

Activities

The OG has tested a prototype of a dynamic sanitizing aerobic biocell for the stabilization of the solid fraction derived by solid/liquid separation of dairy cow slurry for its use as bedding litter. For a year, has been monitored the stabilization treatment effects on the cleanliness and wellness of the cows, on the hygiene of the milk, on the cheese-making and maturation process of the cheese and on the farm cost-benefit. Not only, the environmental sustainability was evaluated by LCA and also by real monitoring of the ammonia and GHG emissions from the cubicles.

Further details



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Stabilized Litter

Stabilized litter for dairy cows: optimization of the use of litter derived from the solid fraction separated from manure



Objectives

The objective of the Operational Group is to evaluate the impact of the use of bedding material obtained from the solid/liquid separation of manure in the Parmigiano-Reggiano district by testing an innovative technology to sanitize and stabilize it before spreading into cubicles of the resting area.

Dairy cow cubicles with stabilized bedding



Dairy cows for milk production to produce Parmigiano-Reggiano cheese (left) and Aerobic Dynamic Hygienizing Biocell (right)



Results

The treatment retention time in the bio-cell was on average 1.2 days and the exothermic bio-oxidation process increased the total solid content by 3-5%. The stabilization process showed a strong reduction in the bacterial load due to the sanitization effect thanks to 70°C for at least one hour. Total Bacterial Count was reduced from 9 to 7 log₁₀ CFU/g; Total Coliforms reduced from 5 to 1 log₁₀ CFU/g.

A soiling index of the dairy cows in the barn with stabilized litter was equal to 2.59, generally low and comparable to those of cubicle barns that use straw. The hygienic-sanitary quality of the milk was largely comparable in the barn with stabilized litter compared to that found in the rest of the Parmigiano-Reggiano area.

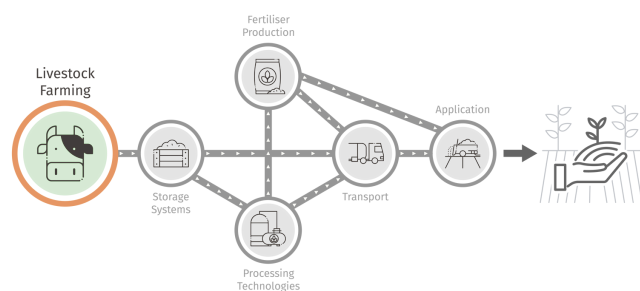
The emission factor from stabilized litter, referred to the square meter of cubicle and per year, is equal to: 31 g NH₃; 88 g N₂O; 0.8 kg CH₄. The emissions from cubicles using stabilized litter from separated solids are comparable, even if slightly higher, to those of cubicles using straw and significantly lower than emissions from permanent litter. This solution can be applied to the reality of Parmigiano Reggiano without affecting the quality of the final milk product, animal wellness and cleanliness. Based on the scenarios assumed, it can be economically viable for herds above 200 or 300 cows with a Pay Back Period from 2,9 to 7,3 years, depending on the farm business and equipment.

Context

In Emilia-Romagna, most dairy farms procure bedding materials directly on the market because the cultivation of their land is almost entirely dedicated to the cultivation of forage crops for dairy cow.

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Location in the Nutri-Know value chain



However, in recent decades, many medium and large-sized farms have installed mechanical separator for slurry and some of these have tried to use the solid fraction obtained from the solid/liquid cow slurry separation as bedding in free stalls with cubicles. The convenience is evident especially for large stalls, but there are also implications of a hygienic-sanitary nature that must be carefully evaluated, especially in the production of milk intended for Parmigiano-Reggiano DPO cheese.

One of the most problematic aspects of using the separated manure as such as bedding for cows housed in cubicles is its high humidity content (75-80%), which promote microbial development and the adhesion of the finest particles of the separated to the skin of the udder, which act as a vehicle for pathogenic microorganisms to the produced milk. Quite a few farms successfully use this system in Emilia-Romagna. Several have tried it and then abandoned it and returned to using traditional litter materials as straw.



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