baltic greenbelt

SUSTAINABLE AGRICULTURE AND INDUSTRIAL LIVESTOCK PRODUCTION IN THE CONTEXT OF PREVENTION OF THE BALTIC SEA EUTROPHICATION

Kołobrzeg, 22-23 June 2010

Baltic Green Belt International Conference and International Workshop on Sustainable Land Cultivation and Sustainable Animal Farming

"Baltic Sea begins from the rivers' springs"

PROJEKT WSPÓŁFINANSOWANO ZE ŚRODKÓW UNII EUROPEJSKIEJ FUNDUSZ ROZWOJU REGIONALNEGO).

Baltic Sea Region Programme 2007-2013

FEDERACJA ZIELONYCH GAJA

Edited by:
Jakub Skorupski

Photos:
Aneta Kozłowska

Publisher:

Federacja Zielonych GAJA
5 Lipca 45 St.
70-374 Szczecin
tel./fax (091) 489 42 32
email: jakub@gajanet.pl
www.gajanet.pl

ISBN 978-83-924762-5-2

Publication elaboratem in the frame of the ***Baltic Green Belt*** project, co-financed by the European Union (European Regional Development Fund) and the Regional Fund for Environmental Protection and Water Management in Szczecin

More information at **www.balticgreenbelt.org.pl** oraz **www.balticgreenbelt.uni-kiel.de**

Preface

We are happy to present the Book of Abstracts of the speakers presented the international conference "Sustainable agriculture and industrial livestock production in the context of prevention of the Baltic Sea eutrophication", organized in the frame of the project *Baltic Green Belt*.

Conference topics meets one of the biggest environmental problem of the Baltic Sea catchment area, which is directly related to agricultural activity, namely eutrophication.

The dynamic development of modern agriculture, intensification of animal production and the desire to maximize garner for a limited and defined area of available arable land hopes for economic benefits, but also causes serious environmental threat to the catchment area and the Baltic Sea.

The only solution seems to sustainable agriculture, which balanced the need to meet the needs of present generations with the need to meet the needs of future generations. This idea, deriving from a very pragmatic reasons set out by the much broader concept of sustainable development, protects the interests of the natural environment. Many examples from different parts of the world indicates a real opportunity to achieve this aspiration to tackle in the future reconstruction and reconciliation of ecosystems' homeostasis nature and agricultural activity with the needs of the environment. Sustainable farming is not a brake on progressive crops and livestock production, but only stimulus guiding the direction and framework for their development.

We are confident that this conference will be set in a very useful trend to organize similar education and informational events addressed to the groups connected with agricultural activities (agricultural self-government, agricultural associations, owners of industrial animal farms, agricultural advisory centers, agricultural research institutes, state and local institutions and administrative bodies and NGOs responsible for the agrienvironmental problems, universities and agricultural schools, farmers).

The objective of the conference is to integrate entities responsible for the agricultural production and nature conservation and environmental protection about a common problem, which is the eutrophication of the Baltic Sea, as well as to provide a complete and accessible information about how to tackle the negative impact of agriculture on the environment and promoting good agricultural practices and disseminate the idea of the Baltic Green Belt project (http://www.balticgreenbelt.uni-kiel.de/, http://www.balticgreenbelt.org.pl/),

The aim of the conference is responsible for the integration of environment agricultural production and nature conservation and environmental protection around the common problem of eutrophication of the Baltic Sea, possibly to provide a complete and accessible information about how to tackle the negative impact of agriculture on the environment and promoting good agricultural practices and disseminate the idea of the project Baltic Green Belt (www.balticgreenbelt.uni-kiel.de, www.balticgreenbelt.org.pl).

The Conference is held under the patronage of the Westpomeranian Voivode, Mr Marcin Zydorowicz.

Organizers

european greenbelt

Baltic Green Belt Project is part of a European Green Belt **initiative, which persues a vision to create the axis of environmental projects – from the Barents Sea to the Black Sea – which is the international symbol of the cross-border cooperation, environment protection and sustainable development**

Table of Contents

LECTURERS 5

CONFERENCE PROGRAMME 6

BALTIC GREEN BELT PROJECT 8

BALTIC GREEN BELT PROJECT IN POLAND, OR HOW SUSTAINABLE AGRICULTURE CAN CONTRIBUTE TO IMPROVING THE CONDITION OF THE BALTIC SEA ENVIRONMENT 12

AXIS RDP (RURAL DEVELOPMENT PROGRAMME) 2007-2013 AND ORGANIC FARMING IN POLAND 15

NITRATE DIRECTIVE AND FERTILIZATION PLANS AND QUESTION OF FERTILIZATION AND EUTROPHICATION .. 19

PROBLEMS WITH IMPLEMENTATION OF THE HELCINKI CONVENTION IN POLAND 21

OLFACTOMETRIC MEASUREMENT TECHNIQUES 34

BIRDS AND AGROCENOSIS 39

THE NEW CROSS-COMPLIANCE REQUIREMENTS AND NEW STANDARDS FOR GOOD AGRI CULTURAL AND ENVIRONMENTAL CONDITION IN POLAND IN THE YEAR 2010/2011 41

ORGANIC FARMING AND NATURE CONSERVATION PROBLEMS IN BELARUS 45

ENVIRONMENTAL ASPECTS OF LARGE-SCALE INDUSTRIAL PORK PRODUCTION IN THE BALTIC SEA CATCHMENT AREA OF BELARUS 48

SWINE FARM ODOUR NUISANCE 54

BEST AVAILABLE TECHNOLOGIES FOR MANURE TREATMENT, FOR INTENSIVE REARING OF PIGS IN THE BALTIC SEA REGION 59

UTILIZATION OF ASH FROM THERMAL GASIFICATION OF FERMENTATION RESIDUE FROM A BIOGAS PLANT – EXPERIENCE FROM DENMARK AND AUSTRALIA 62

SUPPORTING POLISH AGRICULTURE BY CAP COMPATIBLE TO THE NATURE AND ENVIRONMENT PROTECTION RULES 68

CAN LARGE-SCALE ANIMAL PRODUCTION BE SUSTAINABLE? 71

AGRI-ENVIRONMENTAL PROGRAMME 2007-2013 77

ORGANIZING COMMITTEE 82

Lecturers

Zbigniew Bukowski, PhD – Kazimierz Wielki University in Bydgoszcz, Poland

Małgorzata Friedrich – West Pomeranian University of Technology in Szczecin, Air Fragrance Quality Laboratory, Poland

Marek Jobda – Polish Society for Birds Protection, Poland

Eugeniy Lobanov – Center of Environmental Solutions, Belarus

Karolina Liberadzka-Czubowska – Ministry of Agriculture and Rural Development, Poland

Joanna Kośmider, **Prof. PhD** – West Pomeranian University of Technology in Szczecin, Air Fragrance Quality Laboratory, Poland

Aneta Kozłowska – Green Federation GAIA, Poland

Elke Körner – Speaker "baltic green belt", BUND Schleswig-Holstein e.V., Niemcy

Marek Kryda – Civic Coalition of Greens, Poland

Ksawery Kuligowski, PhD – Pomeranian Center for Environmental Research & Technology (POMCERT), Poland

Anna Robak-Bakierowska, PhD – Regional Environment Protection Inspectorate in Szczecin, Poland

Dietrich Schulz, PhD – HELCOM LAND, Head of Department of Land Use and Resource Management, Agricultur, Federal Environment Protection Agency, Germany

Svetlana Semenas, PhD – Public Association Ecohome, Belarus

Lotta Samuelson – Baltic Sea 2020, Sweden

Jakub Skorupski – Green Federation GAIA, Poland

Maria Staniszewska – Polish Ecological Club, Poland

Ewa Szymborska – Ministry of Agriculture and Rural Development, Poland

Barbara Wójcik – Westpomeranian Voivodeship Office in Szczecin, Poland

Conference Programme

D A Y I (22.06.2010)

9:00 – 10:00 Registration

10:00 – 10:05 ***Conference Openning and Welcom of Participants*** (Aneta Kozłowska, Jakub Skorupski, Green Federation GAIA, Poland)

10:05 – 10:10 ***Conference Opening Speech*** (Barbara Wójcik, West Pomeranian Voivodeship Office in Szczecin, Poland)

10:10 – 10:40 ***Baltic Green Belt Project*** (Elke Körner, BUND Schleswig-Holstein e.V., Germany)

10:40 – 13:00 LECTURES SESSION I

10:40 – 11:10 ***Environmental Axis of Rural Development Programme and Organic Farming in Poland*** (Ewa Szymborska, Ministry of Agriculture and Rural Development, Poland)

11:10 – 11:30 Coffee break

11:30 – 12:00 ***Nitrates Directive, Fertilization Plans and Overfertilization and Eutrophication*** (Marek Kryda, Civic Coalition of Greens, Poland)

12:00 – 12:30 ***Problems with Helsinki Convention Implementation in Poland*** (Zbigniew Bukowski, PhD, Kazimierz Wielki University in Bydgoszcz, Poland)

12:30 – 13:00 ***Industrial Agriculture and Environment Protection Inspectorate*** (Anna Robak-Bakierowska, PhD, Regional Environment Protection Inspectorate in Szczecin, Poland)

13:00 – 14:00 Lunch

14:00 – 15:30 OLFACTOMETRIC WORKSHOP

14:00 – 15:20 ***Olfactometric Measurement Techniques in Mobil Laboratory of Air Quality Research – Introduction to the workshop*** (Małgorzata Friedrich, West Pomeranian University of Technology in Szczecin, Poland)

14:20 – 15:30 ***Practical Presentation of the Olfactometric Techniques*** (West Pomeranian University of Technology in Szczecin, Air Fragrance Quality Laboratory, Poland)

15:30 – 15:50 Coffee brake

15:50 – 18:10 LECTURES SESSION II

15:50 – 16:20 ***Birds and Agrocoenosis*** (Marek Jobda, Polish Society for Birds Protection, Poland)

16:20 – 16:50 ***The New Cross-compliance Requirements and New Standards of Good Agricultural Practices in Accordance with Environmental Protection Rules in Poland in years 2010/2011*** (Karolina Liberadzka-Czubowska, Ministry of Agriculture and Rural Development, Poland)

16:50 – 17:20 ***Organic Farming and Nature Conservation Problems in Belarus*** (Svetlana Semenas, PhD, Public Association Ecohome, Belarus)

17:20 – 17:40 Discussion

17:40 - 19:30 SCREENING OF THE MOVIE ***PIG BUSINESS*** (dir. Tracy Worcester, Great Britain) / POSTER SESSION

20:00 FORMAL DINNER

D A Y I I (23.06.2010)

7:00 – 9:00 Breakfast

9:00 – 9:10 ***Opening of the Second Conference Day*** (Aneta Kozłowska, Jakub Skorupski)

9:10 – 11:00 LECTURES SESSION III

9:10 – 9:40 ***Environmental Aspects of Large-scale Industrial Pork Production in the Baltic Sea Catchment Area of Belarus*** (Eugeniy Lobanov, Center of Environmental Solutions, Belarus)

9:40 – 10:10 ***Olfactory Nuisance of Pig Farming*** (Joanna Kośmider, Prof. PhD, West Pomeranian University of Technology in Szczecin, Poland)

10:10 – 10:40 ***Intensive Pig Production and Best Available Technologies to reduce leaching of nutrients from manure*** (Lotta Samuelson, Baltic Sea 2020, Sweden)

