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QUANTITATIVE ASSOCIATIONS BETWEEN CLIMATE DATA AND WEANING-TO-FIRST-MATING INTERVAL OR ADJUSTED 21-DAY LITTER WEIGHTS DURING SUMMER IN JAPANESE SWINE BREEDING HERDS

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Introduction and Objectives

High summer temperature is one of the environmental cues which explain the reduction of sow performance (Prunier et al., 1996). The suboptimal sow performance in summer including prolonged weaning-to-first-mating interval (WMI) is a major concern in swine breeding herds (Anil et al., 2005). The objective of the present study was to quantify the associations between climate data and WMI or adjusted 21-day litter weights of sows in summer for different herd productivity groups.

Materials and Methods

This study included 87,428 parity records of 61,558 sows farrowed between June and September 2007 to 2009, in 103 Japanese herds. The 103 herds were classified into high-performing herds and ordinary herds on the basis of the upper 25th percentile of pigs weaned per mated female per year, averaged over the three years. The climate data were obtained from 21 weather stations of the Japan Meteorological Agency. Average values of the daily maximum temperatures (MT), average daily relative humidity (RH) and temperature-humidity index (THI) for 21 days after the farrowing date of a sow were coordinated with sow performance data from a recording system. Two-level mixed-effects models were applied to the data by using a herd at level 2 and an individual record at level 1.

Results and Discussion

Means values (Ranges) of MT, RH and THI were 27.8°C (17.3 to 36.0), 74.6% (57.3 to 90.9) and 22.2°C (13.0 to 27.4), respectively. Higher MT, RH and THI were associated with higher WMI and lighter adjusted 21-day litter weights ($P < 0.05$). High-performing herds had lower WMI and heavier adjusted 21-day litter weights than ordinary herds at any ranges of MT, RH and THI ($P < 0.05$). The WMI of sows in high-performing herds did not increase as much as those in ordinary herds when MT or THI was increased. For example, as MT increased from 25 to 35°C, WMI of sows in high-performing herds increased by 0.3 days, whereas those in ordinary herds increased by 0.8 days (Figure 1). Also, when MT, RH or THI was increased, parity 1 sows showed greater increase in WMI than parity 2 or higher sows ($P < 0.05$). For instance, as THI increased from 15 to 25°C, WMI in parity 1 sows increased by 0.9 days, whereas those in parity 2 or higher sows increased by only 0.3 days. In conclusion, high-performing herds alleviate the negative effects of summer humid subtropical climates on WMI or adjusted 21-day litter weight more than ordinary herds. The parity 1 sows were more sensitive to such summer changes in climate than parity 2 or higher sows. Therefore, it is recommended in particular for parity 1 sows that producers practice cooling management to cope with the negative associations between WMI and high temperatures or humidity during summer.

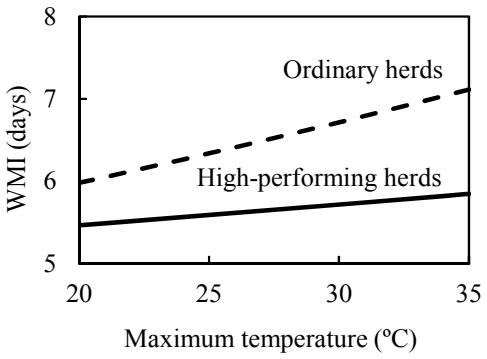

Figure 1. Estimated WMI under changing maximum temperature during lactation, for two herd productivity groups.

References

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Prunier et al. 1996. Livest. Prod. Sci. 45: 103–110.