Changes in Bale Moisture, Thickness, and Force Due to Changing Environments and Bagging

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In a three-phase study, changes in moisture content, bale thickness, and bale tie forces in cotton bales were strongly influenced by bale density, storage climate, and permeability of the protective covering on the bales. In Phase I, eight bales of cotton were packaged at universal density and stored without bagging at ambient conditions for 81 d. Bale thickness and tie force were measured periodically, and the bale weights were taken before and after the storage period. The same eight bales were then randomly placed in four different types of bagging and stored at 26.7 °C (80 °F) and 80% relative humidity (RH) for 100 d (Phase II). The bagging included two types of experimental bagging and two types of standard bagging. The experimental bagging was less permeable than the standard bagging. In Phase III, the same bales were stored for 305 d at 21.1 °C (70 °F) and 50% RH. The bales gained moisture (weight) during Phases I and II but lost moisture during Phase III. In Phase I, bale thickness and tie force initially increased after storage and then responded to the fluctuations in climatic conditions. During Phase II at 80% RH, the bale thickness and tie force increased, but during Phase III at 50% RH, the thickness and the tie force decreased. Weight of bales covered in the standard bags changed by 2.19, 1.42, and -2.35 after storage at ambient conditions, 80% RH, and 50% RH, respectively. Weight of bales covered in experimental bags changed by 2.08, 1.02, and -1.67% after storage at ambient conditions, 80% RH, and 50% RH, respectively.

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