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Phenotyping pregnancy failure occurring within 90 days following first postpartum insemination in Holstein cattle and relationship with fertility breeding value of bull fathers

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This epidemiological study aimed to investigate pregnancy failures occurring within 90 days following first postpartum insemination (fAI) in Holstein cows according to cow fertility breeding value (FERbv) of 12 bull fathers, which were selected according to their fertility QTL status on chromosom 3. A total of 4239 Holstein daughters were inseminated and submitted to the following phenotyping protocol : progesterone (P4) concentration was determined on the day of AI (D0) and 18 to 25 days later ; then two pregnancy checks were performed using ultrasonography 45 and 90 days following AI.

Combining these observations, 4 different chronologies of pregnancy failure were described and subsequent failure incidences were estimated from 3508 cows : cows inseminated during the luteal phase (AI-LP, high P4 level on D0, 5.0%), no fertilization or early embryonic death (NF-EED, low P4 on D0 and D18-25, 35.1 %), late embryonic death (LED, low P4 on D0, high P4 on D18-25 with a negative pregnancy check on D45, 19.0 %) and fetal death (FD, positive pregnancy check on D45 then negative on D90, 2.7 %). Bull fathers FERbv ($CD \geq 0.95$) were classified into 3 groups (low [-0,7 et -0,5], medium [- 0,1 et +0,3], and high [+0,5 et 1,0]). Effects of bull fathers FERbv on pregnancy failure incidences were estimated using mixed models of logistic regression. Cows issued from bulls presenting low FERbv ($\leq -0,5$) presented significantly higher NF-EED and LED rates than cows issued from bulls with medium FERbv (OR=1.3, $p=0.03$ and OR=1.4, $p=0.007$ respectively) or high FERbv (OR=1.3, $p=0.02$ and OR=1.7, $p<0.001$ respectively). No effect of FERbv was observed on FD and AI-LP rates. This study confirmed the major impact of early embryonic death. The precise follow-up within 90 days following AI allowed to describe different fertility phenotypes and to quantify effects from bull father FERv together with environmental sources of variation, management factors and individual characteristics. Further steps consist in interpreting genotype results from phenotyped cows, which should lead to identify new fertility QTLs.