Crop-goat integration

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Most Vietnamese farmers are smallholders, usually with between 0.5 ha to 2 ha of land per household. A typical holding consists of a cropping area and a homestead, with the house, trees, vegetables and livestock. The main activity is growing food crops, and livestock production is usually a sideline. The farming systems are often very complex, especially in areas where the environment is favourable for producing many different types of crops and livestock products. The main feed sources for the livestock are crop residues. The manure is applied to the crops as the sole, or as a supplemental, fertilizer. The most limiting factor for livestock production is the inadequate supply of good quality feed throughout the year, especially in the dry season. Leaves from leguminous trees can be valuable as forage supplements in feeding systems based on crop residues, particularly as tree legumes are locally adapted, require minimal inputs for establishment and maintenance, and are readily utilized in mixed farming systems.

This article describes the development and impact of integrating goat production into existing farming systems in upland areas of South-Eastern Vietnam. It shows the importance of integrating agricultural systems that build on the complementarities between the crop and animal systems. Such integration can lead to increased total productivity as well as increased ecological and economic sustainability. The long term aim of the project was to disseminate appropriate technological solutions that would lead to more sustainable farming systems for these particular ecological zones.

Selection of farms and farmers

The study area is located in Ba Ria-Vung Tau province (about 100 km from Ho Chi Minh City), in South-eastern Vietnam. It is an undulating area, with slopes ranging from 10 to 15 percent. The dominant soil types are red and red-yellow podzols with low fertility and organic matter content and a pH of about 4.2. The annual rainfall is 1 600 mm. The wet season starts in May and ends in October.

At the start of the project in 2001, thirty farmers in Xuan Son village, Chau Duc District, were interviewed in order to understand the existing farming systems and economic activities. It was apparent that management of livestock was a marginal activity. Only four out of the thirty farmers kept pigs and only two kept goats. Gross income per farm was very low, on average US$ 420 per year.

The project

Ten farmers from this initial survey group were selected as participants in the project, based on their interest in diversifying their farm activities and specifically in the introduction of a model of crop-goat integration. Goats were considered to be the most appropriate livestock species as they are browsers and prefer leaves from trees and shrubs.

In discussions with the farmers, it was decided to set aside 1 ha of each farm and to divide this into different parts: 0.3 ha for vegetables, 0.5 ha for growing pepper and 0.2 ha for growing guinea grass. The boundaries of the 1 ha were planted with *Erythrina variata, Gliricidia sepium* and *Leucaena leucocephala.* The peppers were established on live poles of *Erythrina variata* and *Gliricidia sepium* in a double row at 2 x 2 m spacing (2 500 plants/ha). Six goats, five does and one buck (local x Anglo-Nubian), were supplied to the participating farmers, with the agreement that a comparable number of offspring from the original animals would later be given to other interested families. The goats were kept in full confinement in simple sheds built by the farmers. The sources of feed were; the branches of the *Erythrina* trees supporting the peppers, which were pruned every two months; the branches from the shade trees in the boundaries of the farm; and the guinea grass. The goat sheds were constructed with slatted floors so that the manure could be collected from beneath the sheds. The manure was utilized for fertilizing the vegetables, trees and grass.

The impact

Growth and reproductive performance of the goats was of a high order, with slightly better results in the wet than in the dry season. The income of the farms increased very significantly, with the proportion derived from livestock representing some 65 percent of the total income (Table 1). The increase in the value of the crop production reflects the use of the goat manure as fertilizer. Before the introduction of the goat/crop model, the average annual gross income was US$420. Four years after implementing the model, the average annual income had increased to US$1983 (Table 1). The internal rate of return over the 4 years of the project was over 800 percent.

Table 1. Development of the cash flow over the first 4 years of the project (average of the 10 farms) US$

	2001	2002	2003	2004
Returns				
Cash income				
Crops	580	862	1425	1400
Goat kids	450	675	900	1012
Total cash income (I)	1030	1537	2325	2412
Value of non-cash income				
Added value of livestock	656	875	1093	1312
Manure	94	100	100	120
Total non-cash income	750	975	1193	1432
Total gross returns	**1780**	**2512**	**3518**	**3844**
Costs				
Supplies	304	170	180	180
Goat house	125	20	20	20
Loan interest	65	53	41	29
Loan repayment	200	200	200	200
Total cash costs (E)	694	443	441	429
Non-cash costs				
Labour	1200	1200	1200	1200
Total non-cash costs	1200	1200	1200	1200
Total costs	**1894**	**1643**	**1641**	**1629**
Net profit	-114.00	869.00	1877.00	2215.00
Net cash return (I-E)	336	1094	1884	1983

Over the four years of the project there was a major uptake from farmers in the region. The numbers of farmers adopting the system increased from 15 in 2001 to 570 in 2004, with the total goat population rising from 120 to 2350. The results of the project show that crop-small ruminant integration can be an important agricultural activity for small land holders. ■

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