

Development of rapid methods for estimating the fertilizing ability (nitrogen and potassium) of pig slurry and its changes during storage

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Two rapid methods for ammonium-nitrogen testing and one for potassium were applied to fourty pig slurry samples. The results were compared with those obtained by chemical assessing after direct distillation in the case of NH_4 and by a flame photometric method for K. Among the tested methods the best one was « Agros » for NH_4^+ , used together with the already preconized gravimetric method and immediately appliable in practice. Selective electrodes (gas sensing electrodes for NH_3 and ion selective electrodes for K^+) could be used *in situ*, but their utilisation was more difficult.

The main elements of the slurry were also analysed during storage in six farm tanks. Results show that the dry matter content varied much. In contrast, the level of soluble nutrients (NH_4 and K^+) was stable.

The results obtained should lead to a better use of pig slurry in agriculture.

Swine waste anaerobic digesters : technical and economic performance

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More than 120 animal waste anaerobic digesters exist in France. They were built between 1979 and 1983 either without financial aid or with a state grant.

In this study, 76 digesters were systematically studied. The volume of biogas produced, the biogas required for the maintenance of fermentation (self-consumption) and the gas used in replacement of a conventional power supply were recorded. Moreover, the waste used and the amount of methane produced were systematically analysed (total DM, organic matter, N Kj. - N_{NH_3} - total and soluble COD) once a month.

Results reported here concern 9 swine waste anaerobic digesters. Eight units were based on a mesophilic continuous system, one on a contact process. Two of them were built privately, the other by an engineer.

Analyses of manure did not show a significant difference except in 2 places treating special kinds of pig manure : very old manure settled in pit and manure from pigs fed on soup and emptied in very short pipelines without dilution risk. The composition of the treated swine waste was the following : T.D.M. = 51.3 g/l, Org. M = 35.7 g/l, N kj = 3.9 g/l, COD = 49.7 g/l.

The digester output expressed as m^3 biogas/ m^3 tank/day ranged from 0.4 to 1.3 $\text{m}^3/\text{m}^3 \cdot \text{d}$ over a period of 9 to 11 months. Output close to 1.0 was accompanied by a production of organic matter of 0.5 m^3/kg as compared to the organic matter introduced, which is an usual performance. Low outputs can be explained either by a high detention time (depending on the tank size) or by a low productivity of the matter which can be checked

by the ratio of biogas production to organic matter input : 0.20 to 0.3 m³/kg organic matter.

When considering the period of steady operation, i.e. without technical problems such as blocking of pumps or pipes, mixing difficulties, the output was improved.

Selfconsumption represented about 50 p. 100 of the energy produced and mainly corresponded to the heating of fresh manure. Selfconsumption was all the larger as manure was diluted.

According to economic calculations the return to investment length ranged from 13 to 3 years if considering valorized energy only and from 9 to 3 years when referring to available energy, i.e. potentially economizable energy. This length of return was improved when integrating the deodorization costs. On the basis of these results, it may be expected that a good preliminary study may contribute to obtaining conditions leading to a profitable investment.

VII. — FEEDING

Estimation of amino acid availability

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The purpose of this report was to give guidelines for choosing an estimation method of amino acid availability to be used in practice for the formulation of diets on the basis of digestible amino acids. The definition of availability is recalled and the methods used to estimate it briefly examined; that based on measurements of the apparent digestibility being apparently the most fitted one. The importance of endogenous matters and the possible interest of determining a true digestibility are underlined. The error occurring in a faecal balance due to the activity of the large intestinal microflora leads to using the ileal digestibility. The different methods available in the laboratories (fistulation) are examined. The new technical solutions developed recently for practical reasons are critically analysed with the aim of surveying their advantages and detect their possible sources of errors.

The advantage of using digestible amino acid composition tables is emphasized in relation to diet formulation demands.