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## Considering crop-livestock integration flows in terms of diversity and complexity: a certain regard on resilience and mixed farming systems properties

Charles-Henri Moulin, Harry Archimède, René Pocard-Chapuis, Eliel González García, Fabien Stark

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*Session : Mixed Farming systems - does diversity bring any benefits and at what scale?*

Considering crop-livestock integration flows in terms of diversity and complexity: a *certain regard* on resilience and mixed farming systems properties

C.-H. Moulin<sup>1</sup>, H. Archimède<sup>2</sup>, R. Pocard-Chappuid<sup>1</sup>, E. González-García<sup>1</sup>, F. Stark<sup>1,2,3</sup>

<sup>1</sup>UMR SELMET, Montpellier SupAgro, Place Pierre Viala, 34060 Montpellier, France, <sup>2</sup>URZ, INRA, Centre INRA Antilles Guyane, Prise d'Eau, 97170 Petit Bourg, Guadeloupe; <sup>3</sup>IAVFF-Agreenium, 42 rue Scheffer, 75016 Paris, France ; [charles-henri.moulin@supagro.fr](mailto:charles-henri.moulin@supagro.fr)

From an agroecological perspective, mixed crop-livestock systems (MCLS) can be characterized according to two main properties: i) diversity of production as a structural property and, ii) crop-livestock integration (CLI) as a functional property of the farming system. The objective of this work was to assess the resilience of a range of CLI configurations at system level. We conducted this analysis on three contrasting socioeconomic territories in the humid tropics: Guadeloupe, Brazilian Amazonia and Cuba, thus looking to cover a spectrum of CLI configurations. In order to analyze CLI in a holistic way, we used the ecological network analysis (ENA) method to study the flow networks of nutrients. We applied ENA to a sample of seventeen MCLS farms. We modelled them as a network of flows, using nitrogen as the “currency”. We then characterized CLI in terms of intensity and organization of flows, and examined the resilience of the flow networks. The results show that both the intensity and organization of CLI flows are consistent in characterizing CLI in a range of situations i.e. from low CLI intensity based on few flows to high CLI intensity based on complex flows. The CLI is especially effective in promoting resilience, viewed as the stability provided by the distribution of flow networks among the farming system compartments. This study proposes a suitable framework to analyze complex farming systems helping with a methodological support to the objectives of agroecological transition in agriculture.