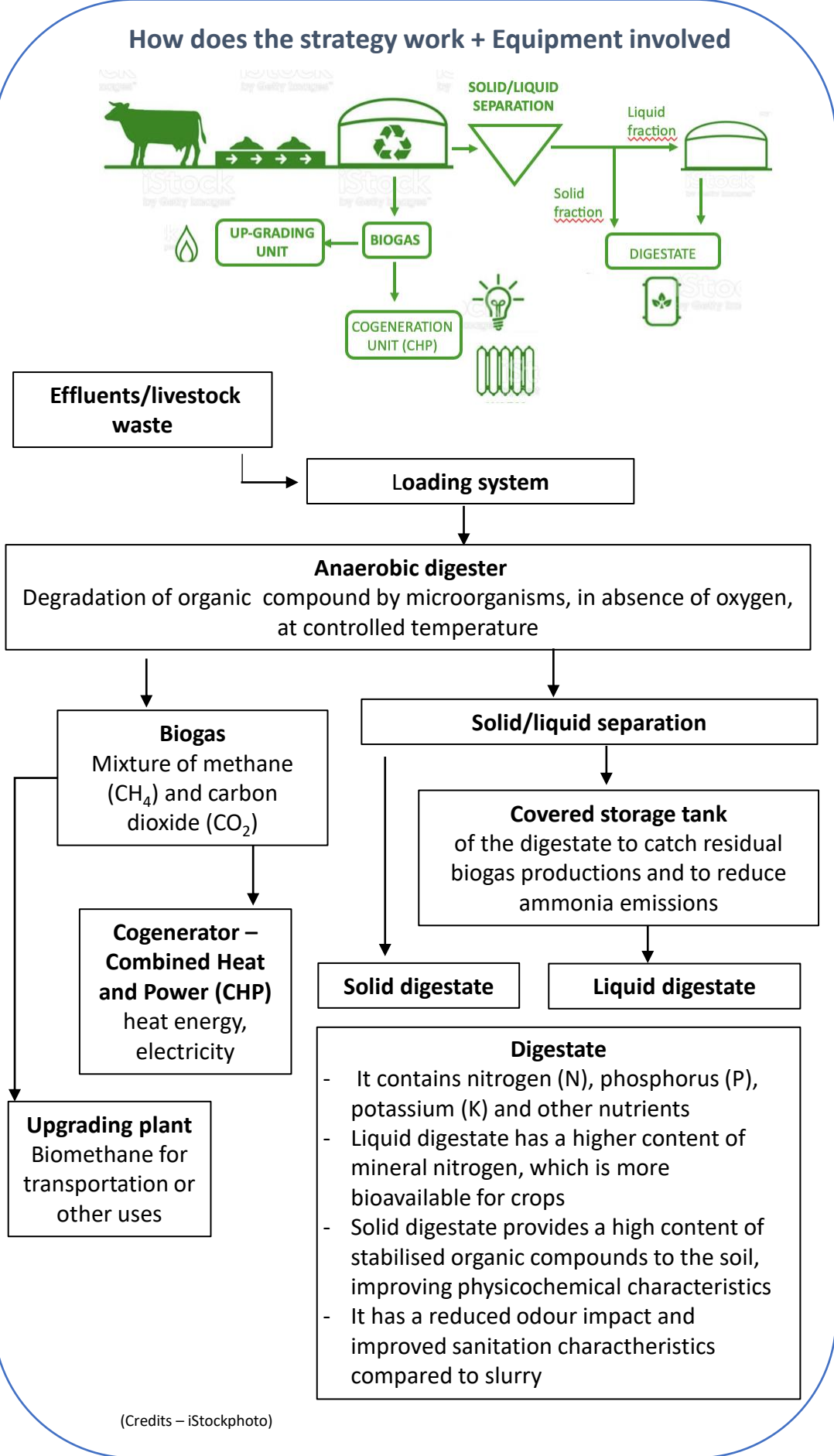


BIOGAS – HOW TO UTILISE CATTLE EFFLUENTS

Topic	Topic
Environment 	Economic resilience 

Background

The reduction of GHG emissions, the improved utilization of effluents, and the increase of green energy use are top priorities in dairy farms. Anaerobic digestion of the effluent/livestock waste fits the realisation of those targets. Biogas plants allow ruminant producers to get carbon credits both because of the emissions avoided by the storage of effluents and because biogas, which is a renewable energy source, can replace fossil sources.



