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Observations and Projections of Heat Stress for Livestock in Sub-saharan Africa

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Abstract

Heat stress events for livestock species are expected to become more frequent due to climatic changes in the next decades. In this investigation, we assess the frequency of heat stress as well as the changes in consecutive days with heat stress events for different livestock species (dairy cattle, beef cattle, sheep, goat, swine, and poultry) in sub-Saharan Africa. Our analysis included observations as well as simulations from global and regional climate models from the Coupled Model Intercomparison Project Phase 5 (CMIP5) according to two representative concentration pathways (RCP4.5 and RCP8.5). We found that in recent decades the frequency of Severe/Danger heat events, i.e. events that result in significant decreases in productive and reproductive performances, has already significantly increased (at 95 % confidence level) in the region (e.g. for dairy cattle, it has increased in >1/5 of the study area). We also found that by the end of the 21st century, under both RCP scenarios, the frequency of Severe/Danger heat stress conditions and the mean average length of consecutive days with heat stress events are likely to significantly increase for almost all livestock species. As an example, such changes in frequency of dangerous heat stress condition may affect on average 15 % of our current livestock production (beef, milk, mutton, pork, poultry meat, and eggs) in East African countries by 2071–2100 climate period under RCP8.5. Our results highlight the hotspot regions where global climate change, in the absence of mitigation strategies, will significantly affect livestock productions in Sub-Saharan Africa in the future.

Keywords: Climate change, heat stress, livestock production, sub-Saharan Africa

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