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ProEnvironment

ProEnvironment 2 (2008) 42 - 45

Original paper

The assessment of the intensive poultry rearing farms within the context of the IPPC Directive (B)

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Received 6 October 2008; received in revised form 25 October 2008; accepted 3 November 2008
Available online 10 December 2008

Abstract

Poultry production in intensive farms has been steadily increasing since the 1970s. This has occurred through a number of factors including increased feed supply through greater use of nitrogen (N) fertilizer and increased use of supplementary forage feeds. Potentially, the integration of low-protein forage (e.g. maize), to reduce dietary-N concentration, or management practices (e.g. deep layer, cage tier), to reduce excreta to waste, water and soil, can mitigate environmental N emissions and increase efficiency. However, effects of these mitigation practices on resource use efficiency and environmental emissions, such as greenhouse gas emissions and N leaching, are becoming more and more substantial, as the production on wider basis increased. This is one of the reasons for including the large scale poultry farms on the list of the economical activities with significant impact on environment, being subjected to more and stricter regulations. The direct and indirect environmental impacts of poultry farming are currently being investigated by using simulation modelling. The model simulation using a life cycle assessment approach indicates that N fertilizer increases production and economic efficiency but decreases environmental efficiency through predicted increases in N leaching and greenhouse gas emissions. In contrast, using forage increases the use of land and production efficiency, with a decrease in N leaching and no increase in greenhouse gas emissions (per capita). A comparison of an average poultry farm applying the Best Available Technologies versus an older technology is provided, together with considerations regarding the mitigation of impacts on various scales.

Kewords: intensive farms of poultry rearing, assessment of life cycle, mathematical modelling

1. Introduction

The negative effects due to poultry production in intensive farms were firstly finding by gas emission with bad smell. The waste water from these farms is causing in resident zones discomfort, eutrophyzation phenomena and acids ecosystems.

Gaseous compounds from dejections from production farms, natural deposits or because of natural fertilizer, was with impact on environment, more after 1970s. Recently are precepts like negative effects the increases of N leaching and greenhouse gas emissions. A significant part of N quantity, from food like organic compounds, is emitted in environment like ammonias. In European climatic condition, the total level of ammonias emitted is about 30%

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from total of nitrogen forage, provided by (IPPC, 2003). On regional scale, nitrogen deposits from natural fertilizers utilization can cause eutrophyzation and ecosystems acidification [1].

IPPC directive. In 1996s, the Directive of Integration Pollution and Prevention Control (IPPC), was emitted by EU IPPC Council to control the effects of the large industrial units. From this type of units are intensive poultry farms (with a capacity bigger than 40000 heads on one series). The directive stipulated the prevention of pollutant emission in air, water and soil if it is not feasible economical, through efficient utilization of resources.

IPPS directive is applied through implementation of one activity authorization system on different industrial activity categories, based on integrated evaluation of pollutant, row matters and energy utilization in industries. The final aim is to assure a high level of environment protection. In this case the producers must apply all prevention measures in case of specific industrial activity through implementation of "best available techniques" or BAT (IPPC, 2003). These regulations from BAT had a dynamic character, being all the time improved with the reason to avoid the impact on environment. IPPC regulations is addressing to all production cycle beginning from production equipments quality, forage quality, production cycle progress, etc. to residues administration (natural fertilizers deposits and utilization). In the sight of development activities for production the producers must be demonstrated to the settlement organisms activity integration in progress in BAT requirements and to show the absence of significantly impact on environment at local and regional scale.

Nitric Directive. The EU members adopted in 1991 Nitric Directive for water protection caused by nitrites from agriculture sources. This directive solicited by members states to identify the vulnerable zones to nitric pollution and to establish an action plan for minimize nitric levigation in this zones. Surfaces and underground water pollution with fertilizer from agriculture sources is a worry reason for the all Europe. In the aim of water quality depreciation prevention, Nitric Directive define the action based on agriculture management including stored activities and application of organic fertilizer with the reason to minimize nitric quantities from surface and underground waters.

This actions include measures like forbidden periods to natural fertilizer application, maximum quantities of N/ha admitted being implicated under organic fertilizer form, restrictions concerning the natural fertilizers application on frozen soils or funded on bold slopes, measures concerning the proper storage of organic fertilizers, the cultures rotation, herbal bands for protection of watery bodies.