10:40 – 11:00 Coffee brake

11:00 – 14:10 INTERNATIONAL WORKSHOP ON SUSTAINABLE AGRICULTURE AND SUSTAINABLE ANIMAL FARMING

11:00 – 11:30 ***HELCOM's Actions Against the Agriculture Impact on the Baltic Sea Eutrophication*** (Dietrich Schulz, PhD, HELCOM LAND, Head of Department of Land Use and Resource Management, Agricultur, Federal Environment Protection Agency, Germany)

11:30 – 12:00 ***Agricultural Utilization of ash from Thermal Gasification of Fermentation Residue from an Agricultural Biogas Plant – Experiences from Denmark and Australia*** (Ksawery Kuligowski, PhD, Pomeranian Center for Environmental Research & Technology (POMCERT), Poland)

12:00 – 12:30 ***Incompatible with the Principles of Nature Conservation and Environment Protection EU Agricultural Subsidy Providing in Poland*** (Maria Staniszewska, Polish Ecological Club, Poland)

12:30 – 12:50 Coffee brake

12:50 – 13:20 ***Can large-scale Animal Production be Sustainable?*** (Jakub Skorupski, Green Federation GAIA, Poland)

13:20 – 13:50 ***Agroenvironmental Programme 2007-2013*** (Aneta Kozłowska, Green Federation GAIA, Poland)

13:50 – 14:10 Discussion

14:10 – 14:20 ***Summary and Closing of the Conference*** (Aneta Kozłowska, Jakub Skorupski)

14.30 – 15:30 Lunch

16.00 – Short boat trip for interested participants

Baltic Green Belt Project

Elke Körner
BUND Schleswig-Holstein e.V.
elke.koerner@bund-sh.de

1. From "Iron Curtain" to Europe's lifeline

For almost 40 years the so-called "Iron Curtain" had divided Europe. It ran from the Barents Sea at the border between Russia, Norway and Finland, all the way to the Bosporus at the border between Bulgaria, Greece and Turkey. It was a political, ideological and physical barrier, most strongly expressed in Germany: Metal fences, walls, barbed wire, guard towers, spring guns, land mines and watchdogs created a death zone through Germany and separated one country in East and West, divided families and friends for decades. Nature was the only winner in this forbidden zone.

Today, the *central* Green Belt's lifeline through Germany is the area between the road for military vehicles and the former borderline of the Federal Republic of Germany (FRG) and German Democratic Republic (GDR) – today the borderline of the German federal states.

This strip is between 50 and 200 m wide. In the long run it is planned to protect this partly narrow *central* strip and also some (largely) protected nature conservation areas along the entire Green Belt as a core area and key element of a national ecological network. The *central* Green Belt is the important backbone with ribs to both sides building up the longest habitat connecting system not only in Germany but also in Middle Europe.

For decades almost nobody was allowed to enter the Iron Curtain through Europe. Therefore, this area remained comparatively undisturbed and did not undergo any cultivation or intensification of land use. In the shadow of the heavily guarded border, nature was given a 40-year breathing space. An almost 1400 kilometre long unique network of habitats evolved. Along the route of the former Iron Curtain we can find some of the most important habitats for biodiversity in Europe.

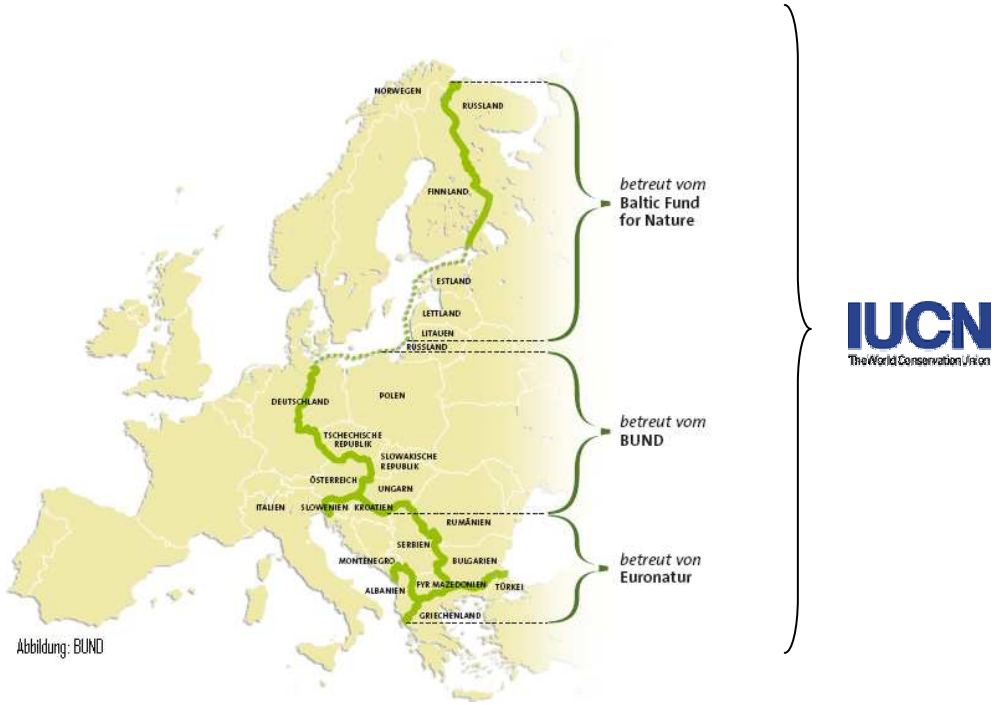
The special status of the Green Belt derives from the connection of different habitat types, a fact extremely rare in the intensively used and fragmented German landscape. Fallow grassland, shrubland, dry grassland, pioneer forests, wet meadows, water bodies and bogs are linked and interlinked.

Green Belt at the border of Saxony-Anhalt/Lower Saxony and at the border Bavaria/Thuringia. Pictures: Klaus Leidorf.

BUND/FoE Germany (Bund für Umwelt und Naturschutz Deutschland, Friends of the Earth Germany) has been engaged to protect the valuable habitats along the former Inner-German border – the so-called Green Belt – since the fall of the Iron Curtain in 1989. A few weeks after the Iron Curtain, in December 1989, BN organised the first meeting of nature conservationists of East- and West-Germany in a restaurant in the town Hof (Upper Franconia): The name "Green Belt" was created and one of the most important projects in the history of BUND arised. This was the beginning of the today 20-year lobby work to preserve a piece of diverse nature among the rough-and-tumble of the reunified Germany. About 85 % of the Green Belt Germany has not yet been degraded to intensively used arable land or grassland, forest plantation, streets or buildings. The function of the Green Belt as a system of connected habitats is ecologically intact today. But the threats are always present. Until the mid-1990ies nearly 2000 hectares of the Green Belt (11%) were taken over into intensive agricultural use – one of the largest destruction of habitats in Germany! Another problem regarding the connectivity of the Green Belt is the crossing of roads. Further problems are industrial parks (120 ha) in and beside the Green Belt and the reforestation with non-indigenous species.

2. Green Belt Europe – from a vision to the implementation

The German Green Belt initiative is the origin of the fantastic vision of the European Green Belt. Similar to Germany there was a "forbidden zone" in other countries along the barrier where no activities were allowed. Originating from the Green Belt Germany the vision of a Green Belt through Europe developed. A Green Belt from the Barents Sea to the Black Sea can become a backbone of an ecological network and a global symbol for trans-boundary co-operation in nature conservation and sustainable development. Moreover, this Green Belt should connect people and become a symbol showing that the enlarged European Union has not only a cultural but also a natural heritage.Today a huge number of associations, groups and authorities in 23 countries, from the Barents to the Black Sea, are working on this fascinating idea. IUCN (World Conservation Union) has taken over the over-all coordination, the three main regions Fennoscandia, Central Europe and South-Eastern Europe are attended by Regional Coordinators: The Baltic Fund for Nature in Northwest Russia, BUND and Euronatur.



Route of the Green Belt Europe with the regions managed by Regional Coordinators. Picture: BUND.

The implementation of the Green Belt Europe as one of the largest European and trans-boundary ecological networks is one of the main challenges of European nature conservation in the next decades. The existing nature reserves and pristine landscapes should be conserved as core areas and the landscapes next to and between these areas must be developed as stepping stones for species. In this way, the European Green Belt contributes to the implementation of the Convention on Biological Diversity (CBD) and Natura 2000 (EU Habitats Directive 92/43/EWG). Furthermore the EU and state governments are asked to initiate and support further trans-boundary projects and activities resp. to create special financial support programmes for the Green Belt regions. In cooperation with several partners BUND initiated and conducted already European projects, like the Interreg IVB-Project Baltic Green Belt for the Baltic Sea region. They are an important basis for next trans-boundary projects.

3. The Baltic Green Belt project

The project European Green Belt is a big challenge. It should fulfill the functions of an ecological corridor and thus, contribute to the conservation of biodiversity. However, it should also increase people's connection to their natural surrounding and increase the opportunities for socio-economic development that is beneficial to local communities and biodiversity as well.

But there was still a missing link. Along the southern and eastern Baltic coast regional Green Belt activities were still relatively scarce, if at allexistent. Similar to the continental European Green Belt for decades, many coastal strips along the former socialist countries were completely or partly closed to public access. Not only did these strips demark national borders, but even constituted a barrier seperating two systems. Similar to the terrestrial border strips, these areas preserved vast, almost pristine stretches of coastland. Some of them were successfully designated as nature reserves or national parks after the collapse of the Soviet Union. However, the Baltic and its coast line has many pearls of nature to offer up to now that grace the water line both above and below the water surface, largely undiscovered, unrecognised and unprotected. Sea weed forests and sea gras meadows, bogs and beach walls, lagoons, bays and many other submarine and terrestrial paradises are typical of the Green Belt along the Baltic.

A group of voluntiers from BUND mainly working for a healthier Baltic Sea and a sustainable devolopment at the coast had the idea of a Green – "Blue" – Belt along the Baltic Sea Coast.

A sailing trip was organised and carried out in 2007. With this first step the awareness was raised and stakeholders were informed about values along the coast and the threats to this treasure of nature.

After the trip it was clear that the project has to go on and in 2008 the application for the Baltic Green Belt project, evolved together with the University of Kiel in Germany, was submitted.

Successfully, because in the late 2008 it was adopted and in 2009, the year of the 20th anniversary of the the Green Belt, the new Baltic Green Belt project started officially. It runs until January 2012 and has an overall budget of 2,45 Mio Euro.

The Baltic Green Belt project, partfinanced by the Baltic Sea Region Programme of the European Union, brings together diverse partners engaged in sustainable economy and ecology development from 6 countries at the southeasterly coast of the Baltic Sea.

