

Livestock in Integrated Farming Systems

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In an earlier paper in this conference (Rodriguez and Preston 1996), we stressed the advantages of indigenous breeds of livestock when multi-purpose "recycling + upgrading" replace "specialized feed conversion" as the major role of animals in natural resource management. There are many opportunities to be investigated. Certainly the animal provides the most efficient pre-treatment of high-moisture biomass to convert it to a substrate suitable for biodigestion. Equally the "animal-biodigester" sub-system is a more efficient way of preparing organic matter for return to the soil than aerobic composting.

In such systems the criteria for the 'efficient' animal should give greater weight to traits such as the capacity to select and consume voluminous and usually fibrous materials rather than digestibility. Milk and meat will be by-products rather than primary outputs in these scenarios.

Thus as emphasis has shifted from "adapting the resource to the system" (eg: the maize-soya bean feeding system for pigs) to "adapting the animal to the resource" (Preston and Leng, 1987), the economic traits required of livestock will also change. This will be particularly true for the tropical regions. The advantages in the tropics of dual purpose (milk-beef) breeds and management systems over specialized milk and beef production as separate enterprises are increasingly being recognised at least in tropical Latin America (Preston and Murgueitio, 1992). Incorporation of work, for land cultivation and transport as a third purpose, and of fuel (biogas) + fertilizer as a fourth purpose is perhaps too demanding on needs for nutrients. However, multi-purpose work plus fuel/fertilizer plus meat is a traditional way of using cattle and buffaloes

in SE Asia and is a more efficient way of using fibrous crop residues than specialist (ranching) production of meat alone.

Evaluating the Role of Livestock in Integrated Farming Systems

Our present methodologies for evaluating livestock-based activities are not suitable when the output is multi-faceted and has implications for the environment. Input-output coefficients have to be applied to the whole system and not just the animal. One approach is to make some measure of total solar energy capture in the system including that returned to the soil. Soil organic matter should be monitored as organic matter is a nutrient (source of energy) for soil organisms. Changes in soil fertility should be assessed and this can be related to effects on crop yields. The increases in annual yield of sugar cane of 10 tonnes/ha reported by Mui *et al.* (1996) can be attributed mainly to increases in soil organic matter through return of dead sugar cane leaves to the soil.

There are many new opportunities for livestock in integrated farming systems. The challenges are for the technologist to develop more efficient systems for deriving benefit from solar energy using an holistic approach; and for the economist to determine in monetary terms the presently intangible cost of pollution and the income to society of activities that enhance, rather than destroy, the environment.

References:

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