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Caribbean Food Security-The Future of Livestock in a Warmer Climate

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The Islands of the Caribbean, like other Small Island Developing States (SIDS) face several challenges related to climate change. The agriculture sector and livestock sub-sector are particularly climate sensitive given the open field nature of production and the general absence of cooling systems. The Temperature Humidity Index (THI) is a useful indicator of livestock productivity response as a function of climate. In this paper, present and future heat stress conditions are determined using THI calculations for three livestock categories - chickens (layers and broilers), ruminants and pigs - across three agro-ecological zones in Jamaica. These livestock are the principal sources of animal protein in Jamaica and the entire Caribbean and are therefore important to protein security. Present day THI values are calculated using meteorological data for the period 2001-2012. Future THI is determined using data from the Providing REgional Climates for Impact Studies (PRECIS) regional climate model (RCM) system. PRECIS is driven by four ensemble members of the Quantifying Uncertainty in Model Predictions (QUMP) of the Hadley Centre Coupled Model, version 3 (HadCM3) for the AIB SRES Scenario for 1850-2100. A 21-year daily time series is extracted centred on the year when each global warming threshold of 1.5 °C, 2.0 °C and 2.5 °C above pre-industrial values is attained and is compared with a base period of 1960-1990. The results suggest that animals are currently experiencing considerable periods of heat stress, especially in the Northern Hemisphere summer (July to September) and even during the winter (December to February). Linear increase is noted in THI over the period 1960-2099, with minor variations among ensemble members. At warming of 1.5 °C above pre-industrial levels, there is a significant increase in THI values for all livestock, and the attendant heat stress is at danger or severe levels year-round. This warming threshold is attained between 2019 and 2043 with a mean occurrence of 2023, suggesting that remedial actions to safeguard protein security should be immediately planned. More severe consequences are projected with the higher warming thresholds.