

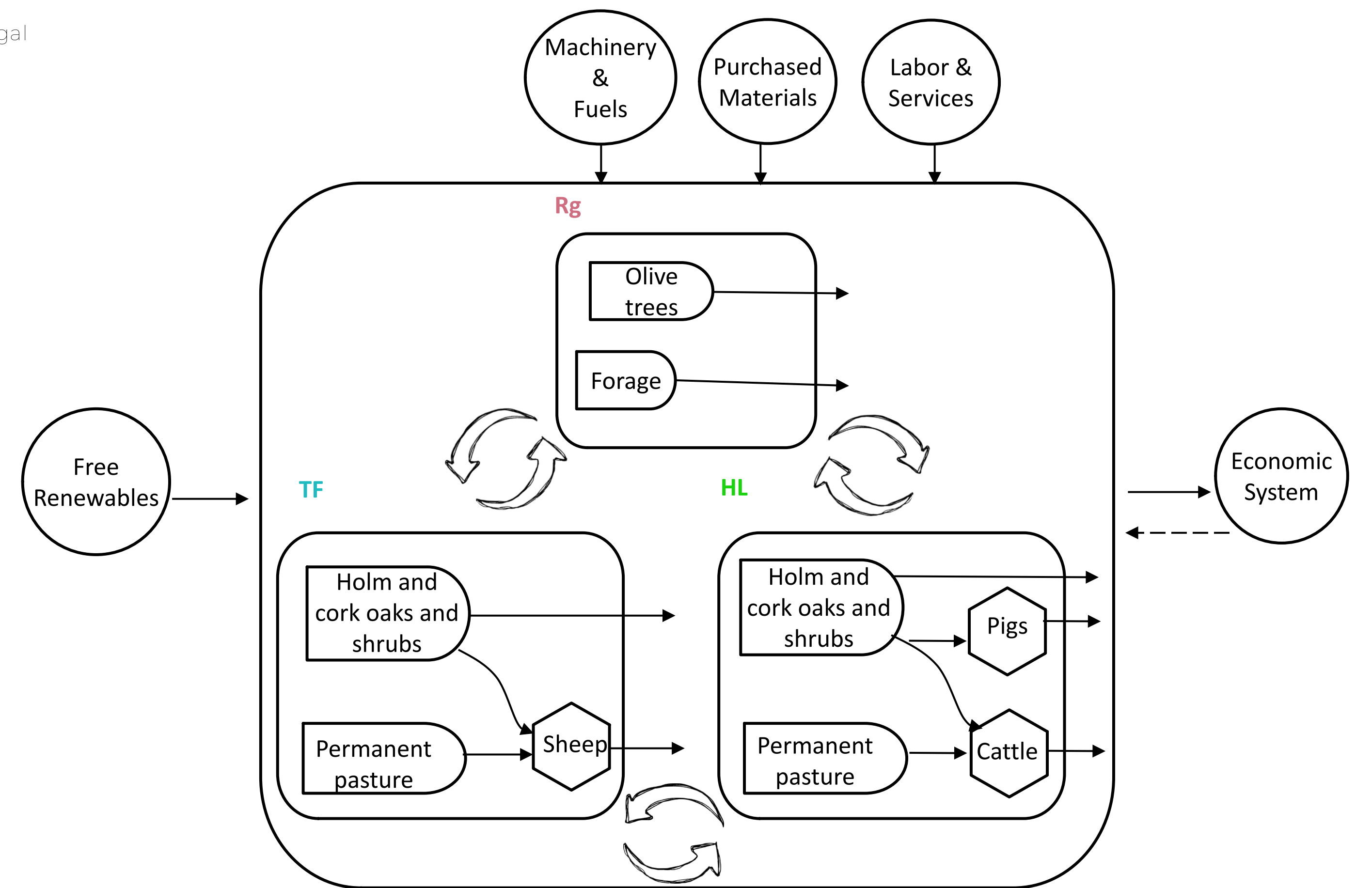
MIXED PRODUCTION AT THE LANDSCAPE LEVEL: AN EMERGY ASSESSMENT

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INTRODUCTION

Montado is a typical Mediterranean extensive silvo-pastoral system with cork and holm oak production and animal grazing. This mixed (crop-livestock integrated) extensive system has its natural regeneration being hindered by several reasons: bad management, climate change and by standard policies that do not apply to these systems. Under a joint management there is a direct raw materials exchange and a temporal and spatial integration between farms, allowing several management conducts to be held depending on actual conditions - both external and internal to the farms. Here we'll be analysing how three different farms perform under joint management, and to address these complex systems at a landscape level, we used emergy assessment to measure and understand its multifunctionality.



