



Quintil  
Valley

## CHALLENGE 1

“Use of Manure for the Production of Quality Forage”

## CHALLENGE LACTEA

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## CHALLENGE 1: USE OF MANURE FOR THE PRODUCTION OF QUALITY FORAGE

### Identified Problem:

Láctea S.A. generates approximately 69 m<sup>3</sup> of manure daily, a liquid waste highly concentrated in nutrients and organic matter, whose management presents a significant economic challenge due to high operational costs and the limited profitability currently derived from its traditional use on low-nutrient pastures.

### Main Objective:

To convert manure into innovative products of high economic value, promoting sustainability and operational efficiency within a circular economy model.

### Key Success Indicators:

- Development and validation of innovative solutions with real scalability potential.
- Significant improvement in the quality and nutritional value of products generated compared to traditional solutions.
- Clear reduction in operational costs associated with current manure management.

### Desired Solutions:

- Advanced hydroponic systems for intensive forage production with high nutritional quality, improving dairy cattle feeding and performance.
- Biotechnological projects using black soldier fly larvae, fungi, or worms to produce high-quality, protein-rich biomass for animal feed.
- Innovations in biomaterials, such as efficient fuel briquettes or biodegradable plant pots, offering clear economic and sustainable benefits compared to conventional materials.
- Integrated aquaponic crops combining treated manure as nutrients for plants and fish, creating self-sustaining systems.
- Advanced solid-liquid separation technologies to generate specific products for various industrial applications.

### Undesired Solutions:

- Biodigesters, gravity-fed irrigation crops, basic biofertilizers, traditional composting.

## GENERAL TECHNICAL DETAILS OF MANURE (ANALYTICAL SUMMARY):

| Parameter                                 | Observed RAnge |
|-------------------------------------------|----------------|
| Conductivity ( $\mu\text{S}/\text{cm}$ )  | 5269 - 5682    |
| pH                                        | 6.7 - 7.38     |
| Ammonium ( $\text{mg}/\text{L}$ )         | 150 - 436      |
| Calcium ( $\text{mg}/\text{L}$ )          | 64.2 - 92.28   |
| Magnesium ( $\text{mg}/\text{L}$ )        | 42.9 - 82.43   |
| Potassium ( $\text{mg}/\text{L}$ )        | 417 - 786.90   |
| Sodium ( $\text{mg}/\text{L}$ )           | 157 - 243.30   |
| Chlorides ( $\text{mg}/\text{L}$ )        | 334.53 - 549   |
| Phosphates ( $\text{mg}/\text{L}$ )       | 60.57 - 125    |
| Sulfates ( $\text{mg}/\text{L}$ )         | 174.08 - 504   |
| Iron ( $\text{mg}/\text{L}$ )             | 0.13 - 2.034   |
| Manganese ( $\text{mg}/\text{L}$ )        | 0.533 - 0.61   |
| Copper ( $\text{mg}/\text{L}$ )           | <0.05 - 0.195  |
| Zinc ( $\text{mg}/\text{L}$ )             | <0.05 - 0.231  |
| Boron ( $\text{mg}/\text{L}$ )            | 0.81 - 0.962   |
| COD ( $\text{mg}/\text{L}$ )              | 5800           |
| BOD ( $\text{mg O}_2/\text{L}$ )          | 2870           |
| Dissolved Solids ( $\text{mg}/\text{L}$ ) | 2786           |
| Suspended Solids ( $\text{mg}/\text{L}$ ) | 698            |

### Technical Conclusions:

- **High Organic Load:** The elevated levels of COD and BOD indicate a significant organic load, suggesting a substantial potential for biotechnological applications such as anaerobic digestion, microbial fuel cells, or the production of protein-rich biomass using insects or microorganisms.
- **Significant Presence of Macro and Micronutrients:** The notable concentrations of potassium, calcium, magnesium, and phosphorus make the purines an excellent resource for agricultural and hydroponic applications, where these nutrients are essential for plant growth and development.
- **Variability in Metal Concentrations:** The presence of iron, manganese, copper, and zinc at varying concentrations suggests that purines might require specific treatment before being used in delicate applications like aquaponics or direct animal nutrition, as excess levels of these metals can be toxic to certain species or affect the balance of nutrient availability.
- **Elevated Conductivity:** The high conductivity indicates that the purines may contain high levels of dissolved salts, which could potentially harm sensitive crops. To mitigate this, dilution or specific treatment processes may be necessary before using them for agricultural purposes, particularly for crops that are sensitive to salinity.

These conclusions emphasize the need for tailored treatment processes to optimize the use of purines, ensuring that they can be transformed into valuable resources for a variety of applications while minimizing potential risks.