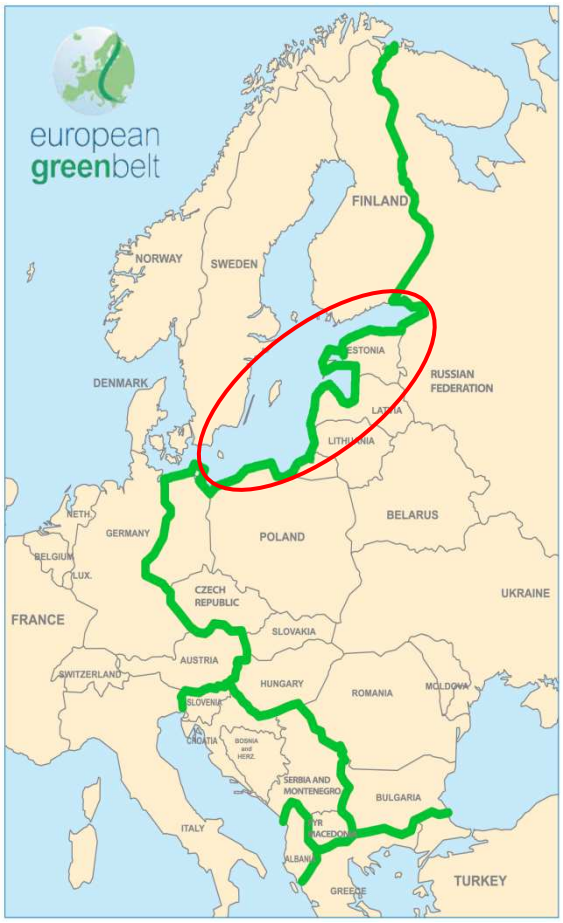
The partnership with the University of Kiel as lead partner consists altogether of 13 partners and 9 associated partners from Germany, Poland, Lithuania, Latvia, Estonia and Russia. The partners are from NGOs, scientific institutions, public authorities and economic stakeholders and thus excellently mirror the Green Belt approach of successfully integrating a wide set of actors and supporters. The activities of the Baltic Green Belt project focus on improving the ecological situation of the coastal strip on both sides of the waterline, while promoting

social and economical aspects of sustainability to secure economic prosperity. So coastal protection and coastal nature protection is one field of work. Pilot projects to further sustainable and environmentally friendly tourism by the integration of the military heritage into tourism concepts is is carried out by Lauku Celotajs, Latvia. Thus, the Baltic Green Belt project will also contribute to the implementation of the HELCOM Baltic Sea Action Plan towards a healthier Baltic Sea Basin that gets less nutrient load done by the polish partner the Green Federation Gaja, as well as the HELCOM Recommendation 15/1 “Protection of Coastal Strips” and the EU Recommendation “Implementation of integrated coastal zone management in Europe”.

A significant part of the project work is dedicated to dissemination and related activities.

Literature:

1. Bundesamt für Naturschutz; BfN (ed.) (2004): Daten zur Natur 2004, Federal Agency for Nature Conservation, Germany, Bonn, 474 p.
2. Engels, B.; Heidrich, A.; Nauber, J.; Riecken, U: Schmauder, H.; Ullrich, K. (Eds.) (2004): “Perspectives of the Green Belt” – Chances for an Ecological Network from the Barents Sea to the Adriatic?; German Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN), BfN-Skripte 102, Bonn, 95 p.
3. Frobel, Kai; Riecken, Uwe u. Ullrich, Karin (2009): Das „Grüne Band“ - das Naturschutzprojekt Deutsche Einheit. Natur und Landschaft 84 (9/10): 399-403
4. Lang, Alois; Geidezis, Liana; Schneider-Jacoby, Martin u. Strauss, Andrea (2009): Das Grüne Band Europa: Gemeinsames Naturerbe als Basis für eine neue regionale Identität. Natur und Landschaft 84 (9/10): 404-408
5. Schlumprecht, H.; Ludwig, F.; Geidezis, L.; Frobel, K. (2002): E+E-Vorhaben “Bestandsaufnahme Grünes Band” – Naturschutzfachliche Bedeutung des längsten Biotopverbundsystems Deutschlands; in: Natur und Landschaft, Heft 9/10 2002, pp 407 – 414
6. Terry A., Ullrich K. , Riecken U. (2006): The Green Belt of Europe: From Vision to Reality. IUCN, Gland, Switzerland and Cambridge, UK, 214 p.



Baltic Green Belt project in Poland, or how sustainable agriculture can contribute to improving the condition of the Baltic Sea environment

Jakub Skorupski
Federacja Zielonych GAJA
jakub@gajanet.pl

„Baltic Green Belt" project (www.balticgreenbelt.uni-kiel.de, www.balticgreenbelt.org.pl) covers all countries of the Baltic Sea region. The aim of the action taken in the project is to improve the ecological conditions of coastal areas, including the promotion of social and economic aspects of sustainable development of coastal areas, as guarantor of the dynamic economic growth. The project is to contribute to the implementation of HELCOM's "Baltic Sea Action Plan", and the period of its implementation covers time span from 2009 to 2012.

Lead partner of the project is Christian-Albrechts-Universität Kiel (Germany), while other national partners are: Green Federation GAIA (Poland), BUND Landesverband Schleswig-Holstein (Germany), BUND Landesverband Mecklenburg Vorpommern (Germany), EKOLOGINIS klubas "Zvejone (Lithuania) Klaipedos universitetas, Baltijos Pajurio aplinkos tyrimų ir planavimo (Lithuania), Sliteres Nacionala pair administracija (Latvia), the Rural Turism Asociacija "Lauku celotajs" (Latvia), Eesti Looduskaitse Selts (Estonia), Mittetulundusühning Läänerannik (Estonia), Eesti Maaülikool (Estonia), IUCN - International Union for Conservation of Nature and Coallition Clean Baltic (CCB).

The main objectives of the project "Baltic Green Belt" are:

- to protect the natural environment of the Baltic Sea as a Particularly Sensitive Sea Area (PSSA), by countering eutrophication and implementing the vision of Helsinki Committee (HELCOM),
- to establish a functional platform for environmental conservation and promoting sustainable development in the Baltic Sea basin and the protection of its resources.

The Polish part of the project consists of two sections – agricultural advisory services geared to sustainable development in rural areas and monitoring of the functioning of large-scale livestock farms, for compliance with environmental regulations and the possibility of reducing their negative impact on local communities and the natural environment (the title of the Polish component is: "Promoting sustainable agriculture and monitoring of large-scale livestock production in the context of the reduction of eutrophication in the Baltic Sea and as a tool for environmental protection and nature conservation in rural areas").

Specific project activities include consultation on sustainable development in rural areas (sustainable agriculture, conservation of meadows, birds and conservation of natural habitats, protection of endangered breeds of livestock and crop varieties, soil and water conservation, buffer zones and mid-field bounds, organic farming and agricultural activities on NATURA 2000, the principles of management in areas particularly vulnerable to pollution by nitrogen compounds from agricultural sources, the cross-compliance instrument) developing and maintaining an Advisory Internet Point for farmers, media activities in the field of sustainable agriculture, a mapping of environmental and social conflicts related to large-scale livestock production in Poland, the promotion of free access to information on large-scale livestock farms as a public information on facilities that are required to obtain an integrated permit, and monitoring of official databases of these installations (web-based database of the Ministry of Environment, the European Pollutant Release and Transfer Register (E-PRTR), developing and maintaining an online database of Polish large-scale livestock farms, promoting ways to minimize and / or eliminate the negative impact of large-scale animal production, participation on the rights of side in administrative proceedings relating to the integrated licensing and social monitoring of control mechanisms in large-scale livestock sector.

Project activities are focused in the coastal voivodships – Western Pomerania, Pomerania and Warmia and Masuria. The source of its funding is the Baltic Sea Region INTERREG III B - "The Baltic Sea Region Programme 2007-2013, the Regional Fund for Environmental Protection and Water Management in Szczecin and Green Federation GAIA own resources.

Very important to the project "Baltic Green Belt" in Poland is the support of Western Pomeranian Voivodship Office in Szczecin (www.szczecin.uw.gov.pl).

The project is part of a pan-European initiative "European Green Belt" (www.europeangreenbelt.org).

Intensive animal farming causes a number of hazards, not only for the immediate vicinity of farms, but the whole Baltic Sea catchment area. This negative impact concerns all components of the environment: air, soil and water (surface water, subsoil water, rainwater). The negative effects of large-scale farming also have serious social, economic, legislative and legal connotations.

Pig population in Poland is 13.3 million animals (March 2009), and poultry – 124.3 million (December 2008). The number of operating large-scale farms is estimated at 650, including 126 pig farms and 524 poultry farms. At the same time, according to the data of the Agricultural Advisory Center in Brwinow, the number of ecological farms rearing pigs in Poland is only 57, while in Denmark there are around 364 such holdings.

Particularly onerous are the major source of pollution – large commercial rearing farms (large-scale farms, IPPC installations), defined as installations required to obtain an integrated permit, with places for over 2 000 pigs weighing more than 30kg and/or 750 sows, as well as 40 000 heads of poultry (EU Council Directive 96/61/EC on Integrated Pollution Prevention and Control/IPPC Directive). In 2008, the Helsinki Committee (HELCOM) recognized large-scale farms as a point sources of agricultural pollution (Baltic Hot Spots). Being considered for industrial farms were also cattle farms with cast corresponding to 400 AU (Animal Units). Nowadays the need for extending the definition of industry farms to installations for the intensive rearing of sheep, goats, horses and fur animals, generating equally large threat to the environment as the IPPC farms arises.

The most negative, from the environmental point of view, in these farms is rearing without bedding, generating vast amounts of manure. Liquid manure is a natural animal fertilizer, which constitutes a mixture of feces, urine and water. It is highly concentrated fertilizer, with high level of mineralization and also containing microbiological pollution, which can lead to serious environmental risks in its raw form, mainly in the stages of storage, management and utilization.

For comparison, the dung is less concentrated animal fertilizer, produced on farms with bedding. Dung contains a much more solid organic matter, its temperature is much higher than in liquid manure (less favorable conditions for the development of pathogenic microorganisms) and as such is considered to be more environmentally friendly.

Therefore, the negative impact of large-scale farms depends on the farms' cast, the technology of farming and related way of handling manure, produced during the production cycle.

Intensive farming of animals is governed by the rules and guidelines of about 15 national, EU and international legal acts and reference documents (including the IPPC Directive, the Law on Fertilizers and Fertilization, Nitrates Directive, the Law on Environmental Protection Law, Water Law Act, the Helsinki Convention, the Code of Good Agricultural Practice, Agenda 21 for the Baltic Sea region, the reference document (BREF) on best available techniques (BAT) in the intensive rearing of poultry and pigs). These provisions are not universally respected, as evidenced by control results of the Polish Supreme Chamber of Control. In the Information of the results of supervision of large-scale pig farms carried out in the years 2006 – 2007, one can read that: The Supreme Chamber of Control is critical regarding the government administration in developing and implementing the state policy towards large-scale pig farming. Similarly, a surveillance system for the government administration was reviewed in this regard.

Problems connected with operating of industrial livestock production can be divided into three groups: environmental problems (water pollution and overfertilization, eutrophication, microbiological contamination, indirect and secondary effects on the formation of acid rain and increase of the greenhouse effect), socio-economic problems (offensive odour, loss of recreation places, high cost of drinking water treatment, degradation of agricultural land, the location of farms in the immediate vicinity of Natura 2000 sites and the Nitrate Vulnerable Zones), legislative and legal issues (incorrect fertilization plans, lack of implementation of the Helsinki Convention, differences in the definition of installation, lack of free access to information about the environment and its protection, lack of an "odour regulations", ineffective monitoring of large-scale farms, disregarding the voice of local communities in the permitting process and the location of the farms).

