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 conflicts¹, 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

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 ruziieziansi, 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 Pruk: Penned cattle were fed 3.8 - 4.1 kg forage dry matter (DM)/day

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).

<table>
<thead>
<tr>
<th>Forage species</th>
<th>Paspalum atratum</th>
<th>Brachiaria ruziieziansi guianensis</th>
<th>Panicum maximum</th>
<th>B. hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude protein</td>
<td>57 ± 3</td>
<td>75 ± 26</td>
<td>123 ± 14</td>
<td>71 ± 25</td>
</tr>
<tr>
<td>Neutral detergent fibre</td>
<td>682 ± 52</td>
<td>656 ± 38</td>
<td>625 ± 93</td>
<td>625 ± 70</td>
</tr>
<tr>
<td>Acid detergent fibre</td>
<td>460 ± 149</td>
<td>549 ± 154</td>
<td>424 ± 72</td>
<td>415 ± 129</td>
</tr>
<tr>
<td>Digestibility of organic matter</td>
<td>520 ± 30</td>
<td>544 ± 24</td>
<td>559 ± 25</td>
<td>550 ± 60</td>
</tr>
<tr>
<td>Metabolizable energy</td>
<td>7.0 ± 0.4</td>
<td>7.4 ± 0.3</td>
<td>7.8 ± 0.3</td>
<td>7.3 ± 0.8</td>
</tr>
</tbody>
</table>

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

Cattle husbandry

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

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

Fig. 2. Natural pasture.

Fig. 3. Penned cattle.

Fig. 4. Harvesting forages.

Fig. 5. Recording live weight.

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

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
