

# THE ROLE OF ANAEROBIC DIGESTION OF DAIRY MANURE AND CHEESE WHEY FOR THE DEVELOPMENT OF RURAL AREAS IN SPAIN



Unión Europea  
Fondo Europeo Agrícola de Desarrollo Rural  
"Europa invierte en las zonas rurales"

B. Molinuevo-Salces, B. Riaño, P. Calvo de Diego, M. C. García-González

Agricultural Technological Institute of Castilla y León. Ctra. Burgos, km. 119. 47071 Valladolid (Spain)  
(E-mail: [ita-molsalbe@itacyl.es](mailto:ita-molsalbe@itacyl.es))

## BACKGROUND



- ✓ Spain ranks first in Europe in **livestock population**, more than 55 million animal heads in 2019.
- ✓ Production in **small rural areas**.
- ✓ The management of livestock wastewater is an **environmental issue**.
- ✓ **Sustainable alternatives** must be implemented.
- ✓ Biogas production in Spain of 260 ktce in 2019, almost 30 times lower than in Germany.
- ✓ Need of co-substrates to boost methane yields.
- ✓ **Cheese whey (CW)** a proper co-substrate for livestock waste.
- ✓ LACTOCyL project studies **three strategies for CW valorization**: 1) anaerobic co-digestion, 2) bio compounds recovery and 3) microparticulation to obtain whey protein concentrates.

## OBJECTIVES

To study anaerobic co-digestion of dairy manure (DM) and cheese whey (CW).

1. Biochemical methane potential (BMP) of six cheese whey sources (CW1-CW6).
2. Anaerobic co-digestion of DM with increasing percentages of CW under semi-continuous conditions.

## RESULTS



Specific methane yields in the range of **456 to 542 ml CH<sub>4</sub> / g VS added** were obtained for CW (Fig. 1), with no significant differences among the tested CW sources. The lowest methane yields were obtained for CW corresponding to cheese made with cow milk (CW4).

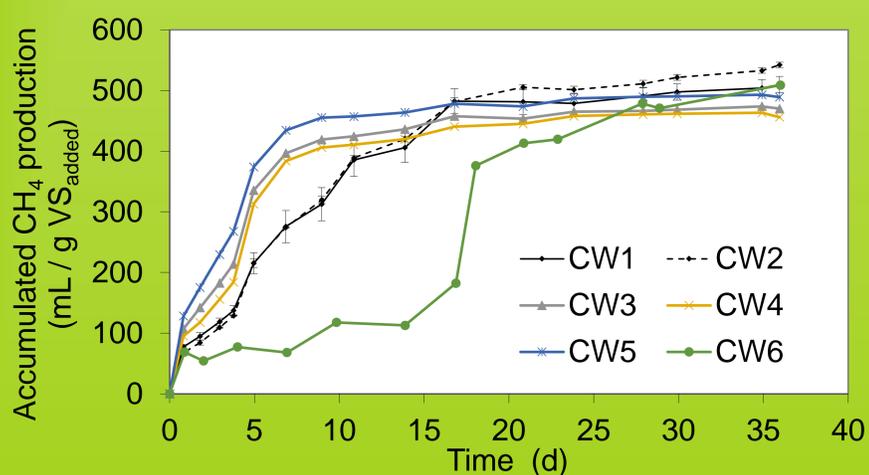


Figure 1. Accumulated specific methane yields CW1 – CW6.

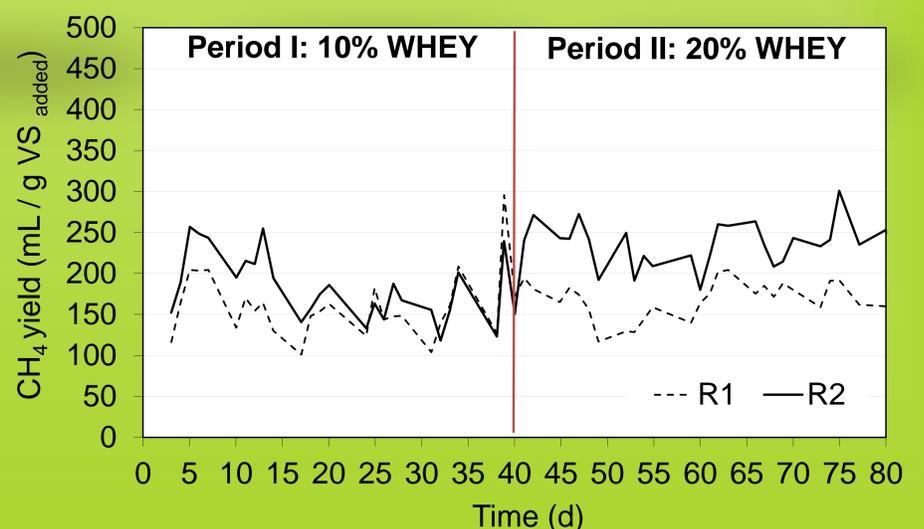


Figure 2. Methane yield of co-digestion in semi-continuous operation.

The CW source with the highest methane potential was selected for the semi-continuous co-digestion with DM (R2), and it was compared to the digestion of DM alone (R1). It was observed that the addition of **20% of CW** (in VS basis) to the anaerobic digestion of DM resulted in a **40% increased methane yield** ( $168 \pm 23$  and  $236 \pm 27$  ml CH<sub>4</sub> / g VS added for R1 and R2, respectively) (Fig. 2).

## CONCLUSIONS

It was concluded that cheese whey is a highly biodegradable by-product that could properly boost methane production from dairy manure, contributing to the development of Spanish rural areas.