Due to the scale and intensification of production, as well as size of cast on large-scale farms, it significant impact of these installations on the environment and local communities is very obvious. The general opinion, supported by shameful practice, unfortunately, is that large-scale livestock production may not be environmentally friendly. However, it is possible to implement a number of specific ways to counteract the negative effects of industrial fattening, thereby making it not only environmentally friendly, as neutral towards it.

Among these methods should be mentioned practices indicated on several occasions by the recommendations of the Green Federation GAIA, Coalition Clean Baltic, the Helsinki Commission (HELCOM), as well as in the Baltic Sea Action Plan, or audit findings and recommendations of the Polish Supreme Chamber of Control:

- identifying particularly arduous industrial farms as a point sources of agricultural pollution (HELCOM Hot Spots),
- detailed inspection on meeting legal standards (both in terms of fulfilling the obligation to obtain an integrated permit, as well as meeting the conditions contained therein and compliance of installation with applicable regulations for the protection of the environment),
- increasing the participation of local authorities in monitoring and enforcement of the Polish Environmental Protection Act,
- publication of information on installations that need to obtain an integrated permit (update and expansion of an official national databases and the European Pollutant Release and Transfer Register/E-PRTR),
- promotion and increase in numbers of the organic farms rearing swine, cattle and poultry,
- the use of biotechnology for liquid manure treatment (reduction of odours, biological disinfection and sanitarisation, mineralization of organic matter, biogas production, purification of biological sewage in local treatment plants – controlled fermentation, the use of effective microorganisms),
- establishing a well-designed and effective regulation of air quality,
- full implementation of ratified Helsinki Convention,
- increasing importance of the Code of Good Agricultural Practices and Best Available Techniques on Intensive Rearing Of Poultry and Pigs (BAT) and studies of Agenda 21 in the large-scale livestock production,
- the use of a balanced and low-processed feed for farm animals, preventing expulsion of excessive amounts of nitrogen and phosphorus,
- increase in participation of local communities in administrative proceedings relating to the establishment of new farms (for example, by keeping the current standards of public consultation, to facilitate public access to information and its protection, promotion practices related to the idea of citizen-friendly offices),
- a more restrictive approach to farms operating within or near protected areas, including prevention of establishing of new farms in these areas,
- review of existing on Polish territory areas particularly vulnerable to pollution from nitrogen compounds from agricultural sources (NVZ), including the appointment of new NVZs, which corresponds to real needs and to conditions set out in the Nitrates Directive.

All of these practices overthrow large-scale livestock closer to the model of sustainable agriculture, which relies on the use of environmentally friendly methods, enabling the reduction of the negative impact of agriculture on the environment through the introduction of integrated pest management and fertilization plan, based on nitrogen balance. After all, it still remains a current question: whether industrial animal farms can be reconciled with sustainable agriculture?

Axis RDP (Rural Development Programme) 2007-2013 and organic farming in Poland

Ewa Szymborska
Ministry of Agriculture and Rural Development
Ewa.Szymborska@minrol.gov.pl

Rural Development Programme 2007-2013 (RDP 2007-2013) [1] is divided into four axes:

- Axis 1 Improving the competitiveness of agriculture and forestry,

- Axis 2 Improving the environment and rural

- Axis 3 Quality of life in rural areas and diversification of the rural economy,

- AXIS 4 LEADER.

Under Axis 2, the so-called. Environmental there are four action.

1. Action 211, 212: Supporting the management of mountain areas and other areas with handicaps (LFA)

The action is intended to prevent the depopulation of rural areas, classified as mountain and other less-favored and losing their agricultural character and thus to the consequences of social, economic and environmental. LFA payments are compensated for costs incurred and income lost as a result of farming in these areas. The objectives are to ensure the continuity of agricultural land use and thereby maintain the vitality of rural areas, the preservation of rural landscapes as well as maintain a balanced manner taking into account the management of environmental aspects. Financial support under this measure applies to farms located in areas where agricultural production is hampered due to unfavorable natural conditions. Payments to farms located in mountain areas and other areas with handicaps are designed to compensate for the existing difficulties in relation to farms outside the LFA.

The delimitation of mountain areas and other areas favored distinguished mountainous areas, lowland areas where there are constraints to agricultural productivity associated with poor quality soils, adverse weather, adverse water conditions, inclement relief and an indicator for a substantial share of demographic and population related agriculture and areas with specific natural handicaps (mountainous regions).

2. Action 214th Agri-environment Program (Agri-environment payments)

The program aims to improve the natural environment and rural areas in particular:

1) rehabilitate or restore the state to maintain valuable habitats used for agriculture and the preservation of biodiversity in rural areas;
2) promoting sustainable management system;
3) appropriate use of soil and water protection;
4) the protection of livestock breeds and local varieties of crops.

Within each package, there are options for agri-environment, which contain sets of tasks beyond the current basic requirements, and which do not overlap with other instruments of the Common Agricultural Policy (CAP).

Basic requirements denotes mandatory standards, which must be followed in carrying out agricultural activities, in particular, are associated with environmental protection. Basic requirements for agri-environmental program include (in accordance with Article. Paragraph 39. 3 of Council Regulation (EC) No 1698/2005 [2]):

minimum standards (Article 5 of Council Regulation (EC) No 1782/2003), the basic requirements for management (SMR), the minimum requirements for the application of manure and mineral fertilizers, and the requirements of national legislation concerning the maintenance of cleanliness and order on the farm and the protection of habitats.

Agricultural environmental program under RDP 2007-2013 was launched on 1 March 2008, the program consists of nine packages, divided into 49 variants, each of which contains a specific set of tasks, projects aimed at environmental objectives of the program.

The agri-environmental program achieved the following packages are agri-environment:

Package 1st Sustainable forming

Package 2nd Organic farming

Package 3th Extensive permanent grassland

Package 4th Protection of valuable natural habitats outside Natura 2000 sites

Package 5th Protection of valuable natural habitats in Natura

Package 6th Conservation of endangered plant genetic resources in agriculture

Package 7th Preservation of local breeds of livestock

Package 8th Soil and water protection

Package 9th Buffer Jones

Natural Action Programme is the fourth package Protection of endangered species and habitats outside Natura 2000 and the package. 5th Protection of endangered species and habitats in Natura 2000 sites because of their specificity have been implemented since 2009

In 2010 was the third call for proposals. According to information on 04 June 2010, 076 applications submitted in 1936 and 27,664 follow-up of new applications which means that as at 04.06.2010, the program implements agri environmental 63 740 farmers, mainly in the region of Lublin (7 468) and Mazowieckie (6 258) and Wielkopolskie (5 525). The least interested in the implementation of the program is in the Śląsk region (786) and Opole (1 186).

The greatest interest is the third package Extensive permanent grassland - it does 34 665 farmers, mainly in the region of Lublin (4 461) and Mazowieckie (3 777), Podkarpackie (3 516) and Podlaskie (3 448). It is least popular in the province of Opole (251) and Śląskie (378). The second most popular package is a package eighth Protection of soil and water - it does 28 745 farmers, mostly in the voivodship of Lublin (4 814) and Wielkopolskie (3 497). The least of farmers interested in soil and water conservation under agri-environmental program is in the Silesian region (321) and Lubuskie (469).

Package 9th Buffer zone is only 126 concerned farmers mainly in the Silesian region (22) and Lubuskie (22). In the western provinces of Opole and no one realizes this package. As for the packages is a natural agri-environmental program, these products are still moderate interest - the 4th package 1 584 farmers implement a fifth package - 1 939th Package 4th is implemented primarily in the Podkarpackie Province (208) and Pomeranian (204) and Lublin (202) and fifth Package - In Podlaskie (255) and Podkarpackie (231). The least popular among those packages within the province (Package 4 - 12, Package 5 - 9), and Kujawsko-Pomorskie (Package 4 - 24, Package 5 - 26).

3. Action 221, 223: Afforestation of agricultural land and afforestation of non agricultural

This action can be performed on:

1) agricultural land on which arable land or orchards (CHART I - Afforestation of agricultural land)
2) non-agricultural land, which must be understood as shown in the land register of land as agricultural land or land covered with trees and shrubs on agricultural land not used for agricultural production, (CHART II - Afforestation of non-agricultural). In Scheme II, assistance may be granted to the natural succession of land for a minimum of 10% of the area of land for afforestation or land set aside for forestation as indicated in the plan as a land that requires protection due to their functions or glebochronne waterproofing.

How important is the implementation of environmental action? Forests contribute to the prevention and mitigation of climate change. Forest ecosystems significantly reduce the problem of soil erosion. Afforestation of degraded land to protect particularly vulnerable to erosion, exhaustion and absorption of pollutants. It prevents the formation of floods, avalanches and land slide. Forests are losing very little rain water through surface runoff, keeping them in Geo complexs, filtering and purifying.

Playback of the forest are important especially in areas of low suitability for agriculture, they shape the structure of the rural landscape.

Enhance the ecological functions of forests in rural areas through the restoration of old and new animal migration routes and ecological corridors. Thanks to afforestation leads to strengthen and protect valuable natural areas. In preparing plans for afforestation should be ignored in these areas, which for reasons of natural landscape and should not be afforested (Natura 2000, TUZ, parcels, subject to multiannual commitments for payments under environmental programs, LFA, tree plantations and rapidly growing trees, which production cycle does not exceed 15 years.

Financial assistance under the action consists of such elements as:

1. Support for afforestation (wz) - Forest planting and the purchase and installation of fencing the wire
2. The premium care (pp) - Treatment of established plantation in the first five years after planting and the use of individual tree protection against game (repellents, pickets or sheep wool),
3. The premium forestation (pz) - compensation for the exclusion of land from agricultural crops.

4. Action 226: Playing forestry production potential damaged by disasters and introducing prevention instruments

The main objectives are: restoration and maintenance of damaged stands, the introduction of mechanisms to prevent natural disasters, protection of endangered forest fire preventive as well as access to forest areas to fulfill a social function, by building and upgrading of tourism and forestry education.

Organic farming in Poland

One of the packages of the 214th Agri Environmental Program is sekond pakage - Organic forming, which consists of 12 variants:

version 2.1. and 2.2. Agricultural crops (with a certificate of conformity and during the switch)

version 2.3. and 2.4. Permanent grassland (with a certificate of compliance and the period of the conversion)

version 2.5. and 2.6. Cultivation of vegetables (with a certificate of conformity and during the conversion)

version 2.7. and 2.8. Cultivation of herbal plants (with a certificate of compliance and the period of the conversion)

version 2.9. and 2.10. Growing fruit (with a certificate of conformity and during the conversion)

version 2.11. and 2.12. Other fruit crops (with a certificate of compliance and the period of the conversion).

Organic farms, which have entered the environment in the principles of farming, long remained at marginal (0.03% agricultural area). The introduction of financial aid in 1999 and legislation in 2002 created the conditions for rapid growth. In the period 1999-2001 there was a threefold increase in their number. In 1998, there were 410 certified organic farms in 2002, more than two thousand. an area of 44 thousand. ha. In the period from 2003 to 2009, there have been approximately 8-fold increase of the number of households in 2286 to 17 478 and increasing the agricultural area of 61 236 hectare in 2003. 395 828 ha in 2009.

