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Modelling of Longterm Pasture Production and Estimation of Carrying Capacity of Ankole Pastoral Production Systems in Southwestern Uganda

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Abstract

Ankole cattle pastoral production system in southwestern Uganda is based on pastoral grazing without supplementary feeding or regular water availability. In this area livestock production is highly dependent on the availability of natural grazing, the quantity and quality of which are primarily determined by the amount and distribution of rainfall. Recent development of opportunities in milk marketing such as establishment of a good road network in combination with the organisation of milk collection and processing centres, led to a market outlet for milk in urban areas. These prevailing market conditions have led to an increasing tendency by the farmers towards the keeping of separate herds of both Ankole and Ankole-Friesian crossbreeds for beef and milk production respectively. This emerging production system raises a number of questions concerning its sustainability in an area characterised with high disease incidence and long droughts. The success of any grazing management strategy depends on the ability to track availability of forage on the range and being able to relate it to the number of animals that can be grazed on the rangeland. The amount of available forage and the number of animals grazing on the area effect intake and therefore animal performance and productivity per unit area. A dynamic stochastic compartment model based on difference equations programmed in STELLA 9.0.2 (High Performance Systems, Inc., Hanover, New Hampshire) was developed to simulate the dynamics of standing crop forage using the concept of rain use efficiency (RUE, kg DM produced ha⁻¹ mm⁻¹ rainfall year⁻¹). The model predicts the long term pasture production and carrying capacity of the production system. The study compares the carrying capacity with the current stocking rates in the area.

Keywords: Ankole cattle, modelling, pasture, production system, Uganda