
# Proceedings

## of the joint conference BOLFA & ICFAE

ISBN: 978-3-03917-093-7

DOI: 10.48350/198657

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S5_P05

## Effects of calving interval and periconception conditions of dairy cows on development and metabolism of their offspring in early 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 early life born from dams with an extended VWP, and maternal conditions around conception on offspring in early life. The objective of the current study was to identify the effect of extending dam's VWP, and periconception conditions on body condition and metabolic status of their offspring from birth until their first calving.

**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 cows with different VWP were monitored from birth until their first calving. Not all dams were successfully inseminated soon after the planned VWP, resulting in differences between the intended VWP and the actual calving interval (CInt). Calves were regrouped according to their dam's actual CInt (CInt_1: 324 - 408 d; CInt_2: 409 - 468 d; CInt_3: 469 - 586 d). Body weight was recorded for dams and offspring. Dam's blood was collected every 2 weeks from 4 week before to 4 weeks after conception. Offspring's blood was collected every 2 weeks from birth to 11 weeks old, and then every 4 months until calving. Data analyses were performed using a mixed model, with repeated measurements and fixed affects for dam's CInt, 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**
From birth to weaning, the calves born to dams in CInt_1 had a higher plasma non-esterified fatty acids (NEFA) concentration than CInt_3 calves (0.34 vs. 0.26 mmol/L). For primiparous dams, calves born to dams with a shorter CInt (CInt_1) had greater IgG against keyhole limpet hemocyanin (KLH) than CInt_3 (6.02 vs. 4.60) before weaning. After weaning till calving, CInt_1-calves from primiparous dams tended to have greater plasma NEFA concentration than CInt_2-calves. From birth to weaning, dam's milk fat content around conception was positively related to offspring's insulin and glucose concentrations. During weaning to calving, dam's SCC and body weight around conception was positively related to offspring's IgG and IgM against KLH in plasma. Dam's insulin-like growth factor_1 was positively related to offspring's body weight, insulin and IGF_1 from birth to weaning.

**Conclusion**
From birth to weaning, a longer CInt in dams can result in a lower natural antibodies, although effects were not present in all CInt categories and parity groups. The periconception conditions of dams did not largely influence the offspring till weaning. After weaning, dam's CInt had limited effects on offspring, but other periconception conditions like body weight and milk performance had stronger relationship with offspring's metabolism than before weaning.