Organic farming is supported under both the S02 package Organic farming under RDP 2004-2006 and the second package Organic farming under the RDP 2007-2013. Agri-environmental commitment is undertaken voluntarily by the farmer for five years. Recent proposals in the framework of the RDP 2004-2006 S02 package was adopted in 2007, and the operation of these undertakings will continue until 2012. The largest number of submitted applications in 2010, agri-environment measures under RDP RDP 2007-2013 and 2004-2006, according to the data as at 04.06.2010 ARMA, is registered in the region (2390), Lesser (2136), Podkarpackie (2076), Podlaskie (2031), Lublin (1875) and Mazowieckie (1600). In total, the package of agri-environmental commitments in organic farming in 2010, taking the RDP RDP 2004-2006 and 2007-2013 - 20 632 farmers.

Organic agriculture has been regulated by law in 2001, the Law on organic farming. Currently valid Act on Organic Agriculture in 2009 [3]. It defines the institutional principles of organic farming system in Poland, a system of inspection and certification of production. Inspection and certification system is based on the private certification bodies, accredited according to PN / EN 45011 and supervised by the Inspection of Commercial Quality of Agricultural and Food. The principles of organic production and labeling of organic products in Poland are governed by Council Regulation No 834/2007 [4].

The purpose of the second package Organic farming is to promote sustainable rural development. It includes the holding of switching to the production of organically grown and organic farms have a valid certificate issued by an approved certification body, in accordance with the rules of organic farming.

Literature:

1. Program Rozwoju Obszarów Wiejskich na lata 2007-2013 Monitor Polski Dz. Urz. Rz. P. Zał. do nr 94, poz. 1035 z dnia 17 grudnia 2007 r.
2. Rozporządzenie Rady (WE) nr 1698/2005 z dnia 20 września 2005 r. w sprawie wsparcia rozwoju obszarów wiejskich przez Europejski Fundusz Rolny na rzecz Rozwoju Obszarów Wiejskich (EFRROW) (Dz. Urz. UE L 277/1 z 21.10.2005 r.)
3. Ustawa z dnia 25 czerwca 2009 r. o rolnictwie ekologicznym (Dz. U. Nr 116, poz. 975)
4. Rozporządzeniem Rady (WE) nr 834/2007 z dnia 28 czerwca 2007 r. w sprawie produkcji ekologicznej i znakowania produktów ekologicznych (Dz. U. UE L. 189 z 20.07.2007 r, s.1),
5. Rozporządzenie Ministra Rolnictwa i Rozwoju Wsi z dnia 26 lutego 2009 r. w sprawie szczegółowych warunków i trybu przyznawania pomocy finansowej w ramach działania „Program rolnośrodowiskowy" objętego Programem Rozwoju Obszarów Wiejskich na lata 2007—2013 (Dz. U. Nr 33 poz. 262 z późn. zm.).

Nitrate Directive and fertilization plans and question of fertilization and eutrophication

Marek Kryda
Fundacja Pomarańczowa Alternatywa
mkryda@wp.pl

Baltic is a see of high eutrophication. The biggest source of nitrates and phosphorus are the rivers, Polish rivers are bringing 25 up to 50% of all nitrates and Phosphorus reaching Baltic Sea. Roughly 60% of all Nitrogen and 40% of all Phosphorus delivered to this sea by Poland originate from factory farms.

This date shows that environmental situation of Poland is a major factor in Baltic Sea eutrophication. We should remember that Baltic is receiving water from an area of 1.7 million of square kilometers, where lives 80 million people. 99% of Polish territory with 40 million people is in the drainage basin of this sea covering 311 thousand kilometers. Polish population consist 50% of the whole population of the Baltic Sea drainage basin.

Polish hydrological situation has special importance because 90% of water deliveries to Baltic Sea are going through just two rivers: Vistula and Oder, the rest flows through smaller rivers in the Pomerania Region.

Average loads of Nitrogen reaching Baltic from Poland are around 100 – 250 thousand tones a year (Polish Environmental Inspection, 2003). Taking into account that 60% of it originate in the agriculture and at the same time Poland has 13 million hectares of under agricultural cultivation it is justified to say that average delivery of Nitrogen from Poland is 5 – 12 kg of Nitrogen from each hectare a year.

Very intensive use of liquid manure creates huge problems for the Environment not only because of eutrophication, but also because of lowering the quality of the ground water, in some water sources causing a toxic level of Nitrates. The scale of this impact depends on the local climate conditions, structure of the soil and agricultural conditions.

Excessive Nitrogen is a source of other environmental problems:

- global warming
- ozone layer depletion
- acidification of rivers and lakes, caused mainly by acidification of the soil

The Nitrates Directive (91/676/EEC) – Council Directive of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources - has the objective of reducing water pollution caused or induced by nitrates from agricultural sources.

The European Nitrates Directive requires Nitrates Vulnerable Zones(NVZ) to be designated and for farmers with land in NVZs to follow mandatory rules to tackle nitrate loss from agriculture.

Nitrates Directive was implemented because the European Commission came to conclusion that:

- intensive farming is the main source of contamination of waters
- this kind of contamination in one member country is affecting other member countries, so action on community level is necessary.

In EC view all member countries should implement the measures described in the Directive. They are also required to implement other measures to achieve the goals of this legal act – limiting the contamination of water by nitrates from agricultural sources. The measures shouldn't be limited only to NVZ (Tab. 1), but also covers the whole territory of the country.

These zones are called in accordance to the Directive "NVZ" or according to Polish Water Law of 18th of July 2001 "OSN".

When Poland became a member of the EU in May 2004, designed only 21 NVZ in six regions of the country. They were designed basing on the results of water monitoring in the years 1990-2002 and they cover an area of 6263 square kilometers, which is only 2% of Polish territory. According to Dutch research sponsored by European Commission the designation of NVZ in Poland should much more reflect enormous eutrophication of Baltic Sea and major role of intensive animal production in the input of Nitrogen and Phosphorus to this body of water. Current actions including NVZ designation in Poland are not fulfilling this requirement. (The research of Wageningen University & Research Centre, Netherlands, Contract EC 2006/441164/MAR/B, the Implementation of the Nitrates Directive)

Tab. 1 In the period of May 2008 – April 2012 19 NVZ are existing:

Regional Water Management		Area of NVZ			
		May 2004 - April 2008		May 2008 - April 2012	
Region	Total area in sq. km	Sq. km	% of Poland's Territory	Sq. km	% of Poland's Territory
Gdańsk	33100	721,00	2,18	613,23	1,87
Gliwice	8390	317,14	3,78	0,00	0,00
Kraków	43767	0,00	0,00	0,00	0,00
Poznań	55098	728,70	1,32	911,05	1,65
Szczecin	20402	1098,70	5,38	925,42	4,53
Warszawa	111160	575,50	0,50	573,24	0,50
Wrocław	39212	2823,31	7,20	1600,20	4,08
Poland	311129	6264,35	2,00	4623,14	1,49

Source: National Council of Water Management

The Dutch experts in this Report are pointing out that:

"There are arguments to suggest to designating the whole territory of Poland under one Action Program of the EU Nitrates Directive. These arguments include the dominance and vulnerability of the sandy soils, the omnipresence of (sensitive) lakes and streams and the large areas of wet soils, the relatively large contribution of livestock manure to N leaching losses and its diffuse distribution in the country, the omnipresence of irrigation, and the increasing use of fertilizer N and Polish role in the eutrophication of the Baltic Sea. Important aspects in such an Action Program would be improving manure storage and management. When doing so, the priority should be given to the larger (livestock) farms."

Problems with implementation of the Helsinki Convention in Poland

Zbigniew Bukowski, PhD
Univeristy of Kazimierza Wielki in Bydgoszcz
zbigniew.bukowski@ukw.edu.pl

1. Legal regulations pertaining to storage and utilization of livestock manure (a liquid manure and a dung)

The register of international law enactments:
Convention on the Protection of the Marine Environment of the Baltic Sea Area delivered in Helsinki on 9th April 1992 (the Helsinki Convention)

The register of the European Union law enactments:
Regulation (EC) No 2003/2003 of the European Parliament and of the Council of 13 October 2003 relating to fertilizers (OJ L 304/1; 21.11.2003).
Regulation No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption (OJ L 273, 10.10.2002, p.1.; OJ L Special edition in Polish: Chapter 3, Volume 37, page 92).
Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (previous version: Council Directive 96/61/EC of 24.09.1996 concerning integrated pollution prevention and control (IPPC Directive).
Council Directive 91/676/ of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrates Directive).

The register of national law enactments:

- ***The act*** concerning ***fertilizers*** and fertilization dated ***10.07.2007.***
- ***The Environment Protection Act of 27.04.2001.***
- ***The Water Law Act of 18.07.2001.***
- ***The Waste Products Act of 27.04.2001.***
- Ministry of the Environment Ordinance dated 26.07.2002 on the types of installations that cause considerable pollution of particular elements of nature and environment as a whole (Journal of Laws, 2.122.1055).
- Ministry of the Environment Ordinance dated 23.12.2002 on determining waters sensitive to nitrogen contamination from agricultural sources (Journal of Laws 2002. No 241, it. 2093).
- Ministry of the Environment Ordinance dated 23.12.2002 on detailed requirements for limiting nitrogen run-off from agricultural sources oriented programmes (Journal of Laws 2003. No 4, it. 44).

Other studies and recommendations include:

- Code of Good Agricultural Practice (The ***Ministry of Agriculture and Rural*** Development, The Ministry of Environment, Warsaw 2004);
- An Agenda 21 for the Baltic Sea Region (agriculture sector);
- Reference document (BREF) on Best Available Techniques (BAT) for Intensive Rearing of Poultry and Pigs (Integrated Prevention and Pollution Control. Reference Document- Best Available Techniques for Intensive Rearing of Poultry and Pigs. The European Commision. July 2003);

(The acts are not legally binding and they do not constitute, except the BREF, a direct base of duties within Poland).

2a) Problem of mutual relation between the Helsinki Convention and Polish enactments (notably the act on fertilizers and fertilizing)

International covenant is a main source of an international law. Country which binds with such covenant contracts two obligations: country's rules application in internal, international relations and implementation of the law within the country[1].

Problems connected with international covenants were under the common law through ages. This regulation was codified in Vienna Convention on the Law of Treaties signed at Vienna 23 May 1969 (OJL 1990, No 74, it. 439).

Within the meaning of it 'treaty' means an international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation is.

Basic regulations in international covenants in Polish law are embodied in the Constitution of 2 April 1997[2]. The most general rule of binding the Republic of Poland with the international law is contained in chapter I which regulates general rules of government. It affects not only the covenants but also the aggregate of international law sources. In turn the rules and the procedures of agreement drawing , their ratification, approval, proclamation, execution, disaffirming and changes in enuring of the covenants was determined in the act of 14 April on international covenants.[3]

Ratification of the covenant and its proclamation in the Journal of Laws of the Republic of Poland is required to take direct effects in Polish law. Ratification is the approval of the covenant by the respective competent organ. In Poland the ratification is within the competence of the President of the Republic of Poland, who is a representative of the country in external relations. More over the ratification act requires a countersignature of the Prime Minister. Nonetheless in case of some covenants it is essential to obtain foregoing approval of the Sejm (lower house of the Polish parliament) expressed in the statute form. It pertains to covenants related with:

1) peace, alliances, political pacts and military pacts,
2) freedom, rights and obligations specified in the Constitution,
3) membership of the Republic of Poland in the international organization,
4) significant financial encumbrance of the country,
5) problems regulated by the statute or for which the Constitution requires the statute.