Positive features

The dairy farm creates a perfect synergy with the production of biogas

- Rumen microbiology is similar to the anaerobic digestion
- Dairy farm facilities can be used for the biogas production (storage tanks, tractors...)
- Cattle effluents are cost-free biomass
- Green energy can be produced according to farm needs, providing a diversification of revenue: electricity, heat and/or biomethane.
- Digestate can be used as fertiliser and has better features than the “raw” effluents.

Carbon footprint

The biogas plant in a dairy farm can effectively reduce the carbon footprint of the dairy production.

The covering of digestate storage enables residual biogas to be caught, reducing total CO_{2eq} and ammonia emissions.

Be careful, especially on these points

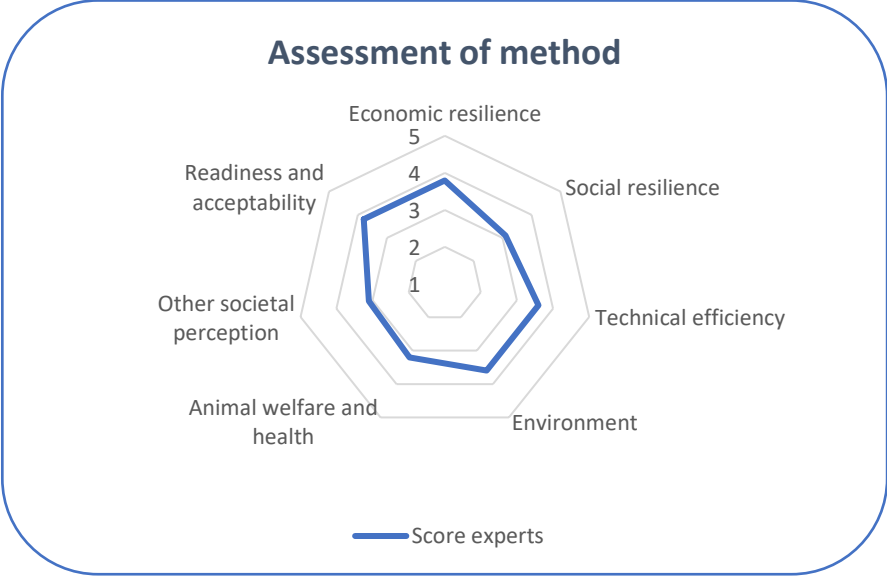
Biogas yield can be very variable and it depends on many factors such as animal feeding, farming system (housing, bedding), effluents management, rinsing and rainwater management, freshness of the slurry.

Specific advises

In order to optimise the construction and the management of a biogas plant, it is pivotal to preliminarily investigate the quantity and the quality of the effluents of your own farm!

Quote of a farmer:

*“With the production of biogas in the dairy farm, from being a **problem**, effluents become a **resource**”.*



More info:
https://www.europeanbiogas.eu/wp-content/uploads/2023/05/EBA_Campaign_Factsheet-2_Digital.pdf
<https://www.europeanbiogas.eu>



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ASSESSMENT/PREDICTION OF PRODUCTIONS

Productions of an effluent biogas plant depend on its dimensions, which derive from many factors, primarily from the number of animals (1). From the quantity of effluents it is possible to predict its yield (2), which also depends on many different features such as animal feeding, farming system (housing, bedding), effluents management, rinsing and rainwater management, freshness of the slurry.

The scheme displays the productions of 525 head herd (relative to 245 dry cows, 42 pregnant heifers, 68 replacement heifers, 52 calves), with a 100kWe plant.

1. HERD SIZE

HERD OF DAIRY COWS*			
NO.	SLURRY (t/day)	POWER (kWe)	Biomethane (Sm ³ CH ₄ /hour)
60	3,0	11	3
265	13,2	50	14
525	26,2	100	28
895	44,7	170	47
1580	78,9	300	84

The potential production of green energy (electrical power or biomethane capacity) of an anaerobic digester is shown, according to the size of the herd.

In the example displayed, dairy cows contribute to 70% of the production of biogas.

