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Livestock carrying capacity: assessment of world`s grasslands based on MODIS data products.

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Despite the consensus among researchers that future diets should include more plant-based proteins, animal-based foodstuffs are unlikely to disappear completely from our diet. Natural grasslands yield a notable part of the world`s animal protein production, but little is known about the sustainable potential of different areas, and thus the level of meat production that could be achieved globally by grazing. Whilst heavy stocking densities and overgrazing occurs in many regions, there still remain areas that have the potential to increase grazing from a carrying capacity perspective. This study aims to estimate the aboveground biomass that is sustainably available for grazers on the grasslands and savannas based on the MODIS Net Primary Production (NPP) approach at the global scale. We then use this information to calculate reasonable livestock-carrying capacities, using slopes, forest cover densities, proper use factors, and animal forage requirements as restrictions. The use of remote sensing to assess carrying capacities is still in its infancy, and this study represents the first global application of this novel approach. In addition, this study provides a methodology for examining the spatial and temporal variability of carrying capacities between seasons and years. Here we define the regional upper limits for pasture-based animal production, identify where future production could sustainably concentrate, and quantify the amount of protein intake that can be fulfilled by grazing animals.