

Animal slurry management and lombard regulations an example of application.

*Règlementations sur la gestion des déjections animales
en Lombardie : un exemple d'application.*

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Abstract

The Regional Act n° 37/93 is, at least for the Italian habits, very advanced because it considers for the first time the concept that all the farms with animals must submit a plan for agronomic utilisation of slurry. This plan must be prepared by using a special software (GIARA37) and circulated on floppy disk, for the approval by the different organisations involved. An investigation was carried out in three communes around Lodi, which is a significant and illustrative area of Lombard farming. The results obtained highlighted that in the area considered about 250.000 m³ of slurry are produced every year, which means a load of 100 m³/ha. Another 48.500 tons of manure (20 t/ha) need to be added, which it makes a total of 645 t (260 kg/ha) of nitrogen. Since the quantity of nutrient required is 950 t, one can observe, generally speaking, that the relationship between slurry production and fields on which to spread it is not contradictory.

Keywords : legislation, manure handling, catchment areas

Résumé

L'Acte Régional n°37/93 est, compte-tenu des habitudes italiennes, relativement nouveau car il considère pour la première fois le concept d'équilibre agronomique des éléments et du plan d'épandage. Ce plan doit être utilisé suivant un logiciel spécifique (GIARA37) et doit circuler dans sa version fichier-disquette pour approbation par les différentes parties impliquées. Une investigation pilote a ainsi été effectuée sur 3 communes représentatives des pratiques d'élevage en Lombardie. Les résultats obtenus soulignent que dans la zone considérée, environ 250 000 m³ de lisier sont produits annuellement, ce qui conduit à un apport moyen de 100 m³/ha. De plus, 48 500 tonnes de fumier (soit 20 t/ha) doivent également être pris en compte dans ce bilan de fumure, ce qui aboutit à un total de 645 t. d'azote (soit 260 kg/ha). Compte-tenu de l'estimation en besoins en azote, soit 950 t., la relation entre production de déjections et les terres sur lesquelles les épandre n'apparaît pas conflictuelle.

Mots-clés : législation, manipulation et gestion des déjections, bassin versant.

Foreword

Since the war the production system in the Po Valley has deeply changed, which has affected production and slurry disposal procedures. As a general consequence farmers have stopped to consider slurry as a nutrients source and started to manage slurry disposal in a more casual way. Agriculture, and animal husbandry in particular, have then been blamed as the main responsible for non point pollution.

Act 37/1993 of the Lombardy Region aims at providing guidelines on how to process and utilize animal organic residues in order to improve soil fertility and water quality. Within the region areas with different animal load and soil profiles have been selected with the aim to establish a rank order for the implementation of the act and for the more or less detailed plan to be submitted to the Local Authorities. The aim of the above-mentioned Act is to urge farmers to utilize slurry in an agronomically correct way.

Here are the main features of the Act :

- to select areas with the highest animal load and to find a relationship between those areas and the soil;
- to improve or to keep at its best soil fertility thanks to an evaluation of crop requirements;
- to measure how much slurry needs to be spread on the basis of crop requirements and nutrients content of the slurry;
- safeguard surface and ground waters thanks to the correct management of slurry;
- to limit foul odours thanks to slurry treatment;
- to set up Manure Management Plans of which specially trained technicians will be in charge.

Using slurry in an agronomically correct way may be considered obvious, but it is not; in fact huge sums of money have been invested to finance ad hoc researches in these last few years. The main problem is to establish if and to what extent the agronomic use of slurry is responsible for the pollution of surface and ground waters. On this condition depends the viability of administrative or judiciary measures.

The Act and its implementation guidelines put the responsibility on farmers and technicians, but also on who have to issue local authorities permissions. Local Authorities, in particular, become the real soil managers, since they collect data and issue permissions only after STAP (Agricultural Advisory Service) technicians have given their approval of the structural and managerial aspects of the farm, and the Local Health Inspectors have made sure that there are no pollution hazards of surface and ground waters and have set limits if there are wells or houses in the surrounding area.

How the Act affects the area

One of the main features of Regional Act 37 is that information on slurry management is collected in a systematic way. Having this information is the

condition to manage the soil in an environmentally friendly way, at least as far as pollution from agriculture is concerned.