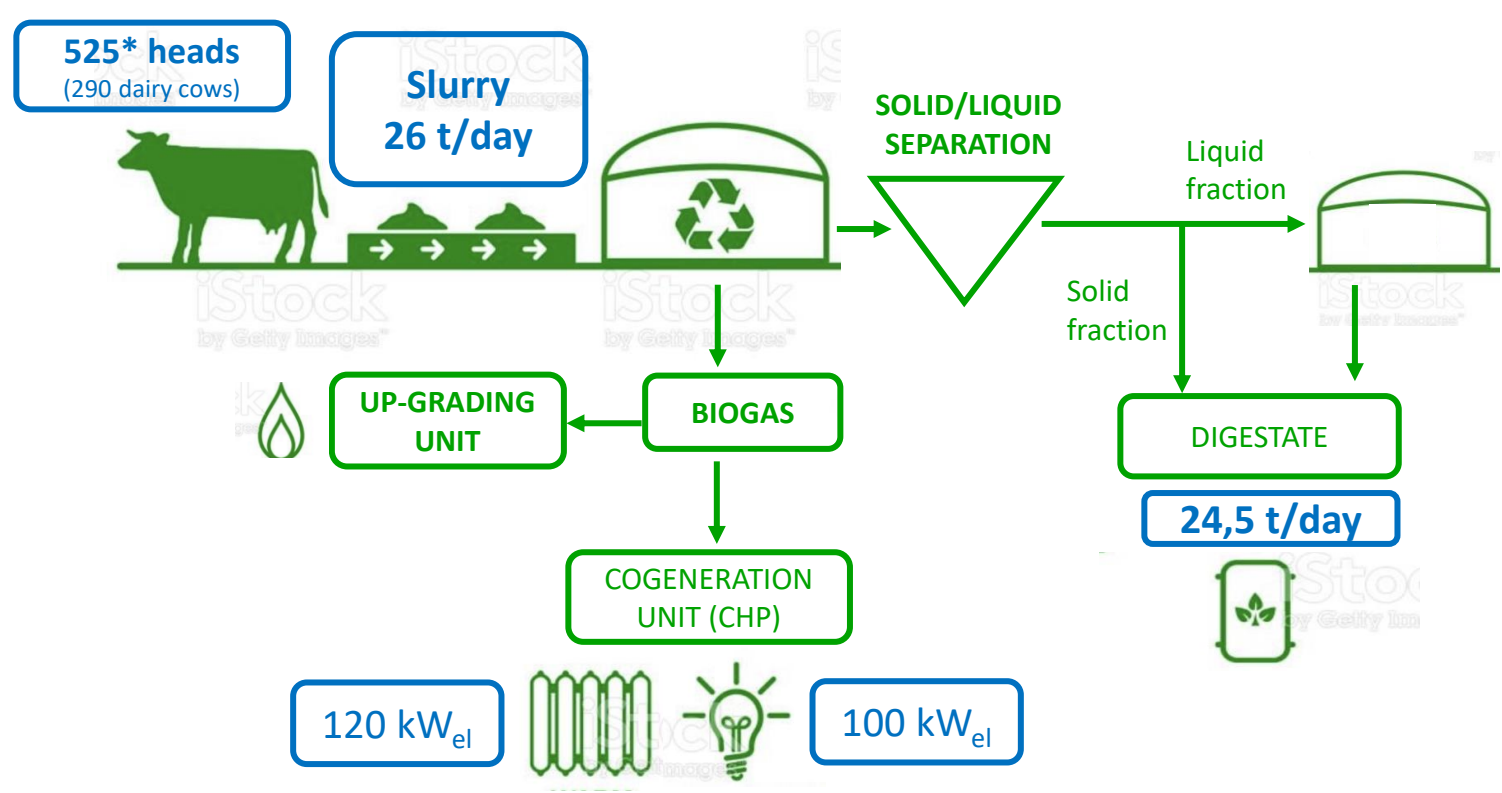
2. HOW MUCH CAN EFFLUENTS PRODUCE?

The yield of the effluents is evaluated using the Biochemical Methane Potential (BMP) test .



The BMP test is a wet batch anaerobic digestion test, conducted according to the UNI EN ISO 11734:2004 standard and the Italian UNI/TS 11703:2018 standard. It allows you to measure the maximum amount of methane that can be produced from a given organic matrix subjected to anaerobic digestion. The matrix is initially characterized in terms of dry matter (total solids) and organic content (volatile solids). The tests are performed with laboratory digesters placed at a temperature of 38°C for a total duration of 28 days. CRPA Lab internal method requires the use of an inoculum characterized by a stable biological process; also, a solution of micro and macroelements is added in order to guarantee the right supply to the microorganisms. The final result is expressed as a normal cubic meter of methane producible per ton of volatile solids (Nm³CH₄/tSV).

PRODUCTIONS



*Herd composition: dairy cows 47%, dry cows 8%, pregnant heifers 13%, heifers 22%, calves 10%