Pen-Fed *versus* Grazing: The Potential of Forages for Cattle Production in North-Eastern Cambodia

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Background

Challenge: Conversion of grazing land into cropland and plantations, resulting in land conflicts[1, 2]

Potential solution: Feeding penned livestock on farm-grown, highly productive and nutritious forages

Objectives

To estimate the above-ground biomass and the nutrient concentration of **farm-grown forages**

To compare the **cattle productivity** between planted forage cut-and-carry systems (penned) and traditional, extensive livestock systems (grazing)

Research Design

Fig. 1. Map of Northeast Cambodia with the target site Pruok.

Study site: Northeast Cambodia, Lumphat district in Ratanakiri Province

Field study period: June to September (rainy season) 2015

Forage species: *Stylosanthes guianensis, Panicum maximum, Brachiaria ruziziensis, B. ruziziensis* × *B. decumbens* × *B. brizantha*, and *Paspalum atratum*

Proximate forage analyses: Crude protein and fibre concentrations, digestible organic matter and metabolizable energy concentrations (n = 15)

Cattle experiment: Live weight gains of local cattle (86 - 147 kg initial body weight) either grazing (n = 19) or penned and fed a mix of farm-grown forages (n = 16) were recorded fortnightly on five farms in Pruok;
Penned cattle were fed 3.8 - 4.1 kg forage dry matter (DM)/day

Fig. 2. Natural pasture.

Fig. 3. Penned cattle.

Results

Forage management

Above-ground biomass yields: 2 - 3 DM t/ha/month

Table 1. Chemical composition (g/kg dry matter (DM)) and metabolizable energy (MJ/kg DM) of forages (arithmetic mean ± standard deviation).

	Forage species				
Parameter	*Paspalum atratum*	*Brachiaria ruziziensis*	*Stylosanthes guianensis*	*Panicum maximum*	*B.* hybrid
Crude protein	57 ± 3	75 ± 26	123 ± 14	71 ± 25	93 ± 44
Neutral detergent fibre	682 ± 52	656 ± 38	625 ± 93	625 ± 70	649 ± 35
Acid detergent fibre	460 ± 149	549 ± 154	424 ± 72	415 ± 129	442 ± 212
Digestibility of organic matter	520 ± 30	544 ± 24	559 ± 25	550 ± 60	539 ± 40
Metabolizable energy	7.0 ± 0.4	7.4 ± 0.3	7.8 ± 0.3	7.3 ± 0.8	7.2 ± 0.5

B. hybrid, *B. ruziziensis x B. decumbens x B. brizantha*; n = 15, 5 forage species x 3 cutting times.

Cattle husbandry

9 - 30 cattle/smallholding and 3 - 25 ha/smallholding

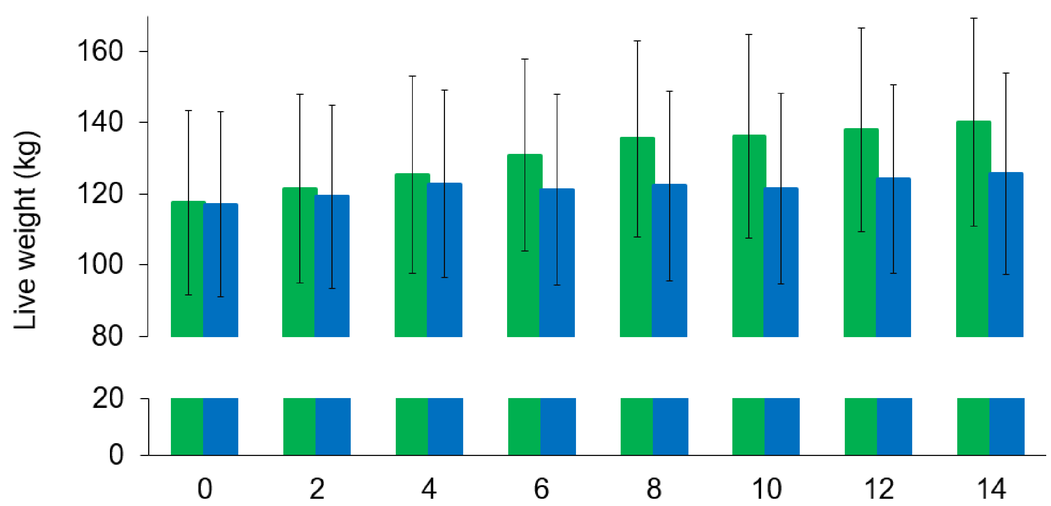

Fig. 6. Live weight (kg) of local cattle at about two years of age.

Fig. 4. Harvesting forages.

Fig. 5. Recording live weight.

Grazing cattle gained 247 ± 124 g/day and **penned cattle** 79 ± 76 g/day (arithmetic mean ± standard deviation; mixed linear model, n = 35, Kenward-Roger's adjusted F-test = 26.91, P < 0.001)

Conclusions

The significantly larger average daily gains of grazing cattle compared to penned cattle may be attributed to **variations in nutrient composition** between cultivated forages and natural pasture

Grazing cattle may have been able to **select more nutritious plants** during the rainy season than the penned cattle

Outlook and Recommendations

Investigating the threshold of **compensatory growth** in local cattle

Exploring different modalities of optimising the use of natural **pastures** by farmers during the rainy season

Developing appropriate means **of conserving forages** for the dry season

References

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2. Statistical records, 2015. Provincial Department of Rural Development Ratanakiri and Provincial Department of Agriculture, Banlung, Cambodia.