RESULTS

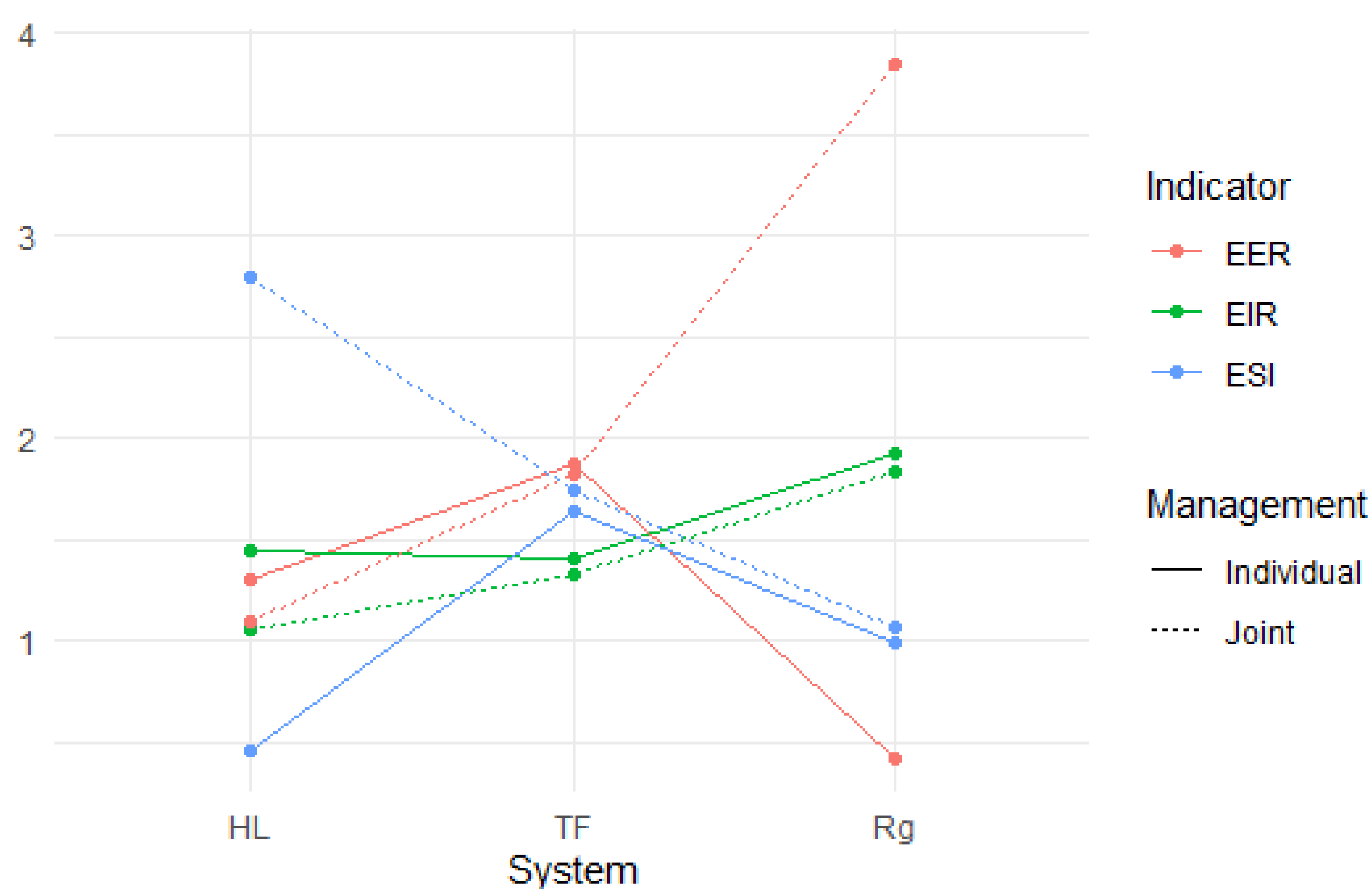


Figure 1 – Emergy indicators EER (Emergy Exchange Ratio), EIR (Emergy Investment Ratio) and ESI (Emergy Sustainability Index) for each farm under joint and individual management.

Table 1 – Average, maximum and minimum values of ESI and EIR from literature review for crop, mixed and livestock production systems (from J. Marinheiro et al, 2023).

	ESI			EIR		
	Crop	Mixed	Livestock	Crop	Mixed	Livestock
Avg	1.42	1.67	0.90	2.31	2.14	17.23
Max	8.74	10.94	3.86	12.67	3.88	42.65
Min	0.03	0.30	0.02	0.19	0.62	4.49
n	27	18	14	20	11	3

Table 2– Emergy indicators EER (Emergy Exchange Ratio), EIR (Emergy Investment Ratio) and ESI (Emergy Sustainability Index) for the production submodels of sheep, cattle and cork in both farms, TF and HL.

