

Session 3: Breeding for Resilience to Climate Change: Adaptation strategies.

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### **TOWARDS NEW BREEDING TOOLS IN A CONTEXT OF CLIMATE CHANGE: FERTILITY RESULTS OF THE RUMIGEN PROJECT ON NEW PHENOTYPES FOR HEAT TOLERANCE TRAITS**

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RUMIGEN is a project financially supported by the EU that aims to develop breeding programs capable of managing the trade-offs between efficient production and resilience to extreme climate conditions. Previous results on heat tolerance indicators derived from milk recording data and meteorological information showed differences of magnitude of the effects and heat load threshold for heat stress between countries. In this study, we estimated the effect of heat load on fertility in three countries by analysing simultaneously fertility data registered from 2010 through 2020 in national reproductive recording systems and meteorological information from the closest to farm weather stations. More specifically, fertility data were defined as the success or failure in first insemination (CR) from first lactation Holstein cows in France (N=4,450,637), Spain (N=471,793) and The Netherlands (N=417,548) and from first lactation Montbéliarde cows (N=835,751) in France. The heat load was measured from the average of a temperature and relative humidity index (THI) in the seven days post AI. In all countries, the effect of heat load on CR were estimated using animal mixed models including a class effect for THI values together with other fixed and random effects used in national fertility evaluations. Heat stress thresholds and slopes of decay in CR after the threshold were estimated from THI effect solutions using segmented regression models, having a fixed number of break-points. Considering a single heat stress threshold (value after which a considerable reduction in CR is observed) showed that this threshold is around 70 for THI in all countries. Slopes of decay in CR did show substantial differences across countries, ranging from 0.79 points per degree of THI in Holstein cows in Spain to 2.25 points per degree of THI in Holstein cows in France.