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Grazing Management and Microclimate Effects on Cattle Distribution Relative to a Cool Season Pasture Stream

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Abstract

Because of concerns about the impact of grazing management on surface water quality, a 3-yr study was conducted to determine grazing management and microclimate impacts on cattle distribution relative to a pasture stream and shade. Three treatments, continuous stocking with unrestricted stream access (CSU), continuous stocking with restricted stream access (CSR), and rotational stocking (RS), were evaluated on six 12.1-ha cool-season grass pastures stocked with 15 fall-calving Angus cows (*Bos taurus* L.) from mid-May through mid-October of each year. On 2 $d \cdot mo^{-1}$ from May through September of each year, a trained observer in each pasture recorded cattle position and activity every 10 min from 0600 to 1800 hours. In years 2 and 3, position of one cow per pasture was recorded with a Global Positioning System (GPS) collar at 10-min intervals 24 $h \cdot d^{-1}$ for 2 $wk \cdot mo^{-1}$ from May through September. In week 2 of collar deployment in May, July, and September, cattle had access to off-stream water. Ambient temperature, black globe temperature, relative humidity, and wind speed were recorded at 10-min intervals and temperature humidity (THI), black globe temperature humidity (BGTHI), and heat load (HLI) indices were calculated. Based on GPS collars, mean percentage of time cows in CSU pastures were in the stream (1.1%) and streamside zone (10.5%) were greater ($P < 0.05$) than cows in CSR (0.2% and 1.8%) or RS (0.1% and 1.5%) pastures. Based on GPS collar data, off-stream water did not affect the percentage of time cattle in CSU or CSR pastures spent in the stream. Probabilities that cattle in CSU and CSR pastures were in the stream or riparian zones increased ($P < 0.05$) as ambient temperature, black globe temperature, THI, BGTHI, and HLI increased. Rotational stocking and restricted stream access were effective strategies to decrease the amount of time cattle spent in or near a pasture stream.

Resumen

Debido a preocupaciones sobre el impacto del manejo del pastoreo sobre la calidad del agua superficial, se realizó un estudio de 3 años para determinar el impacto del manejo del pastoreo y del microclima sobre la distribución del ganado en relación a la sombra y la corriente de agua. Se utilizaron tres tratamientos: Pastoreo continuo—sin restricción al acceso a la corriente de agua (CSU), pastoreo continúo con restricciones al acceso a la corriente de agua (CSR), y pastoreo rotacional; se evaluaron en seis potreros de 12.1 ha de gramíneas de crecimiento invernal utilizando 15 vacas Angus (*Bos taurus* L.) de mediados de Mayo hasta mediados de Octubre en cada año. En el 2 d-mes de Mayo hasta Septiembre de cada año un observador entrenado en cada potrero registró la posición y la actividad del ganado cada 10 minutos desde 0600 hasta las 1800 horas. En los años 2 y 3, se registró la posición y la actividad de una vaca/potrero utilizando collares con GPS a intervalos de 10 min cada 24 h-d-1 durante dos semanas-mes desde Mayo hasta septiembre. En la semana 2 de la implementación de los collares en Mayo, Julio, y septiembre el ganado tenía acceso a la corriente de agua. Temperatura ambiente, humedad relativa, temperatura de globo negro y velocidad del viento se registraron a intervalos de 10 minutos y humedad de temperatura (THI), la humedad de la temperatura del globo negro (BGTHI), y se calcularon los índices de carga de calor (HLI). Basados en los collares de GPS, la media del porcentaje del tiempo de las vacas en los potreros CSU que estuvieron en la corriente (1.1%), y en la zona de la corriente (10.5%) fue mayor ($P < 0.05$) que en vacas en CSR (0.2% y 1.8%) o en los potreros de RS (0.1% y 1.5%). Basándose en los datos de los collares de GPS, el agua fuera de la corriente no afectó el porcentaje del tiempo que el ganado en los potreros de CSU o CSR dedicó a la corriente. Las probabilidades de que el ganado en los potreros de CSU y CSR estuviera en la corriente o en las zonas ribereñas se incrementa ($P < 0.05$) conforme aumenta la temperatura ambiente, la temperatura del globo negro, THI, BGTHI, y HLI. El pastoreo rotacional, y el acceso restringido a la corriente son estrategias efectivas para disminuir la cantidad del tiempo que el ganado está cerca o en los potreros de corrientes.

Key Words: GPS, heat stress, off-stream water, rotational stocking, stabilized crossings

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