

## Cut-and-Carry Feeding Systems for Small Ruminants

Where highly labour-intensive cut-and-carry feeding is practised, forage can be the most expensive input to animal production. Practical feeding strategies that help to raise profits by supplementing forage with rice bran are described and a use proposed for forage rejected by animals given 'excess feed'.

### Background

Java has one of the highest rural population densities in world. In common with other areas in which crop production is practised intensively by smallholders, very little land exists for grazing. Instead, livestock are housed, and fed forage cut-and-carried from roadsides and field margins. Cut-and-carry feeding is labour-intensive, engaging farmers for up to six hours each day. Forage is therefore the most expensive input to animal production. Despite this, farmers offer high levels of forage to their animals, allowing them to reject around 40 per cent. This strategy is termed 'excess feeding' and improves the quality of the diet consumed. Another potential benefit of this system lies in the use of rejected forage for mixing with animal faeces and urine to produce compost.

### Research highlights

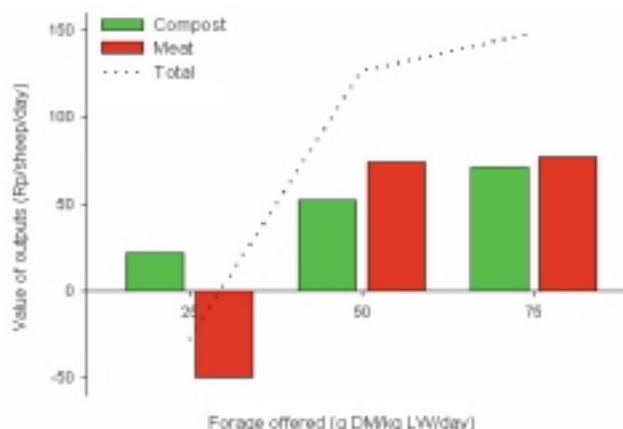
An initial study showed that high offer levels permit selective feeding, leading to improvement in the quality of the diet ingested and, hence, increased weight gain. In addition, the large quantities of rejected forage contributed to a rapid accumulation of compost. Taking into account both outputs (live weight and compost), raising the forage offer-rate from low to medium increased returns to labour by 212% whilst raising the offer-rate from low to high increased returns to labour by 200%.

Another trial examined whether replacing part of the forage ration with

based composts (produced from the first study), compost derived from plant material only, and an inorganic fertiliser. This experiment showed that manure-based composts are superior in their ability to support maize growth on an upland soil and that, of the manure-based composts, those rich in excreta will perform most effectively.

### Uptake

This research has developed practical feeding strategies that help to raise profits by replacing part of the forage component with rice bran. Other practical recommendations were developed relating to the storage of cut forage.



The impact of increasing forage offer-rates on returns from sheep production and its effects on the relative contribution of compost (DM = dry matter, LW = live weight).

rice bran – a cheaper substitute – might reduce feeding costs. Returns to labour on a low forage/high rice bran diet were greater than those achieved with a forage-only diet. A lower yield of compost from the former diet was more than offset by the superior liveweight gains achieved. However, results suggested that the highest profit levels would be achieved by feeding the highest levels of forage and rice bran to maximise growth rate and compost yield.

An agronomy trial with maize compared the qualities of manure-

Establishing the use of the pressure transducer technique (PTT) as a routine method for assessing the fermentability – and therefore the nutritive value – of tropical forages was another valuable contribution. (Use of the transducer for evaluating feeds was further developed by Project R5180 and used by Project R4338). This technique has also been used extensively by the Feed Evaluation, Rumen Microbiology and Feed Chemistry Departments of Balai Penelitian Ternak (BPT). The PTT is still in regular use by trained personnel at BPT and has formed the basis of

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Carrying cut grasses for feeding to goats in West Java.

three MSc theses by students from Bogor Agricultural University, Indonesia.

### Linkages

Project findings have underpinned, in part at least, activities in a number of subsequent DFID-commissioned projects implemented by both the Livestock Production Programme (R6283: Sustainable nutrient cycling in crop/livestock systems) and Natural Resources Systems Research Programmes (R6731 on manure management – collection, storage and composting strategies to enhance fertiliser quality). Strong bilateral links were maintained with – and indeed the project received part of its funding from – the DFID-funded Animal Health Project in Indonesia. Scientists from

other South East Asian countries were trained by the project in the use of the PTT as part of an FAO-funded training course on forage evaluation.

### Relevance to sustainable livelihoods

The project successfully demonstrated the biological and economic rationale for a practice routinely adopted by smallholder farmers on Java – namely excess feeding. This appears to lie in the maximisation of compost yield in addition to liveweight gain. The project also drew attention to the importance of manure-compost in smallholder farming systems and to its value as fertiliser for crops grown in the marginal areas farmed by poorer households. A key finding was the integrated way in which farmers

develop management strategies that address objectives relating to both livestock and crop production. The project's findings demonstrate clearly that the relevance of livelihood strategies in this type of closely integrated system cannot be assessed purely in terms of one form of capital. Farmers in West Java are prepared to accept trade-offs amongst financial, natural and physical capital when planning livestock feeding strategies, and appear to show a highly developed awareness of their interactions.

### Selected project publications

- Tanner, J.C., Owen, E., Winugroho, M. and Gill, M. (1995) Cut-and-carry feeding of indigenous grass in Indonesian sheep production: effect of forage wilting and quantity of forage offered on intake and on yield of compost made from refusals and excreta. *Animal Production*, **60**: 533.
- Tanner, J.C., Holden, S.J., Winugroho, M., Owen, E. and Gill, M. (1995) Feeding livestock for compost production: a strategy for sustainable upland agriculture on Java. pp. 115–128. In: *Livestock and Sustainable Nutrient Cycling in Mixed-Farming Systems of Sub-Saharan Africa. Volume II. Technical Papers*. Powell, J.M. Fernandez-Rivera, S. Williams, T.O. and Renard, C. (Eds.) Proceedings of an International Conference, Addis Ababa, Ethiopia, 22–26 November 1993. ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia.

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