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Relationships between sow conformation, accelerometer data and crushing events in commercial piglet production

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Pig selection for meat production maximises growth rate and length of back with a resulting change of body shape and difficulty in control of posture change in sows. As a consequence, many piglets are crushed, either as the sow lies down or rolls from side to side. This study investigated how characteristics of posture change movements in the sow (in conjunction with leg conformation) affect the likelihood of piglet crushing. Piglet births (n=11752) were recorded for 21 weeks in a population of approx. 750 Landrace sows crossed with either White Duroc or Large White sires. All sows had leg conformation data collected (using previously published criterion), with a subset having rump-mounted accelerometer data (n=315). Data extracted from the accelerometers included the mean rate of change in movement around the X-axis (ROLL-CHANGE) and the mean rate of change of movement around the Y-axis (PITCH-CHANGE). The farrowing floors were either concrete/plastic, concrete/metal, fully metal or fully plastic. Piglet data gathered at processing (18-24 hours after birth) were piglet weight, sex, IUGR-status determined by head morphology (normal, light-IUGR and severe-IUGR) and reason for death. All piglets remained in their birth litters until processing, but were fostered thereafter. Females were individually identified but males were unidentifiable after processing. There were 349 piglets (both males and females) crushed between birth and processing (CPROC); 146 females were crushed between processing and weaning (males were unidentifiable after processing) giving a total of 495 crushed piglets (CTOT). Non-significant effects (GLMM at piglet level with sow-week as a random factor) on both CTOT and CPROC included sow parity, piglet sire breed, gender and the direct effects of sow conformation. Significant effects on CPROC were an interaction between piglet weight and IUGR-status (P=0.004), the type of flooring in the farrowing house (P=0.038), ROLL-CHANGE (P=0.043), PITCH-CHANGE (P=0.008), the interactions between PITCH-CHANGE and the hind pastern angle (P=0.039) and PITCH-CHANGE and placement of the hind feet (P=0.035). There was also an interaction between ROLL-CHANGE and the shape of the hind leg (P=0.077). For effects on CTOT, the piglet weight/IUGR-status interaction retained significance (P=0.002), as did PITCH-CHANGE (P=0.002) and the interactions between PITCH-CHANGE and the hind pastern angle (P=0.032) and PITCH-CHANGE and hind feet placement (P=0.018). The heritabilities for the accelerometer traits were: PITCH-CHANGE, h^2=0.32±0.171 and ROLL-CHANGE, h^2=0.03±0.110. In conclusion, accelerometer-derived measurements of sow movement have an effect on early piglet crushing. Sow limb conformation influences crushing events through interactions with sow movements. The interactive effects of sow conformation and accelerometer-derived data merit more detailed investigation. This research was funded by the EU FP7 Prohealth project (no. 613574).