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Assessing the potential contribution of crop residues to mixed crop ruminant systems in northern Ghana

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Abstract

Mixed crop–ruminant (MCR) farmers across Ghana face major feed shortages due to limited land access and increasing human population. To assess the extent of these shortages, we estimated the amount of feed resources produced in 134 MCR households in the Savannah (SR, n=84) and Northern (NR, n=50) regions using a two-step approach. First, a semi-quantitative survey gathered data on livestock numbers, available feed types and quantities, area cropped, and crop yields. This information was used to estimate the annual metabolisable energy (ME) requirement per tropical livestock unit (TLU) and the ME supply from crop residues per household, if only 50 % of available residues are used as feed in each region. Second, to estimate the forage yield per hectare of pasture in each region, we employed destructive sampling within a 0.25 m² frame every 250 m along identified grazing itineraries and quantified the above-ground biomass (AGB) across three seasons; the nutritional quality of vegetation samples was analyzed. Major feed sources included maize stover, groundnut and soybean haulms, rice straw, and natural pasture. In SR, an average household kept 1.9 TLU, cultivated 3.1 ha, and produced 586 kg dry matter (DM) of crop residues. In NR, the average household kept 2.3 TLU, cultivated 4 ha, and produced 837 kg DM crop residues. The annual ME supply from crop residues in SR and NR was 4,304 MJ and 6,582 MJ, respectively, while maintenance requirements of a household's TLU were 25,420 MJ in SR and 30,441 MJ in NR. Consequently, ME from crop residues could sustain 0.2 TLU annually in both regions. The AGB obtained from communally owned pasturelands in both regions were 689 and 764 kg/ha, supplying an ME of 5,338 MJ and 6,089 MJ annually in SR and NR respectively. This ME could support 0.2 TLU per household in both regions. Although the crop residues feeding ratio of 50 % may be too low, the findings indicate that ruminants in both regions are exposed to undernutrition, underscoring the need for further research to explore alternative strategies to optimise resource use, increase fodder production, and enhance sustainability of livestock keeping on MCR farms.

Keywords: Above ground biomass, crop residues, Guinea savannah zone, land use, metabolisable energy, natural pasture, tropical livestock unit