It means that all international covenants of interest which deal with protection of the environment need to be accepted by the legislative body before they are ratified by the President. In an international practice ratification is not required for:

1) political declarations adopted in meetings of the heads of states or heads of governments,
2) resort covenants drawn by individual ministries and other central offices,
3) covenants drawn during war by military commanders[4].

International covenant ratified by permission which is expressed in the statute takes priority over the statute, if the statute cannot be reconciled with the covenant. It has been established that the legislator setting his seal to the ratification accepted primacy of the international covenant. Considering other covenants in internal relations priority are taken by the statute.

International covenants in the context of the internal relations are in force after their ratification according to the rule “pacta sunt servanda”. The countries are bound with the contract and are obligated to execute it in good faith. It is one of the most important rule of the international law. Article 26 of the Vienna Convention on the Law of Treaties (the ”Vienna Convention”) specifically provides that “every treaty in force is binding upon a parties to it and must be performed by them in good faith”.

In internal Polish law it is required to proclaim the ratified covenant in the Journal of Laws of the Republic of Poland. It allows to announce the subject-matter to the potential consignees. It becomes a part of the national legal order. In this way the transformation of norms to the covenant of internal law follows. Other covenants are proclaimed in the Journal of Laws of the Republic of Poland “Monitor Polski”.

In the context of the Helsinki Convention the question of its change in annexes is the required problem to explain. The original text of the convention has been published in the Journal of Laws of the Republic of Poland so it is an act which is directly in force in Poland and which is superior to other statutes. However, regulations which interest us the most and connected with natural fertilizers have been included subsequently in annexes though they have not been published in the Journal of Laws of the Republic of Poland yet also they have not been published in the Official Journal of the European Union).

The Act of 14 April 2000 on International Agreements provides that a legally-binding of Poland with an international agreement may take place by way of signing, exchange of notes or by other legal way. This kind of binding may happen especially when:

1) the Act authorizes to enter into an international agreement in this way, and the made international agreement does not violate the rules of the authorizing statute, or

2) the international agreement has executive character over the international agreement which is in force and which does not fulfill the conditions of art. 89 act 1 or art. 90 of the Constitution of the Republic of Poland, or
3) the purpose of the international agreement is a change of the covenant which is in force, including the annex to it, and the change does not fulfill the conditionsof art. 89 act 1 or art. 90 of the Constitution of the Republic of Poland, or
4) other special circumstances require it, and the international agreement does not fulfill the conditions of art. 89 act 1 or art. 90 of the Constitution of the Republic of Poland (art.13).

As for the proclamation of such an international agreement it was assumed that ratified international covenant together with its ministerial statements and the international agreement, mentioned in art. 13, act 2, clause 1 and clause 2 and 3 is promptly proclaimed with the ministerial statements in the Journal of Laws of the Republic of Poland (art.18, act 1) as long as it comprises an executive international agreement on ratified international agreement or it changes the one. In valid cases respectively, the President of the Republic of Poland or the Prime Minister may desist from proclamation in the Journal of Laws of the Republic of Poland or in "Monitor Polski" of the annex enclosed to the international agreement, if they embody extensive regulations with specialized character, and which are nonproprietary for statute regulation and which affect smattering of objects and do not respect the citizens. In this case a ministerial announcement, proclaimed with the international agreement in the Journal of Laws of the Republic of Poland or in "Monitor Polski" contains an information about space to disclose or to publish the text of an annex (art.18 act 5). However the situation described in the previous regulation does not take place here in view of the regulations interesting for us which do not affect little account of objects and which pertain to citizen's rights. It is necessary to publish changed annexes in the Journal of Laws of the Republic of Poland. Until this moment we have dealings with the situation in which Poland is connected with them in outer relationship (in view of other countries of the Convention's sides and of the Helsinki Commission), in turn it is not in inner relationship (because of not making them known to the addressee).

2b) Problem of mutal relations between Polish regulations on animal waste

Analyzing Polish regulations which affect animal waste it is important to realize that the problem is regulated in the succession of many enactments what may cause a lot of practical problems signalized by the orderer.

The Act on fertilizers and fertilizing of 10 July 2007 has definitely fundamental meaning, which pertains to the agricultural problem of the utilization of animal wastes for production of organic fertilizers. As for the technically- constructional details of buildings for storing the wastes additional and complementary role has the edict of the Minister of Agriculture and Food Industry on technical conditions of agricultural buildings and their location of 10 July 1997 (pursuant to the Polish Construction Law).

The question of non-agricultural utilization of animal wastes according to their nature is subject to regulation by the enactment on wastes or by the Water Law.

Moreover some special requirements are connected with particular areas (like in case of areas of the programmes about limitation of nitrogen from agricultural sources) or with agri-environmental programmes.

2. The analysis of the Act on fertilizers and fertilizing of 10.07.2007

3a) Introduction

Until the year 2000 there had not been in Poland any law regulations on the fertilizer economy. The only regulation on fertilizing had been art.155 act 3 of 31.01.1980 on environmental protection and management. It was binding the organization units and natural persons who were operating on an agricultural or forestlands managing, to apply chemical and biological agents in quantities which do not disturb environmental balance, especially do not cause a harmful soil and water pollution, animals, plants and ecosystems destruction or deterioration in their life quality and their breeding. Realization of the regulation without administrative acts would be practically impossible.

First jural act which regulates the problem of fertilizer economy is the act of 26.07.2000 on fertilizers and fertilizers application (OJL No 89, it. 991). The purpose of the enactment was to introduce in Poland some legal grounds for correct functioning of rational fertilizer economy, which will let to achieve high crop productivity and their proper quality altogether with measuring up to standards of environment protection.

The range of regulations included:

1) Marketing of fertilizers,
2) Fertilizers application,
3) Prevention from danger to animals and people and environment, which may occur as a result of transport, storing and application of fertilizers,
4) Agrochemical handling of agriculture.

Currently in force enactment is the Act of 10 July 2007 on fertilizers and fertilizing (Journal of Laws No 147, pos. 1033) which from the date of 15 November 2007 abrogated the Act of 26 July 2000 on fertilizers and fertilizing. The enforcement of new act to this extent was related with demonstrating in substantiation of the new requirements set for agriculture in so far as environment protection connected with managing agricultural production and with changes in some regulations regarding water protection and with needs which are reported by different objects and affect regulation of market of resources for agricultural production.

Necessity of changes in existing in Poland enactment state was also connected with the edict enuring in the European Union nr 2003/2003 of European Parliament and Council of 13 October 2003 on fertilizers.

The enactment regulates:

1) Requisites and mode of marketing fertilizers exclusive of matters of marketing fertilizers regulated in the edict enactments,
2) Requisites and mode of marketing plant growth regulators,
3) Tasks and competences of organizational agencies and units in so far as marketing of fertilizers pursuant to prescriptions of the ordinance No 2003/2003,
4) Application of fertilizers and agents supporting plant tillage in agriculture,
5) Prevention from affecting human, animal or plant health, which may occur as a result of transport, storing and application of fertilizers,
6) Agrochemical handling of agriculture.

The regulations of the Act do not contravene of the Water Law regulations in limiting and preventing from water pollution by nitrogen compounds from agricultural sources.

Fertilizers were defined in the Act as products purposed to supply nutrient elements to plants or to improve fertility of soil or fish ponds and they are organic, inorganic and half-organic-half-inorgnic.

Organic fertilizers were defined as :

a) dung, manure, liquid manure,
b) faeces of farm animals, within the meaning of the regulations on organization breeding and reproduction of farm animals, except bee and furry animal's faeces, without addition of any other substances,
c) guano – purposed to agricultural utility.

3b) Trade of fertilizers and adjunctive agents in plant cultivation

Regulations of chapter 2 of the enactment affect the trade of fertilizers and agents of plants cultivation improvement. They allow to market only those fertilizers and adjunctive agents which being properly used are not harmful for people, animals and environment condition.

The term "market" means:

a) offering for sale, sale or any other payable or non-payable form of sale of any fertilizer or plant conditioners by:
i. manufacturer – for any fertilizer or plant conditioner, manufactured on the territory of the Republic of Poland;
ii. importer – for any fertilizer or plant conditioner, imported from third countries;
iii. manufacturer or any other entity placing a fertilizer or plant conditioner on the market on the territory of the Republic of Poland – in case of any fertilizer or plant conditioner manufactured or placed on the market on the territory of any other Member State of the European Union;
b) import on the territory of the Republic of Poland of any fertilizer or plant conditioner intended for own needs.

Fertilizers which may be marketed:

1) manufactured of mixed types of fertilizers designated as "EC Fertilizer" and the mixed fertilizers must not be marked "EC Fertilizer";
2) Meeting a standard for types of agricultural lime specified in administrative rules passed pursuant to Article 12, Clause 5, and for which contaminations do not exceed acceptable level.

3) Natural, consistent with the Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption (OJ L 273, 10.10.2002, p. 1. Regulation as last amended; OJ L Polish Special Edition Chapter 3, Volume 37 page 92, Regulation as last amended).

3c) Use of fertilizers and plant conditioners

In Chapter 3 of the act of 10 July, 2007 on fertilizers and fertilizing, problems affecting threat to health of humans or animals or to the environment as a result of using fertilizers, were regulated. Obligation of using fertilizers in a way posing no threat to health of humans or animals or to the environment was embodied in the Act. In this range regulations embodied in the Act innovated:

- The rules of formulating a fertilizing plan and use of liquid manure and cowpat by entities involved in industrial breeding or breeding of pigs and entities which are the purchasers of natural fertilizers.
- The requirements for plant cultivation on own arable lands, onto which the entities involved in industrial breeding or breeding of pigs use a liquid manure and cowpat.
- The obligation of the entities involved in industrial breeding or breeding of pigs and poultry and the purchasers of natural fertilizers to provide the commune head (mayor, city president) as well as to the Voivodeship Environmental Protection Inspector competent for the place of running a business activity with a copy of the fertilizing plan accompanied by the opinion of Regional Agrochemical Station.
- The prohibition to use fertilizers in the course of rainfalls because of noticed practices of disposing of manure during rainfalls.

Fertilizers and plant conditioners which were admitted to trading pursuant to the Article 3 of Act 1 and 2, Article 5, or the Regulation No 2003/2003, are used. The fertilizers are used in a way posing no threat to health of humans or animals or to the environment. The total amount of livestock manure applied on the holding may not exceed 170 kg of nitrogen per year/hectare of agricultural area used.

A detailed way of using fertilizers was regulated in the Regulation of the Minister of Agriculture and Rural Development of 16 April 2008 concerning detailed method of application of fertilizers, and training on their application (Journal of Laws 2008 No. 80 Pos. 479). This Regulation establishes detailed method of application of fertilizers, which should be applied evenly on the whole surface of the field so that there are excluded fields and cultivations not intended for this. Fertilizers can be applied together with plant protection agents only if it has been foreseen in the instruction of applying plant protection agents of fertilizers.

Natural and organic fertilizers in a liquid or solid form are used from 1 March to 30 November, except the fertilizers used in covered crops.

In the range of application of the natural fertilizers and organic liquid fertilizers- natural an organic fertilizers in a liquid form are used with the aid of the manure spreader, rain gun, or a gully emptier equipped in splashing tiles. In turn natural and organic fertilizers in a liquid form may be used only during plant vegetation onto grasslands and longstanding field crops not intended for direct human consumption.

Natural fertilizers are covered ore mixed with soil no later than next day after their application, except fertilizers applied in woods or grasslands.

