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Is the maternal behaviour conditioned by emotional reactivity in Yucatan sows?

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Genetic selection on sows is usually focused on performance-based criteria, such as prolificacy or milk production. Though, criteria linked to the maternal behaviour per se are more considered for increasing piglet and sow welfare. Moreover, the link between the female's emotional reactivity and its maternal behaviour, reported in rodents and poultry, has received little attention in pigs. An experiment was conducted in order to evaluate this relationship in Yucatan sows, an experimental model for behaviour, nutrition and neurosciences studies. Eight two-year-old, multiparous (2-3) and loose-housed Yucatan sows were studied. The emotional reactivity was determined in standardised tests: open-field (OF) and Human in an arena test 18 d prepartum, and novel object test in the housing pen 10 d prepartum. Maternal behaviour was analysed by 10-min scan sampling for the 24 h prepartum, by continuous sampling during the farrowing process and for 24 h at 3, 5, 11, 15 and 32 days postpartum. Principal component analysis (PCA) on emotional reactivity data allowed us to identify 2 groups with differentiated behavioural patterns. Group 1 was mainly characterized by higher exploration of the OF pen, the unknown human and the novel object, while Group 2 was mainly characterized by more time spent immobile, a higher distance from the human, and higher latency to enter the OF arena and investigate the human or object. A comparative analysis between both groups showed some differences in maternal behaviour, but significant only during the postpartum period, time to investigate the pen higher in group 1 ($U=16$ $n_1=n_2=4$, $P<0.05$). Correlations were also found between the pen investigation during the OF test and the piglet investigation by the sow during farrowing ($r=-0.69$, $P=0.06$). The latency to investigate the unknown human was correlated to the number of times the sows was observed pushing their piglets during the farrowing ($n=8$, $r=0.74$, $P<0.05$) and the suckling frequency during postpartum ($r=0.68$, $P=0.06$). The time spent close to the unknown human was correlated with the frequency of interrupted suckling by the sows ($r=0.84$, $P<0.01$). In conclusion, sows displaying higher fear or anxiety responses in the standardized tests used in this study to assess emotional reactivity, tended to show higher maternal abilities. Those results need to be confirmed but highlight the importance of the assessment of the emotional reactivity for the prediction of maternal abilities, and behavioural criteria or markers for temperament-based selection.