily. Dam's blood was collected every 2 weeks from 4 week before to 4 weeks after conception. Offspring's blood was collected weekly during 8 weeks after calving, and subsequently every 2 weeks until 100 DIM. Data analyses were performed using a mixed model, with repeated measurements and fixed affects for dam's Clnt, parity, offspring's age and their two-way interactions. To analyse effects of periconception conditions, those were included as a covariable in the model, separately.

#### Results

In offspring of primiparous dams, a longer Clnt of the dams resulted in greater body weight (Clnt\_3), greater plasma glucose (Clnt\_2), and lower milk yield (Clnt\_2) during the first 100 DIM, compared with shorter Clnt of the dams (Clnt\_1). In offspring of multiparous dams, a longer Clnt of the dams resulted in lower milk yield (Clnt\_3) than a shorter Clnt (Clnt\_1), and lower plasma insulin-like growth factor-1 concentration (Clnt\_2 and Clnt\_3) than Clnt\_1. Dam's milk fat around conception was positively related to offspring's milk fat and SCC. Dam's milk lactose was negatively related to offspring's milk protein and lactose. Besides, dam's fat and protein corrected milk yield (FPCM) was negatively related to offspring's milk fat, lactose and SCC. Dam's body condition score (BCS) was positively related to offspring's IgG and IgM against keyhole limpet hemocyanin, and negatively to offspring's plasma glucose.

#### Conclusions

A longer Clnt in dams can result in a greater body weight, lower milk yield during the first 100 DIM, although effects were not present in all Clnt categories and parity groups. Besides calving interval, other periconception conditions like parity, milk fat, milk lactose and FPCM were related to offspring milk performance. Dam's parity and BCS were related to offspring's metabolism.