For water protection against effects of using natural fertilizers the institution of protection area was ordained. Fertilizers may be distributed at least 20 meters away from water protection areas, banks of water basins and courses, lidos situated on surface water and marine coastline.

Liquid natural fertilizers may be applied:

- *When groundwater level is below 1.2 m,*
- *Outside the shallow occurrence of fissured rocks areas.*

Within the distance of 20 m from water protection areas, water surface and marine coastline, banks of water basins and courses, mineral fertilizers should be applied manually.

Special requirements were determined for the breeders. The entity involved in breeding or raising of poultry above 40 000 places or breeding or raising of pigs above 2000 places for pigs of a weight above 30 kg or 750 places for sows:

1) shall have a fertilizing plan prepared according to good agricultural practice principles, on the basis of chemical composition of the fertilizers and nutritional needs of plants and soils fertility, considering used waste, plant conditioners and soil conditioners in the meaning of the provisions of the Regulation No. 1774/2002, excluding these entities, which sell natural fertilizers in total;

2) uses at least 70% of liquid manure and cowpat onto owned arable lands, on which it cultivates plants, whereas the remaining 30% it may sell by means specified for natural fertilizer.
Responsibilities for purchaser were also determined. The purchaser of natural fertilizer, sold in a way specified for natural fertilizer, shall prepare within 30 days from the day of entering into the agreement a fertilizing plan meeting the requirements specified in Article 1, however not later that to the day of the first use of such natural fertilizer.
The Act introduce the responsibility of evaluating fertilizing plans. Regional Agrochemical Station, hereinafter referred to as the "regional station" shall issue an opinion on the fertilizing plan. The regional station shall collect a fee for providing an opinion. The fee, shall be the revenue of the state budget. This issue is regulated in the regulation of the Minister of Agriculture and Rural Development of 3 December 2007 on execution of certain provisions for providing an opinion on the fertilizing plan (Journal of Laws No. 233, Pos. 1716). The fee for the opinion is 6,30 PLN for each field, which is the area of arable lands not larger than 4 ha, or every cultivation of one species of crops on the area not larger than 4 ha. The fee is settled with cash or a bank transfer suggested by the Regional Agrichemical Station, where the fertilizing plan have been provided. If the fee is settled by a bank transfer the document which confirms the settle is provided directly to the Regional Agrochemical Station with the fertilizing plan.
The entity involved in breeding or raising of poultry above 40 000 places or breeding or raising of pigs above 2000 places for pigs of a weight above 30 kg or 750 places for sows and the purchaser of natural fertilizer, referred to in Paragraph 2, shall provide the commune head (mayor, city president) as well as to the Voivodeship Environmental Protection Inspector competent for the place of running a business activity with a copy of the fertilizing plan accompanied by the opinion within 14 days from the day of receiving of such opinion.
The Act includes also a prohibition for application the fertilizers. Apart from ban, specified in the Regulation No. 1774/2002 to use organic, organic and mineral fertilizers and soil conditioners and growth stimulants manufactured from animal by-products on the pastures, in the meaning of the provisions of the Regulation No. 1774/2002, other than dung or containing such products – specified in the Regulation No. 1774/2002, it shall be prohibited to use fertilizers:
1) on flooded areas, areas covered with snow or frozen to 30 cm up and in the course of rainfalls;
2) natural fertilizers:
a) in liquid form and nitrate fertilizers – on grounds not covered by vegetation, of the slope gradient exceeding 10%;
b) in liquid form – in vegetation period of plants intended for direct human consumption.

3d) Transport and storage of fertilizers and plant conditioners

In chapter 4 of the Act general rules of safe transport and storage of fertilizers and plant conditioners were specified. This regulations prevent from omissions leading to threat to health of humans or animals or to pollution of the environment. This rules prevent also from quality changes of the products.
Fertilizers, including fertilizers designated „EC FERTILIZER" and plant conditioners, in solid form, transported in bulk, shall be secured in a way preventing their spilling, dusting or soaking. Fertilizers, including fertilizers designated „EC FERTILIZER" and plant conditioners in liquid form shall be transported in sealed and tight packaging, containers or tanks.
On January 1, 2011, special regulation on storaging cowpat and liquid manure (they shall be kept only in tight containers of a volume enabling storage of at least 4-month manufacturing of these fertilizers) comes into effect. These containers should be sealed ones, in the meaning of the provisions issued under Article 7(2) of the Act of 7 July, 1994 - Construction Law (Journal of Laws of 2006, No. 156, item 1118, as amended) concerning technical requirements to be met by agricultural facilities and their location. In turn on January 1, 2009, the entities involved in breeding or raising of poultry above 40 000 places or breeding or raising of pigs above 2000 places for pigs of a weight above 30 kg or 750 places for sows, storage the natural fertilizers, except cowpat and liquid manure, on impermeable platforms, secured in a way to prevent leakages to the ground. However on 31 December 2010 the entities storage the cowpat ant liquid manure in tight, adjusted containers. Storage of the cowpat or liquid fertilizer in a way not compliant with above requirements shall be liable to a fine.

3. Helsinki Convention on the protection of the marine environment of the Baltic Sea area of 9 April 1992

Basic regulations concerning the prevention of pollution from land-based sources are in the Article 6 of the Convention. The Contracting Parties undertake to prevent and eliminate pollution of the Baltic Sea area from land-based sources by taking into account Best Environmental Practice (BEP) and Best Available Technology (BAT) for discrete sources. With an unblemished sovereignty each of the Contracting Parties shall apply the procedures on the Baltic Sea drainage area. The Parties shall put into effect the criteria and measures of the Annex III. To this end they shall cooperate in preparing standards or prescriptions which affect emission and droppings to water and air, environment quality and products containing harmful substances and materials. Such regulation causes that the regulations of Annex III of the Convention play a key role. The Annex III is titled "Criteria and measures concerning the prevention of pollution from land-based sources". In the form of an original text it contained very general regulations. In the way of pollution from dispersed sources, including agriculture, it predict their elimination by promoting and implementing Best Ecological Practice.

The Convention envisages possibility of amendments to the annexes and the adoption of annexes (art. 32):

1. Any amendment to the Annexes proposed by a Contracting Party shall be communicated to the other Contracting Parties by the Depositary and considered in the Commission. If adopted by the Commission, the amendment shall be communicated to the Contracting Parties and recommended for acceptance.
2. Any amendment to the Annexes recommended by the Commission shall be communicated to the Contracting Parties by the Depositary and recommended for acceptance.
3. Such amendment shall be deemed to have been accepted at the end of a period determined by the Commission unless within that period any one of the Contracting Parties has, by written notification to the Depositary, objected to the amendment. The accepted amendment shall enter into force on a date determined by the Commission.

The period determined by the Commission shall be prolonged for an additional period of six months and the date of entry into force of the amendment postponed accordingly, if, in exceptional cases, any Contracting Party informs the Depositary before the expiration of the period determined by the Commission that, although it intends to accept the amendment, the constitutional requirements for such an acceptance are not yet fulfilled.

4. An annex to this Convention may be adopted in accordance with the provisions of this Article.

On 31 December 2000, according to the recommendation of the Helsinki Commission No 21/1 the Annex III was divided into two parts: "Part I. prevention of pollution from industry and municipalities" and "Part II. Prevention of pollution of agriculture" adding the contents of part II. Then, on 15 November 2008 according to the recommendation of the Helsinki Commission 28E/4 significant fragments of Part II of Annex III were amended.

In Part II of Annex III the regulation 1 affects general provisions. The regulation envisages, that the Contracting Parties shall apply the measures described below and take into account Best Environmental Practice (BEP) and Best Available Technology to reduce the pollution from agricultural activities. The Contracting Parties shall elaborate Guidelines containing elements specified below.

The main meaning for natural fertilizers has a regulation 2. It envisages that the Contracting Parties shall integrate the following basic principles into national legislation or guidelines and adapt to the prevailing conditions within the country to reduce the adverse environmental effects of agriculture. Specified requirements levels shall be considered to be a minimum base for national legislation.

Among the detailed regulations a problem of animal density was regulated. It was suggested that there must be a balance between the amount of animals on the farm and the amount of land available for spreading dung (expressed as animal density), to ensure that manure is not produced in excess to the amount of arable land. The maximum amount of animals should be precised with consideration taken to the amount of phosphorus and nitrogen in manure and the crops requirements of plant nutrients.

Next detailed regulation affect location and planning of buildings for farm animals. It is assumed that they must be located and planned to protect soil and water from pollution.

Another detailed regulation is about constructing manure storages. It is assumed that the manure storage must be of such quality that prevents losses. The storage capacity shall be sufficiently large, to ensure that manure only will be spread when the plants can utilize nutrients. The minimum level to be required should be 6 months storage capacity. It is pointed out for some special technical requirements e.g. waterproof floors and sidewalls.

Next regulation affects storing waste water from animal housings and effluents from dung or the preparation and storage of silage.

Another regulation affects application of organic manures. It is assumed that organic manures (slurry, solid dung, urine, sewage sludge, composts, etc.) shall be spread in a way that minimizes the risk for loss of plants nutrients and should not be spread on soils that are frozen, water saturated or are covered with snow. Organic manures should be incorporated as soon as possible after application on bare soils.
Another regulations affect application rates for nutrients in fertilizers. It is assumed that application rates for nutrients should not exceed the crops nutrient requirements. National guidelines should be developed with fertilizing recommendations and they should take reference to:

- Soil conditions, soil nutrient content, soil type and slope;
- Climatic conditions and irrigation;
- Land use and agricultural practices, including crop rotation systems;
- All external potential nutrient sources.

In the way of natural fertilizers doses used in agriculture every year it should not exceed:

- 170 kg/ha of nitrogen
- 25 kg/ha of phosphorus

to elude an excess of nutrient ingredients, taking account soil conditions, agricuturac practises and crop sorts.
Moreover in this regulation other problems were regulated, like winter crop cover to reduce losses of plant nutrients, water protection measures and ammonia emissions.
In a context of natural fertilizers problem the regulation 4 is also important. This regulation pertains to environmental permits. It is assumed that farms with livestock production above a specified size should require approval with regard to environmental aspects and impacts of the farm. It affects installations for the intensive rearing of poultry, pigs, and cattle with more than 40 000 places for poultry, 2000 places for production pigs (over 30 kg), 750 places for sows or 400 animal units cattle.
The regulation 5 pertains to environmental monitoring and the Regulation 6 is about education, information and extension (advisory service) on environmental issues in the agriculture sector.

5. Fertilizers problem according to waste regulations

The basic regulation which pertains to waste managing is the Act from the 27th of April 2001 about waste (Journal of Laws 2007 No. 39 Pos. 251, Regulation as last amended). This Act defines waste management rules in a way that assure protection of health of humans or animals or the environment in accordance with the sustainable development rules, and in particular the rule of preventing from producing waste or limiting the amount of waste and their negative environmental impact, as well as recovery or disposal of waste.
Rules of the Act are not exerted for droppings of animals, dung, manure, liquid manure designated for agricultural usage in the manner and under the rules determined in the regulation of fertilizers and fertilizing (art.2, reg.1, pos.6). *A contrario* they find use for animal droppings, dung, manure, liquid manure with non-agricultural purpose and on the rules defined in the regulation of fertilizers and fertilizing as far as they fulfil the definition of waste (so they are every substance or object belonging to a category specified in Annex 1, where the owner of certain waste disposes of it, intends to dispose or is obliged to dispose). In this case general rules of waste managing shall be in force. In particular attention may be paid for Art. 5 and 6 of Act about waste:
Article 5. Anyone who undertakes action which causes or may cause the production of waste shall plan, project and carry out such actions as to:
1) Prevent the production of waste or limit the volume of waste and its negative environmental effect whilst manufacturing products, during and after the completion of the usage thereof,
2) Provide for the recovery compliant with the environmental protection regulations, if it has not been possible to prevent the production of waste,
3) Provide for the disposal of waste compliant with the environmental protection regulations, the production of which could not have been prevented or which could not have been subject to recovery.
Article 6. A waste producer shall apply such manner of manufacturing or forms of services and raw materials which prevent the production of waste or allow for maintaining the volume thereof at the lowest possible level, and limit the negative environmental impact or threat to life or human health.