In fact, in order to reduce the environmental impact, slurry management at regional level needs to take into account the following aspects :

- analysis of the situation in the region and assessment of the polluting load in consideration of agricultural practices;
- selection of micro-catchment areas and definition of the pollution risk for every one of them;
- plan of operations the priorities of which will be based on the risk level of every micro-catchment area and on policies to be outlined. Measures can be structural (i.e. storage pits) or managerial (adoption of agronomic practices and/or of suitable spreading systems);
- monitoring of surface and ground water characteristics and evaluation of the impact of structural and managerial measures. Some measures may have an effect only in the long term (after 10-15 years).

In order to implement Act 37/93 farmers are expected to submit a Manure Management Plan of animal slurry (PUA), even in a simplified version (PUAS), when the farm load of live weight per hectare is lower than the one accepted for the area.

The aims of the plan are the following :

- to set up a file of the farms, containing information on the farm and the soil where slurry is spread;
- to analyse the most common situations and those at a greater risk, while providing technical solutions to reduce pollution risks;
- to urge farmers to use slurry in an agronomically correct way, yet avoiding to do so when the situation is incompatible;
- to highlight structural deficiencies as far as slurry management is concerned and to put forth solutions supported by incentives.

In order to achieve those aims it is necessary to know all the details about the farms before outlining policies, which have to be evaluated from a technical and economic point of view by means of simulation models. Thus it will be possible to obtain data indicating the best agronomic practices to adopt and the necessary structural policies to implement in order to reduce the risk of pollution as much as possible. Moreover the collection of data will help to select micro-catchment areas at risk on which to focus attention.

It must be emphasized that an extension service needs to be set up so that farmers will be provided of the necessary technical information to manage nutrients (organic and mineral) correctly.

It is necessary to keep in mind that the guidelines require the use of a special software (GIARA 37) for data collection and the processing of manure management plans. Thus information will circulate and will be checked by means of

computers, instead of using paper. The most important consequence is that it will be possible to assess the quantity of nutrients let into surface and ground water.

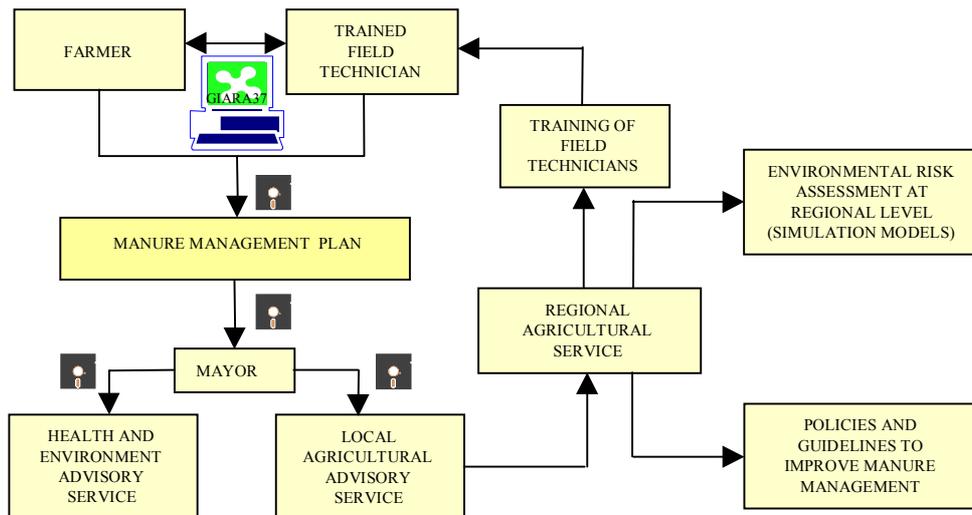


Figure 1.
Implementation of Act 17/93.

An example of implementation

In order to evaluate the potential of Regional Act 37, a survey was carried out in three Lodi communes, which is a representative area of the whole of Lombard husbandry.

The collection of farm data (agronomic and management) was carried out thanks to a survey conducted with farmers, who volunteered provide those data. The operational outline was based on the implementation suggested by Act 37 guidelines.

As for the methodology used to measure crop requirements, in order to define the crop rotation pattern each farm area was identified on maps and the use of every single plot was recorded (the farmer declared the use).

The average nitrogen loss was taken down so as to assess the quantities of nutrients (nitrogen, phosphorus and potassium) to be spread along with organic or mineral fertilizers in order to meet crop requirements in every farm.

The basic information used to measure volumes and define slurry characteristics concerned the animal category (growing phase and live weight) and type of stabling. This information, provided by farmers themselves, made it possible to measure volumes and define nutrients content in the slurry on the basis of the implementation policy.