2. Material and method

The BAT utilization recommended from numerous alternative technology, the reference document BREF (BAT reference document) don't assure implicative the avoiding certainty of negatives impact in neighbourhood production unit or to different geographic scales. IPPC solicits a solid evaluation of the productive unit including the evaluation of the relations with specific geographic and socio-economy conditions of emplacement zone. In this context the information's reference to the activity type and scale coupled with generated information by monitoring and evaluation techniques can provide a precise image on potential impact on the environment. The information's utilization obtained by numerous monitoring techniques beginning from simple balance sheet calculations, at emissions measurements in different environment, near to different facilitation. Using mathematical models referring to dispersion and polluters impact is possible to obtain a precise evaluation about environment impacts. In projection phase these information can be used for the selection of alternative production techniques in the aim of avoiding potentials negative impacts with manifestation on specific location of productive unit. The results obtained can help also to improve strategists of project, the selection of optimum mitigate measures and also can be used in the supervision monitoring phase for the evaluation of cumulative effects of those pressures on environment in specific area at local and regional scale.

The emissions in atmosphere can constitute majors emissions of those poultry intensive farms systems. The key emissions in air are the ammonia, smell and dust.

The factors which can influence the emissions in air are:

- The constructive system of dejection depository and collection
- Ventilation and ventilate systems
- Heating and indoor temperature
- The amount and quality of fertilizers obtained, which depends on nutrition strategy, the type of litre utilized, water system and animals number.

Compliant BREF the air emissions due to poultry intensive farms can be classified like is presented in table 1.

Table 1. Air emissions from intensive productions systems

Air pollutant	Production system
Ammonia (NH_3)	Animals shelters, organic fertilizer deposits, fertilizer distribution on fields
Nitric oxides (N_2O)	
Odors (ex. H_2S)	
Methane (CH_4)	Animals shelters, organic fertilizers deposit, the fertilizers treatment
Carbon-dioxide (CO_2)	Animals shelters, the used energy for heating and transport in farm, burning the residues
Nitric oxides (NO_x)	Buildings heating and small installation of combustion
Dust	Forages chop, deposit. Animals refuge, the storage and disperse of organic fertilizers
Black fumes /CO	Residues burning

The study of technological process assures as much emission points as period in which the pollutants are released in significant amounts.

Local information concerning the geographic localization and identification of sensitive areas from neighbourhood farms are taking over from different sources (maps of the way to use the surfaces, developmental plans, satellites images etc.). The monitoring strategy is projected concordantly with the localization of the points of emission identified in time and space. Life cycle analyze is insured with the aim to identified the impacts generated by residues utilization generated by activity. The natural fertilizers used are treated with a special attention because of supplementary emissions generation possibility through unprofitable use (the selection of unfit period, the technology and application place). Nutrition techniques, including feed stages special projected assures the optimum assimilation by the animals and reduce the amount of microelements excreted and ejected in environment

3. Results and Discussion

A combination of direct measurements, balance-sheet calculations and emission factors were used for environment emissions evaluation and to efficiency mitigate applicable measures. Although are emitted diverse pollutants usually are studied ammonia and dust emissions. The measures used for pollutants minimization usually reduce the same the emission of other air pollutants. Total ammonias emissions from a poultry intensive production farm were evaluated through the technical from table 2.

Table 2. The amounts calculation of emissive

Shelter and grow						
Animals category	Shelter system	Poultry number pieces	Emission factor kg NH_3/year and poultry	Total NH_3		Limits cf. Ord.462/1993 kg/h
				t/an	kg/h	
Chicken broiler	Concrete hall covered with tallish	176.000	0.15	26.4	3	0.3 - 5
Total ammonia emissions due to chicken refuge t NH_3/year Total (a)						26.4
Litier storage						
Storage type	Deposit surface m^2	The number of birds on series	Emission factor kg NH_3/year and chicken	Total NH_3		
				kg /year	kg/h	
Exterior covered depository	100	22.000	0.02	440	0.05	
Ammonias total emissions due chicken refuge t NH_3/year Total (b)					0.44	
The forage utilization like fertilizers						
Technique of fertilization	Birds number	Emission factor kg NH_3/year and chicken	Total NH_3			
			t/year	kg/h		
Dispersal	176.000	0.11	19.36	2.2		
Total ammonia emissions t NH_3/year .....Total (c)					19.36	
Total ammonias emissions on farm surfaces t NH_3/an = (a)+(b)					26.84	
Total ammonia emissions on environment t NH_3/an = (a)+(b) +(c)					46.2	

4. Conclusions

The technologies selection of convenient production from different variants recommended by BREF must do in correlation with the environment objectives required by geographic and productive unit place.

In case of sensitive receptors existence (humid zones, protected zones, etc.) in the neighborhood, the environment protection measures must be strictly.

The application of supplementary environment protection measures can be expensive and to affect the farm economic efficiency.

The environmental management measures, inclusively a continuous evaluation of environmental performances, with immediately measured takes in case of some methods identification to reduce the impact are absolute necessary.

The residue quality and quantity monitoring shall help not only in farm efficiency evaluation, but will confer precious information's to the buyer which use natural fertilizer to avoid other impacts.

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