	Sheep	Cattle	Cork_TF	Cork_HL
EER	2.84	1.56	1.13	0.75
EIR	1.89	1.18	0.76	0.67
ESI	1.03	2.31	4.25	5.82

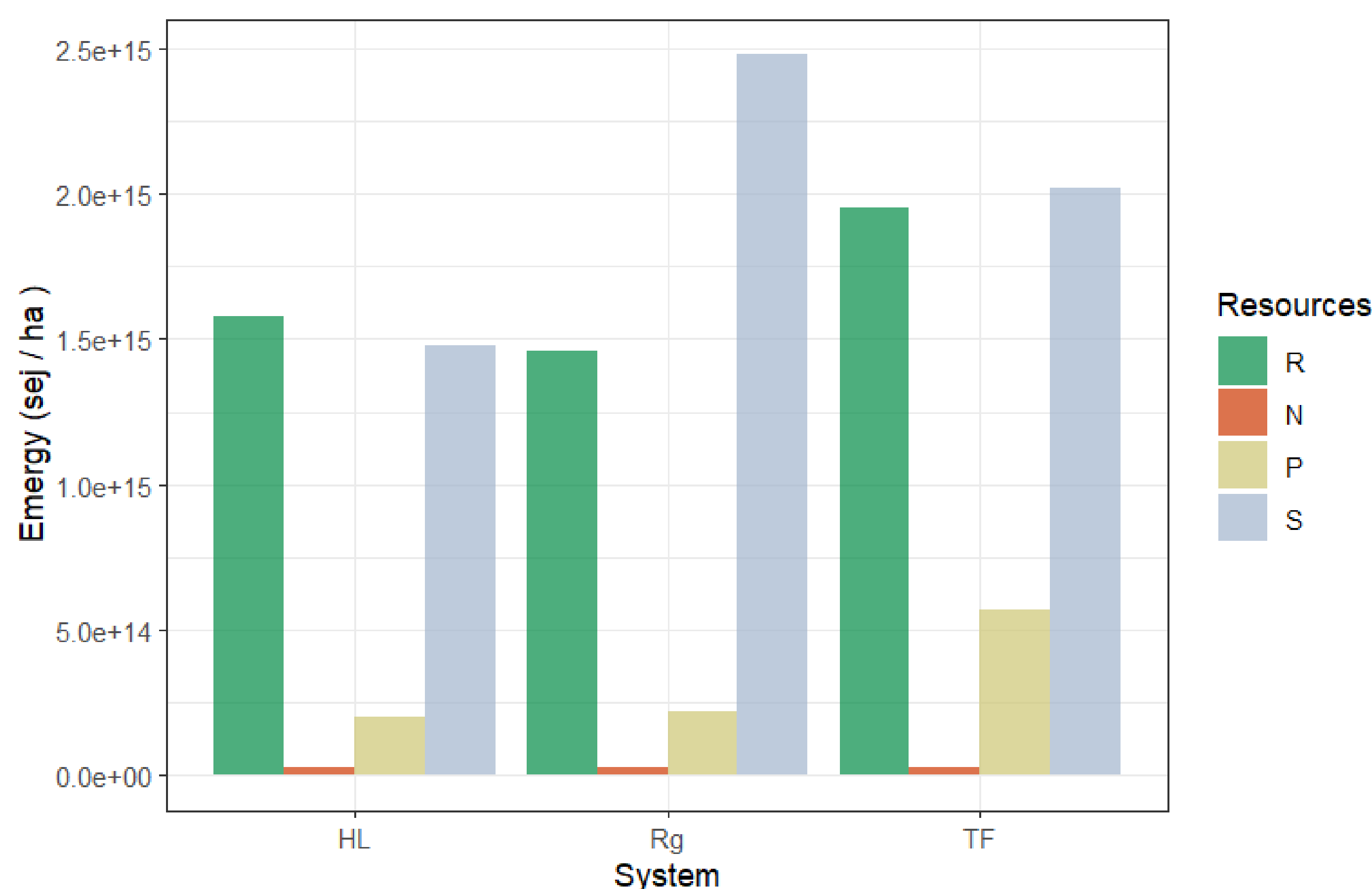


Figure 2 – Emergy per hectare of each categorised resource (R – local renewables; N – local non-renewables, P purchases, S services and labor) for each farm HL, Rg and TF.

MAIN FINDINGS

Sheep production cost increase has not been matched by the value of their products;

Cattle production is more prone to be less sustainable. Forage purchase can have a big impact on terms of investment and environment;

Practices like lime application can result in higher pasture productivity, decreasing the need for external forage;

A sustainable management of farms should contribute to the differentiation and valorisation of its product;

Multifunctional systems, with an economy of scope, can help mitigate the impacts on investment and on the environment.