The final result is that the quantities of slurry and manure to be spread and the quantities of nutrients produced can be defined.

The balance between the quantities of nutrients in the slurry and crop requirements has made it clear if farms can spread slurry without putting the environment at risk because of nutrients surplus.

In order to manage slurry in a correct way, adequate storage pits are necessary. Their size depends not only on the volume of slurry, but also on the time of year when it is spread. They also depend on the type of crop and, somehow, on the spreading techniques.

To take those factors into account when planning storage pits, the volumes of slurry spread in the various months of the year were calculated after farmer's indications. For every crop requirements and expected amounts of slurry to be spread were also taken into account. It was then possible to obtain a farm spreading schedule showing the periods when spreading had to be carried out (crops and spreading techniques) and the amounts of slurry necessary to meet crop requirements.

On the basis of these schedules and considering that the production is constant throughout the year, the necessary storing volumes were calculated.

Results obtained after schedule planning

On the basis both of the data collected in every farm and of Manure Management Plans, all data were again processed so as to better clarify the problem posed by slurry in the area considered.

The average load of slurry produced, 104 m³/ha, makes it possible to state that the situation does not pose any problem as far as the quantities of slurry and the amount of nutrients to be spread are concerned (the general covering level of organic nitrogen is 68%).

At least 1/3 of the farms located in the study area for a total surface of 1,300 ha, spread more than 100 m³/ha; the areas to be spread with great quantities of slurry (40 t/ha) are only 225 ha. As for spreading period, peaks are to be found in March and October, with a small peak in June in the permanent meadow area (Fig. 2a). This period coincides with the wettest months, which poses serious tactical and strategic problems as to the procedures to follow in order to make the most of the fertilising value of slurry and reduce pollution risks from run-off or leaching.

If spreading periods are considered (Fig. 2b) it should be noted that the most slurry is spread between October and November whereas in March a smaller quantity is spread. Fall spreading is connected with winter crops (mainly *Lolium italicum*).

As for the spreading period of mineral nitrogen (Fig. 2c), it can be noticed that the peak is between May and July and that the quantities spread in Fall (especially October) are very small.

Once the crop rotation has been defined in every farm the theoretical requirement of nitrogen was calculated. This figure was compared with the slurry nitrogen content and, afterwards, with the total mineral manure used. The areas with the excess content were the following: 100 kg/ha on 333 ha; 100-200 kg/ha on 1256 ha; 200 kg/ha on 768 ha.

Once the total volume of the slurry produced, the amount of stored slurry and the crop rotation were known, four groups were created including all possible combinations: adequate slurry production and facilities; inadequate facilities and adequate slurry production; adequate facilities and excess slurry; inadequate facilities and excess slurry (Fig. 3).

