

The effect of climate and climate changes on cattle production in Israel

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Abstract

Global climate change poses a challenge for predicting agricultural systems' productivity in the near- and distant future. In Mediterranean regions, the impact of climate trends are noticeable in most agricultural sectors, but the most prominent effects are expected in agricultural sectors with low investment in moderation of environmental conditions. This is the case with cattle feedlots, where the investment in cooling is limited, as well as in extensive rangeland farming. Although it is clear that heat-waves and drought years have an effect on cattle production, the extent of the impacts of climate and extreme climatic events on beef cattle production in Israel is unknown. Using historical data (2005-2021) analysis, we examined annual and seasonal effects of various climate indices (e.g., temperature, humidity, rainfall) and climate continuity indices (e.g., rainfall distribution) on beef cattle production indices in rangelands and feedlots. Over two years, we collected cattle production indices data from seven grazing herds and five feedlots located in different geographic regions along Israel's climatic transect. Among these indices were daily weight gain, pregnancy, calving and weaning rates. A total of 18 basic indices were summarized for the grazing herds and 23 basic indices for the feedlots. Concurrently, hourly and daily measurements of rainfall, humidity, and temperature were collected from seven climatic regions, where the grazing herds and feedlots are located. The climate data was used to calculate 17 annual climate indices. Significant differences were found in cattle production and growth indices between the examined cattle farms. As expected, differences were found between years and farms in all climate indices. Analyzing the effects of climate on beef cattle production indices in grazing herds revealed a distinct negative influence of heat-loads and night-temperature indices, on pregnancy, calving, and mortality. Additionally, a positive effect of winter humidity indices was found alongside a negative effect of heat-load on weight gain in the feedlots. The research findings highlight the advantage of northern herds and the sensitivity of southern herds in cattle breeding, emphasizing the importance of cold and humid winters and indicating the level of changes in production in response to climate factors.