Multifunctions and contributions of grassland-based livestock systems in North-West Vietnam

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Abstract

In Northwest mountains of Vietnam, the smallholder livestock farms depend largely on natural pastures for animal feed. However, the management or improvement of grazing areas has not yet been recognized or regulated by local authorities. There is a need to provide reasonable evidence of the grassland-based livestock systems contribution for sustainable development. An ontology proposed by the AN2-GASL group was used to evaluate the contribution of grazing livestock systems in four dimensions: production, ecosystems, social and local development in the case of the Quài Nưa commune, a northwest mountain commune of Vietnam. Livestock contributed multifunction to all types of family farms. Cattle and buffaloes make an high contribution through meat for domestic consumption, sacrifices and donations, traction force, manure production and stock value as bank saving. This study provides quantified evidence of the multi-functionality of extensive cattle production at farm and communal levels. The contribution of grazing areas for meat production, but also for the creation of employment and the revenue and profit along the beef value chain was calculated at commune level. It appears that a balance between different types of farms with different roles could be a basis for local sustainable development.

Keywords: cattle, buffalo, sustainable development, grassland, Northwest Vietnam

Introduction

In Northwest Viet Nam, rain-fed monocultural crop cultivation is dominated on sloping lands. Cattle are raised in highland extensive mixed farming systems (Dixon *et al.*, 2001) and

rely on grazing lands as the main feed source (Huyen *et al.*, 2006, Trung, 2011). However, the grazing area was declining due to increased crop production, re-settlement or reforestation programs. The intensification of livestock systems relies on the forage crops production, but the available areas are very limited. Pastoral or grazing systems are considered not intensive enough to meet the production challenges and not sufficiently remunerative. They are therefore poorly supported by extension services and development programs. An assessment of the contribution of these grassland livestock systems for the territory development is necessary in order to initiate a dialogue with the local authorities on the basis of evidences. By mobilizing an ontology proposed by the AN2-GAS group, we have identified relevant indicators and structured an evaluation of the multiple functions of these grassland livestock systems for the sustainable development of farms, a territory and the beef value chain in the case of Quài Nưa, a rural and mountainous commune in Northwest Vietnam.

Materials and Methods

Quài Nưa commune

Quài Nưa commune is a rural, remote and steep commune in Northwest Vietnam, with crop area in the valley and grazing area in the slope and the top of the mountains. The climate is monsoon tropical with a cold and dry winter and hot and heavy rainfall summer. The human density is medium (116 hab/km²), with Thaï, Tay, Kinh, Hmong ethnic minority people. The key livelihoods are rice, corn and cassava cultivation and cattle, buffalo and chicken rearing. There are four farm types. The farm without ruminants (0; 17% of the farms) have small cultivated areas (2 240 m²) with rice and maize and rear pig and poultry. The extensive livestock farms (1; 41%) have medium cultivated areas (6 235 m²) with no or little forage crop and a large herd of ruminant (>6 TLU) fed by grazing (60%) and a little supplement to the trough. The semi-intensive livestock farms (2; 17%) cultivate intermediate surfaces (11 870 m²), with forage, and a large herd (>6 TLU), grazing in all seasons and largely fed to the trough. The crop-oriented farm (3; 25%) have the largest cultivated areas (20 160 m²) without forage, and a smaller herd (>3 TLU) under a barn, with mainly draft animals.

Indicators of sustainable development

The ontology proposed by the AN2 GASL group (Muller *et al.*, 2019) allows us to assess the contribution of grassland-based livestock systems for the sustainable development of farms and the territory. We selected 28 indicators that are most relevant in the local context from the 129 proposed through the ontology according to four dimensions: production, ecosystems, social and local development. In the municipality of Quài Nưa, we had prior data and a partnership dynamic that enabled us to carry out surveys of a diversity of mixed farms (48), local authorities (2) and actors of the beef value chains (6, collectors, retailers, slaughters, processors) to fill in variables to calculate the set of indicators.

