

INTRODUCTION

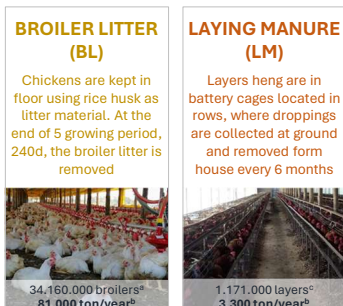


Figure 1. Wastes generation in poultry farms. a. DIEA (2016). b. Benzano et al (2016). c. Arenare, L. (2017).

- Poultry production in Uruguay is concentrated in the south of the country.
- Egg and broiler production farms generate 26% of the total agro-industrial solid wastes (Fig 1).
- These residues are produced in a ratio of 24:1 (BL:LM) based on dry matter.
- The solids wastes have been used as fertilizer; however, the excessive application generated the overload of nutrients in the region (Fig. 2).

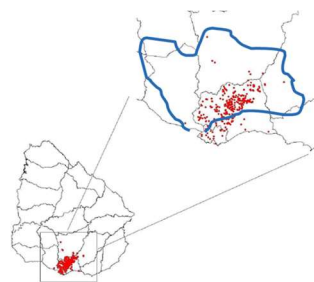


Figure 2. Poultry farms in Uruguay (DIEA, 2016). Blue line represent the Santa Lucia River Basin

Evaluate the technological, economical, and environmental feasibility of three different valorization technologies: Anaerobic Digestion, Composting using Efficient Microorganisms, and Quick Wash process.

OBJETIVE AND ACTIVITIES

AIM:

- Evaluate digestion of the both wastes and codigestion in the proportion that are generated in Uruguay.
- Evaluate the agronomic value of digestate, thinking in a centralized recovery plant.



METHODOLOGY

- BMP test based on VDI 4630:2016 Standard (VDI, 2016) and Holliger et al (2021) using an AMPTS® II (BPC Instruments).
- Biofertilizer capability were tested in a greenhouse assay using oat planted in pots (Del Pino et al, 2014), with Low (50 kgP/ha) and High (100 kgP/ha) doses. TS, TP and TN in the vegetal material were determined for the agronomic performance.

Table 1. Physicochemical characterization using APHA (2023).

Parameter	BL	LM	BL:LM (24:1)	Digestate	Unit
pH	9.25	8.74	8.95	7.88	-
Conductivity	6.11	8.29	8.94	4.95	mS/cm
Density	0.267	1.099	0.380	0.990	g/mL
Total solids	573	514	570	27.5	gTS/kg
Volatile solids	812	576	800	575	gVS/kgTS
COD	484	538	487	1,263	gO ₂ /kgTS
Carbon	351	269	346	292	gC/kgTS
Total Nitrogen (C/TN)	34.9 (10.0)	36.7 (7.3)	35.0 (9.9)	39.3 (7.4)	gN/kgTS (gC/gN)
Ammonium (NH ₄ ⁺ /TN)	17.3 (49.6)	19.6 (53.4)	17.4 (49.7)	25.4 (64.6)	gN-NH ₄ ⁺ /kgTS (%)
Total Phosphorus (C/TP)	16.3 (21.5)	36.9 (7.3)	17.3 (20.0)	13.8 (21.2)	gP/kgTS (gC/gP)
Phosphate (PO ₄ ³⁻ /TP)	4.2 (25.8)	16.2 (43.9)	4.8 (27.7)	2.8 (20.3)	gP-PO ₄ ³⁻ /kgTS (%)
BMP	375 ± 14	259 ± 15	282 ± 9	-	NmLCH ₄ /kgVS

C/N ratio in BL is higher than LM because content rice husk as litter materials, improving the nutrient balance of the mixture for the CoAD process.

CoAD improved methane production compared to the monodigestion of LM.

DIG produced had the **highest performance** in the assay (100 kgP/ha dose) compared to LM and the synthetic fertilizer (Fig. 3).

In this moment, a field trial is carried out to confirm these results, as the same time the economic study and the pathogenic behavior are developing.

REFERENCES

- APHA (2023). SMEWW. 24th Ed. Washington DC.
- Arenare, L. (2017). *DIEA-MGAP*. Uruguay
- Benzano, F. (2016). *Biovalor*. Uruguay.
- Del Pino, A. et. al. (2014). *Journal of Sustainable Bioenergy Systems*, 4, 87-96.
- DIEA (2016). Encuesta 340. *DIEA-MGAP*. Uruguay.
- Holliger, C. et. al. (2021). *Water Science and technology*, 83 (1), 247-250.
- VDI 4630 (2006). *Verein Deutscher Ingenieure*. Berlin: 44-59.

ACKNOWLEDGEMENTS

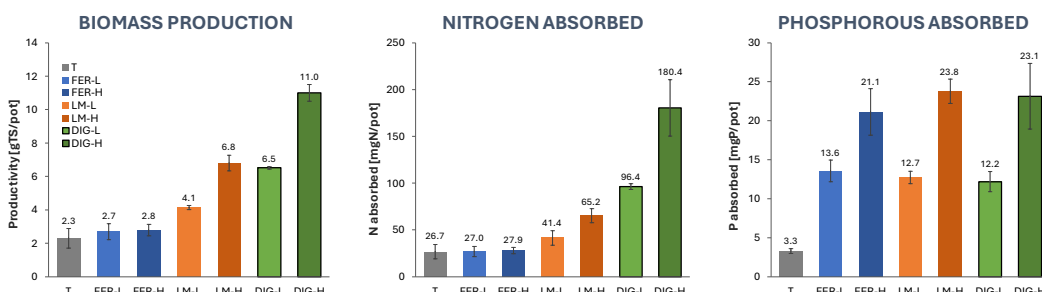


Figure 3. Agronomic performance of DIG from CoAD of BL:LM (24:1) in a greenhouse assay. T: Treatment without any addition. FER: Diammonium phosphate (18% N and 46% P₂O₅). LM: Laying heng manure without any treatment. DIG: Digestate produced from CoAD of BL:LM (24:1).