Gross margin losses due to *Salmonella Dublin* infection in Danish dairy cattle herds estimated by simulation in the Dublin-Simherd model

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The objective of this study was to estimate losses in gross margin (GM) following introduction and spread of *Salmonella Dublin* in dairy herds. GM losses were estimated using an age-structured stochastic, mechanistic and dynamic simulation model (Dublin-Simherd). The model incorporated six age groups (neonatal, pre-weaned calves, weaned calves, growing heifers, breeding heifers and cows) and five infection stages (susceptible, acutely infected, carrier, super shedder and resistant). Twelve scenarios were included in the model, these were the combinations of three herd sizes (85, 200 and 400 cows) and 4 management levels of infection spread (very good, good, poor and very poor). Input parameters for *S. Dublin* effects on production and animal health were based on literature and calibrated to mimic real life observations. The effects of introducing one *S. Dublin* infectious heifer four weeks before calving were estimated through 1000 simulation iterations for each of the 12 scenarios. Mean annual GM per cow stall was compared between herds that experienced spread of *S. Dublin* and non-infected reference herds for over a 10 year period. Estimated GM losses were highest in the first year after infection, and increased with poorer management and herd size. E.g. for a 200 cow stall herd, mean GM losses were estimated to 57 Euros per stall in the first year after herd infection in a herd with good management and to 315 Euros per stall in a herd with poor management. Sensitivity analyses estimated that assumptions about milk yield losses for cows in the resistant or carrier stage had the highest influence on estimated GM losses, and that this effect was more influential the poorer the management was. Results from this study can be used to encourage farmers to prevent introduction and to control spread of *S. Dublin* within the herd.