



Within the Regional Programme for the Industrial Research, the Innovation and the Technological Transfer announced by region Emilia-Romagna with reference to Measure 1 "Actions for the development of the regional productive system towards the industrial and strategical research" Action A – Plans of industrial research and precompetitive development, ROTA GUIDO company made the full score and was first in the list and consequently it has been financed for the plan "INNOVATORY SYSTEM FOR THE DISPOSAL OF THE LIVESTOCK SEWAGE FOR THE ENERGY CONSERVATION, THE REDUCTION OF THE ENVIRONMENTAL IMPACT, THE WATER CONSERVATION AND THE YIELD OF PRODUCTS WITH HIGH AGRONOMIC VALUE".

Grounds of the research

In the areas of Emilia-Romagna with a high inherent vulnerability, the high density of livestock leads to an excess of nitrogenous contributions compared to the removal capacity of the cultivations. The surplus of nitrogen turns into releases to the surface waters – by causing the eutrophication phenomenon, and to the deep waters with the raising of the nitrate level and the consequent risks for the man's health.

The current processes are based on the control of the released nitrogen by means of the reduction of the protein nitrogen in the diet – technique that needs some checks – and the reduction of the nitrogen in the sewage with ventilation treatments. As to the ventilation of the sewage, it should be noted the high energy consumption and the negative side effects because of the release of ammonia and other gases. Because of the aforesaid disadvantages, this technique is not counted among the Best Available Technologies (BAT) according to the IPPC Directive.

Purpose of the plan

The purpose of the plan is the realization of a chain for the disposal of the livestock sewage, economically and energetically sustainable, that allows to reduce the nitrogen content to be applied to the lands. Our solution is characterized by the research and the development of integrated innovatory techniques so as to define a new disposal system. This disposal system is meant to be applied onto the pig sewage, even if its scope can be widened to the sewage of other intensive breedings (milch cows and slaughter cattle, buffaloes, some poultry in cage).

Expected results

Definition of an innovatory stripping system of the ammonia with interventions on the insulation of the reactor and with the partial heating of the mass. The released ammonia is removed from the dissipation by the fixation in matrixes with a high fertilizing power (compost and/or organic fertilizer). The energy consumptions of the system are covered by cogeneration of electric power and heat from the biogas released in a previous anaerobic digestion section. The

treated liquid content allows to get the reduction of the water waste during the sewage irrigation and the release of nitrates.

Innovatory content

The studied, developed and tested prototype consists of all sections provided for by the disposal system described in the previous points. The parts of new concept and development will be the stripping ones through the ventilation with catching device and biofilter, the spreading section with the innovatory technology of the dripping hoses, the composting section where different matters will be mixed and improved. This innovatory process can be used within a company, but also for intercompany solutions, where the high density of animals in areas with a high vulnerability leads to an excess of nitrogenous contributions compared to the removal capacity of the cultivations and the application of the Plans of action provided for by the Nitrates Directive is not enough to assure the protection of the surface and deep waters. Some company and intercompany control modes for the management of the suggested innovatory system are outlined below:

a- Solid/liquid separation and composting of the solids to be carried out within the farm, collection of the compost by the intercompany organization, conveyance of the compost to the target areas situated far off that call for organic matter so as to restore the land fertility; agronomic use within the farm of the clarified content which is subjected to anaerobic digestion and relieved of its nutrients.

b- Solid/liquid separation to be carried out within the farm; composting of the solids on platforms controlled by the company organization, marketing of the compost or conveyance to the target areas situated far off that call for organic matter so as to restore the land fertility; agronomic use within the farm of the clarified content which is subjected to anaerobic digestion and relieved of its nutrients;

c- Solid/liquid separation and composting of the solids to be carried out within the farm; collection of the compost by the intercompany organization, conveyance of the compost to the target areas situated far off that call for organic matter so as to restore the land fertility; purification within the farm of the clarified content which is subjected to anaerobic digestion and relieved of its nutrients, and drainage of the same clarified fraction into public sewers for the final disposal in the public sewage treatment plant;

d- Solid/liquid separation and composting of the solids to be carried out within the farm; collection of the compost by the intercompany Centre, conveyance of the compost to the target areas situated far off that call for organic matter so as to restore the land fertility; purification of the clarified content in the intercompany centre, after the anaerobic digestion;

e- Solid/liquid separation with flotation process to be carried out

within the farm; anaerobic digestion with biogas recycling from the thickened sludge in an intercompany centre; purification within the farm of the clarified content and drainage of the same clarified fraction into public sewers for the final disposal in the public sewage treatment plant and/or sewage on a company small land. It is possible to develop other combinations of integrated company/intercompany actions. The application environment of this project is represented by the livestock centres in Italy and Europe. The techniques used in the development of the project are based on a widely proven and successful collaboration between the company and the Universities, CRPA and qualified consultants.

Collaboration with research institutes

The project will have a systemic character, in close synergy between Rota company, Universities (Faculty of Veterinary Science of Milan) and CRPA (Research Centre for Animal Productions) of Reggio Emilia. The collaboration will be based on work teams with company, University and CRPA staff. The University and CRPA are involved in the research and design stages through their own organization and laboratories and take part in the test and design/technical control stages as well as in the analysis of the different project parameters. The choice of CRPA is crucial as its own activity concerns the promotion, the organization and the assistance of interdisciplinary teams of researchers, mainly through collaborations with Universities, Institutes and experimental companies; besides, it supplies products and services for the research activity and the improvement of the knowledge in the food, livestock and environmental sectors. The CRPA directly runs a laboratory for analysis on livestock sewage, sludge, compost and agro-industrial waste. The collaboration between company and University will be realized by means of a joint work for the systemic development of the project, with the qualified staff and the researchers of the University of Milan – Faculty of Veterinary Science, who will also work at the company after the drawing up of a contract with the University.

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