Results and Discussion

Contribution of grazing livestock systems to the production

Livestock contributes multifunctionally to all types of farms, including the farms without ruminants, the crop-oriented farms, the extensive livestock farms and the semi-intensive livestock farms. Cattle and buffaloes make an important contribution to extensive and semi-intensive farms through the value of meat consumed, animal production, sacrifices and donations, traction force, production of manure for crops and herd value as bank savings. Ruminant livestock are important contributors to income generation and employment in the region.

The intensification of livestock systems promoted to increase productivity and animal production aim to control the feeding at the trough (crop residues, forage, by-products) and to improve independence from pastures. However, even in the most intensive farms, the needs of animals remain partly covered by grazing, which thus participate in animal production. The agricultural production of the commune is estimated at about 6.54 million USD/year, of which 40% from crops and 60% from livestock.. The extensive livestock farms providing 49% of the animal production of the commune and the semi-intensive farms contribute to 22% of this production. Livestock production from the crop-oriented farms and farms without ruminants represents only 15% and 9% respectively of animal production. Given the proportion of animal feed from pastures for each farm, we estimate that 25% of the total value of livestock production in the commune comes from grazing.

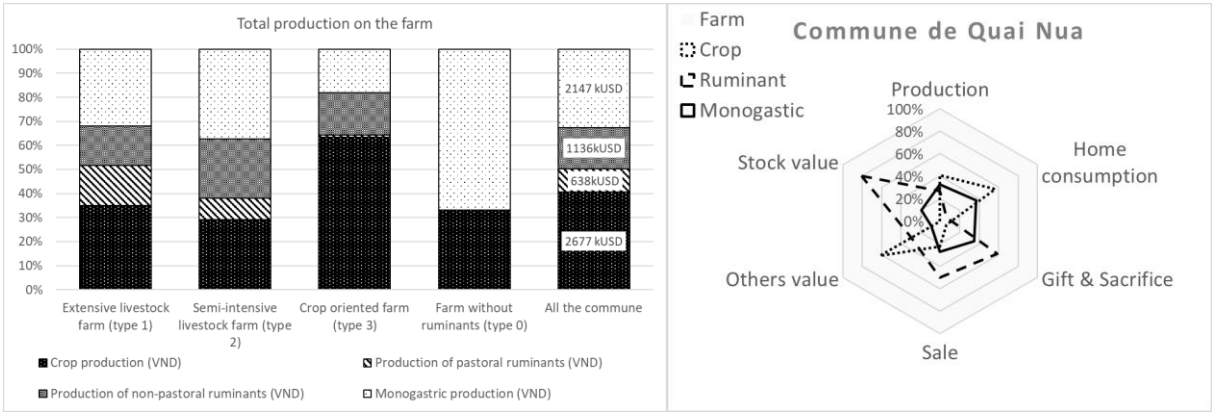

Figure 1. Total values of crop and animal production at farm and communal levels (a) and multifunction roles of livestock in the commune (b)

Contribution of grazing livestock systems to the local development and social dimension

We estimate that 225,800 tonnes of meat are processed each year in the beef value chain and that 48% of this meat comes from pasture feed. Meat consumers recognize that they prefer meat from grazing area without separating the types of meat in the value chain. In the commune, 6,000

people work on farms and 4,000 people work on farms dependent on pastures with average profits of 820 USD/workers/y. The meat value chain employs an average of 133 people, not to mention intermediaries, restaurants and retailers, who also depend on this value chain. Profits per worker are higher for processors (14 600 USD/pers./y) than for collectors (2150 USD/pers./y.) and slaughters (1500 USD/pers./y.). The profits of the commune's farms are estimated at over 5.3 million USD/y., of which 37% comes from livestock activities. We estimate that more than 11% of value chain actors' profits come from grazing areas.

Contribution of grazing livestock systems to the ecosystem

Manure is another flagship product of livestock systems widely used by the commune's farms. We estimate that more than 10,500 t DM of manure used by farms in Quai Nua, 6,974 t DM of manure come from ruminants and 18% from grazing animals. This manure supports the organic fertility and production of crop lands.

Conclusion and recommendation

Grassland, essential for the animals feeding, largely contribute to this multifunctionality and therefore to local sustainable development. It seems necessary to ensure a reasoned and sustainable management of grassland to support livestock production and the sustainable development of territories where grassland-based livestock systems are part of.

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