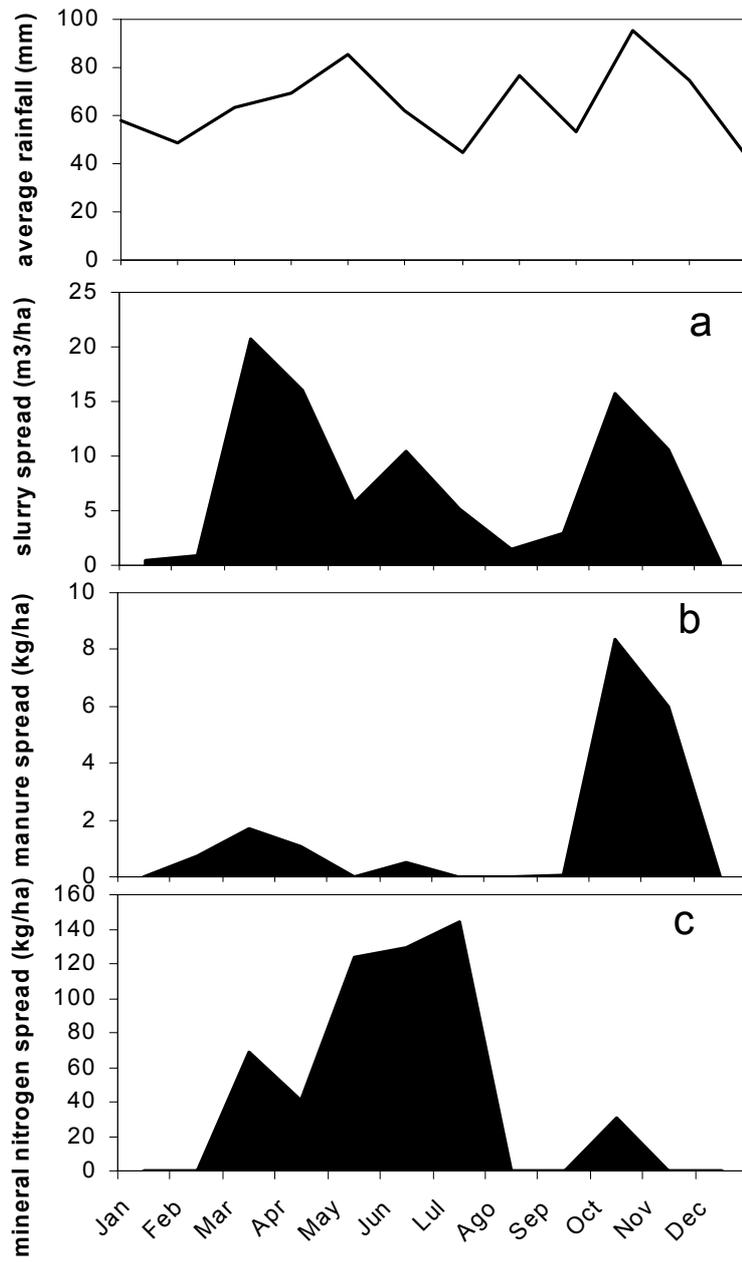
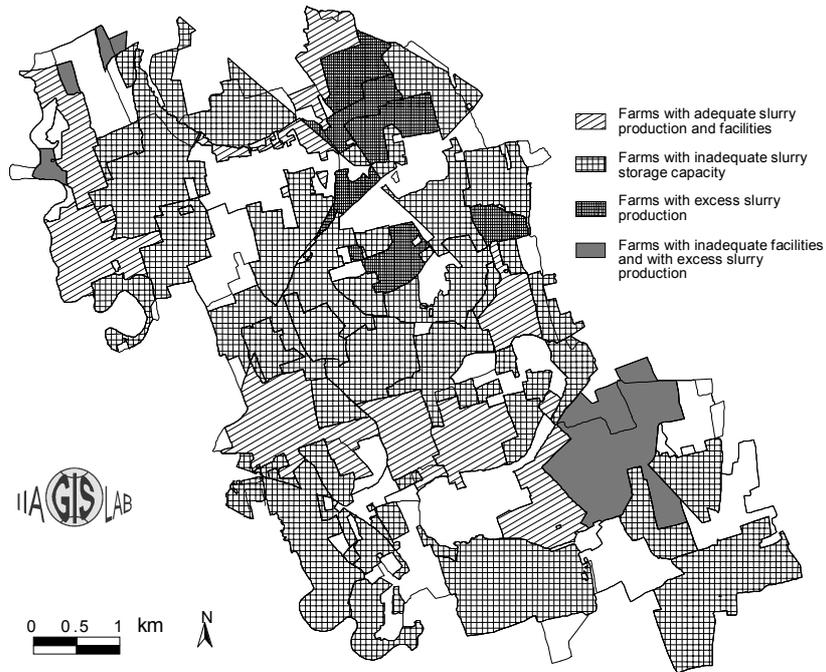


Figure 2
 Amount of liquid manure (slurry), solid manure and mineral nitrogen spread in the studied area in the various months of the year, also in relation to average rainfall.



*Figure 3
Conditions of the farms in the study area in relation to the slurry storage capacity
and the amount of slurry produced.*

Conclusions

The problems posed by the pollution of surface and ground waters require that the responsibilities of each sector involved should be clearly defined.

The aims of the Regional Act 37/93 and its implementation guidelines are: i) to promote the correct agronomic use of slurry through PUA and PUAS; ii) to set up a monitoring system of the environment based on the processing of PUA and PUAS data, that will be entered into models defining nutrient outlet into surface and ground waters.

PUA (and PUAS) require cooperation between farmers and technicians. In the future more technicians should work with farmers and Lombard agriculture should benefit from it. The Regional Act 37/93 and its implementation guidelines provide a complete tool for a better and more correct utilization of animal slurry with less environmental impact, also thanks to the development of technical guidance. The system is undoubtedly complex and ambitious. It will be successful if every party (farmers, technicians, Public Advisory Service, Health Inspectors) cooperate.

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