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Forage Biomass Production under Different Stocking Rates and Stocking Densities on a Namibian Livestock Farm

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Abstract

Understanding the effect of variations of stocking rate, stocking density, grazing intensity, grazing itineraries, and durations of grazing and rest events on vegetation responses is crucial for successful rangeland management. Various strategies, i.e. continuous, rotational, deferred, high density, strip, targeted, circuit grazing are advocated, but knowledge on the effects on vegetation and livestock performance is scarce. Grazing management therefore still largely relies on setting average stocking rates to match average carrying capacity, but this concept appears increasingly unsuitable in heterogeneous and variable rangeland environments.

We investigated the impact of increased stocking rate (twice the projected grazing days per paddock) and increased stocking density (strip grazing on a one-or-two-day moving frequency within the projected grazing time) against the current grazing regime (control) on forage biomass production on semiarid 9,500 ha livestock farm Springbockvley in Namibia. Springbockvley is grazed by on average 890 Nguni cattle and 3,700 Damara sheep (grouped in three herds) at an average stocking rate of 41 kg livestock biomass per hectare (established June 2013 - May 2016). The farm is subdivided into 60 paddocks and the three herds graze all paddocks in the same sequence with a resting period of 80 to 100 days between grazing events. The duration of grazing events for each paddock is determined based on visual vegetation assessment at the end of the growing period in May. Destructive biomass sampling was done in May 2014, 2015 and 2016 in 12 test paddocks (3 treatments, 4 replications) within ten single 1×1 m squares along a 200 metre transect. Samples were sorted by species, weighed, dried and re-weighed.

Absolute biomass production varied between treatments and replications, but declined over the monitored period most likely due to reduced precipitation. However, results on relative biomass production (biomass measured plus biomass hypothetically consumed at the respective stocking rate since the last assessment) indicate that grazing at both, higher stocking density (approx. factor 4) and increased stocking rate (factor 1.2–2) resulted in lower yield depression. Higher density grazing appears to lead to lower accumulation of standing dead plant material and litter. The study is ongoing and data analysis is preliminary.

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