6. Fertilizers problem according to Water Law

Fertilizers problem is also regulated by the Water Law Act from the 18th of July 2001. (Journal of Laws. No 115, pos. 1229, Regulation as last amended). The act regulates water management with the sustainable development rule, and in particular forming and protection of water resources. Water management shall be managed in a way that is in tune with public interest and prevent from backset of ecological function of water and from backset of condition of land ecosystems and marshes directly depended on water.

Defining the term of sewage it was assumed that the term refers also to placing in water or soil liquid animal droppings, except liquid manure and manure, purposed to agricultural usage in a way and on the rules specified in the Act of 10.07.2007 on fertilizing and fertilizers (art. 9, reg. 1, pos.14b). I means that we are implementing full regime of waste law.

Among the forbiddings included in the Act one can note:

- The forbidding of placing (dumping) waste on the sea bottom within the meaning of the Act of 27.04.2001 on waste and liquid animal droppings (art.40, reg.1, pos.1)
- The forbidding of locating on the area with the risk of flooding investments of the enterprises that may have great influence on the environment, storage of sewage, droppings of animals, chemical agents and other materials that may pollute water, and forbidding of recovery management or waste neutralization and in particular waste storage (art.40, reg.1, pos.3).

The Act is meant to transpose the Nitrates Directive. Its detailed regulations connected with water protection against nitrate compounds are specified in art.47. It was assumed in the Act that agricultural production is conducted in a way that limits and prevents water pollution by nitrate compounds derived from agricultural sources. Nitrates compounds are all substances which contain nitrogen, except molecular nitrogen gas. This regulation has general character and may be applied only in relation with institution mentioned in the Act.

It was also suggested that the minister proper for the agricultural matters in agreement with the minister proper for the environment matters shall work out a set of rules of Good Agricultural Practice and shall popularize the rules, especially by organizing special courses for farmers. The set does not have legally binding character and on the base of the regulation it may be applied voluntarily (Its implementation depends on farmers' will- it is different in case of participation in agro-environmental programs).

One of the basic preventive instruments is to determine by the Regional Manager of Water Economy by means of regulation, the surface and underground water susceptible to nitrate pollution from agricultural sources and areas especially vulnerable, and from which Nitrogen ebb must be limited, accounting for:

1) Nitrogen compounds content in surface and underground water, in particular with an acknowledgement of underground water supplied for people and purposed to consumption.
2) Eutrophication level of inland surface water, internal sea water and internal coastal water, for which the eutrophication factor is the Nitrogen;
3) Characteristic of the area with particular acknowledgment of: sort of agricultural activity, agricultural lands structure, concentration of animal production, sort of soil and climate.

This water and areas submit to verification every four years allowing for consideration of changes of factors unforeseen during their determining. The determination and verification are carried out basing on measurements carried out by national environment monitoring. The ***Voivodship*** Inspector for ***Environmental Protection*** carries out every four years a valuation of the eutrophication level of inland surface water, internal sea water and internal coastal water.

The consecution of appointing the areas is that within 2 years from determining the Regional Manager of Water Economy shall workout a project of actions, which will limit Nitrogen ebb from agricultural sources, what is mentioned in art.84 of the Act- Law of environment protection; the platform is introduced by a regulation of the Regional Manager of Water Economy.

The criteria for determining water as susceptible to nitrate pollution from agricultural sources and special requirements for platforms of action which are meant to limit nitrogen ebb from agricultural sources, are determined by the minster in charge of environmental matters in agreement with the minister in charge of rural development on the way of regulation (Regulation of the Minister of Environment from 23rd of December 2002 on criteria of determining susceptible water for Nitrogen compounds from agricultural sources- Journal of Laws 2002 No 241, pos 2093; Regulation of the Minister of Environment from 23rd of December 2002 on special requirements for platforms that are meant to limit the Nitrogen ebb from agricultural sources- Journal of Laws 2003 No 4, pos 44).

7. Technical requirements for agricultural buildings , including containers for liquid manure and dung plates

Problem of technical construction requirements of objects connected with natural fertilizers storage was dealt with in the regulation of the Minister of Agriculture and Food Industry from 7th October 1997 on technical specifications for farm buildings and their location (Journal of Laws No 132, pos. 877- the only novelization of the regulation had a place in the regulation of the Minister of Agriculture and Rural development of 22nd June 2009 that changes the regulation on technical specifications for farm buildings and their location- Journal of Laws No 187, pos. 907). This act was taken up pursuant to the Art. 7, Reg. 2, pos. 2 of the Regulation from 7th July 1994- Building Law (Journal of Laws 2006, No 156, pos.1118, Regulation as last amended).

This regulation is important both for requirements determined in the Act on Fertilizers and Fertilizing and independently- as an act important in investing process in agriculture.

The regulation establish technical specification for farm buildings and machine-building plants and their location. The regulation determines conditions which, with preserving the rules of the Building Law and others, and also Polish Rules, ensure:

1) Safety of the construction
2) Fire safety
3) Safety of utilization
4) Proper hygienic and health conditions, and environment protection
5) Protection against noise and vibrations,
6) Safety of energy and proper thermal insulation of partitions
7) Proper utility conditions
8) Protection of reasonable interests of third party
9) Building durability
10) Protection of culture properties

The rules of the regulation are applied in design, construction, reconstruction, deconstruction, superstructure, conversion, modernization, and in changing of the utilization of farm building or its parts. The term of "farm building" means buildings for agriculture needs and storage of agriculture products, in particular: containers for liquid animal excrements, dung plates, storage bins for silage, storage bins for crops and pasturage, septic tanks and biogas cisterns.

Chapter 2 of the regulation affects land development. Directly the problem of storage bins for animal excrements is regulated in the article 6. It has foreseen that for animal droppings disposal and storage shall exist special devices and tanks attuned to the technologic systems of animal raising hereinafter called "tanks for liquid animal excrements". Tanks for liquid animal excrements should have impermeable base and walls and a tight cover fitted with entrance and ventilating hole. Distances of closed tanks for liquid animal excrements, measured from lids and ventilating holes should be at least:

1) 15 meters from human habitation and human habitation on neighboring parcel
2) 15 meters from agricultural products processing plant and storage of consumption goods
3) 4 meters from border of neighboring allotment
4) 5 meters from general storage building
5) 5 meters from silo for grain and fodder
6) 5 meters from bunker silo (silage)

Distance of open tanks for liquid animal excrements, with the capacity of 200m3 and of manure slabs should be at least:

1) 30 meters from human habitation and human habitation on neighboring parcel
2) 50 meters from agricultural products processing plant and storage of consumption goods
3) 10 meters from general storage building
4) 4 meters from border of neighboring allotment
5) 5 meters from silo for grain and fodder
6) 10 meters from bunker silo (silage)

It is admitted to apply slurry tanks in a distance lower than determined above in relation to the border of neighboring allotment or within the border, in case when the allotments will adhere to the same kind of tanks on the neighboring allotment.

Distance of open slurry tanks with capacity higher than 200m3 from building objects mentioned above and the border of neighboring allotment is determined individually in decision on land development in co-ordination with Voivodship Sanitary Inspector.
It should be noticed that in subsequent regulations in this chapter there are some rules that may affect also tanks for animal excrements, e.g.:

- location of farm building with nuisance for surroundings especially because of dusting of atmosphere, odors, toxic substances production, should allow for wind direction, to place them in external position against building objects destined for human habitation and against protected areas (article 11).
- Farm buildings with nuisance for surroundings should be isolated from adhering areas by tall or mid growing green belts (article 12).

Next chapter No 3 affects farm buildings and farm buildings and machine-building plants. In this chapter problem which interests us the most is mentioned in two articles: 28 and 29. The article 28 affects construction aspects- the construction of open slurry tanks should ensure specifications of their utilization by:

1) allowance to access and empty the accumulating sedimentation
2) creating slopes in the base towards liquid manure chamber
3) creating slopes outside for ebb of precipitation water

Closed slurry tanks equipped with the cover other than rigid and resistant for mechanical damage and open tanks for liquid animal excrements with a height lower than 1,8 m should be protected with the paling with a height of at least 1,8 m. Service platforms and access for service of the closed tanks equipped with the cover other than rigid and resistant for mechanical damage and open tanks for liquid animal excrements should be protected with the protective barriers with a height at least 1,1 m with a crosshead located in the middle of their height and at 0,15 m height over the platform.
Waterproof isolation of the base and scarps of the slurry tanks should be made of stable insulating material. The article 29 foresees that dung plates should have a impermeable base and walls.
Lastly in the chapter 6 “Hygiene and health” in the article 48 it is assumed that installations and devices of farm buildings which serve for waste water, silage juice and other griminess drainage should by designed and made in a way protecting against seeping toxic substances into water and soil.

8. Regulation (Ec) No 1774/2002 of the European Parliament and of the Council of 3rd October 2002 laying down health rules concerning animal by-products not intended for human consumption

The regulation includes dung to category 2 material (Art.5.1.a). Category 2 materials shall be collected, transported and identified without undue delay in accordance with Article 7 and, except as otherwise provided in Articles 23 and 24, shall be:
e) in the case of dung, content of the digestive tract, milk and colostrum, if the competent authority does not consider them to present a risk of spreading any serious transmissible disease:
(i) used without processing as raw material in a biogas plant or in a composting plant approved in accordance with Article 15 or treated in a technical plant approved for this purpose in accordance with Article 18,
(ii) applied to land cultivation in accordance with this Regulation, or
(iii) transformed in a biogas plant or composted in accordance with rules laid down under the procedure referred to in Article 33 (2);
The term of “dung” means: excrements and/or urine of farm animals, with or without a bitter, and a guano.
Detailed regulations connected with a dung are included in the Annex VIII – requirements for the placing on the market of petfood, dogchews and technical products. Its chapter III regulates requirements for dung and processed dung and processed dung products.
I. *Unprocessed dung*
A. T r a d e
1. (a) Trade in unprocessed dung of species other than poultry or equidae is prohibited, except for dung:
(i) from an area which is not subject to restrictions by threat of a serious transmissible disease, and
(ii) intended for application, under the supervision of the competent authorities, to fertilize land belonging to a single holding located on both sides of the border of two Member States.
(b) However, the competent authority may grant specific approval for the introduction on to its territory of:

(i) dung intended for processing in a technical plant or a biogas plant or in a composting plant approved by the competent authority in accordance with this Regulation regarding the manufacture of the products referred to under Section II below.
The competent authority must take account of the origin of the dung when approving such plants; or
(ii) dung intended for applying to land in a holding. Such trade can only occur with the consent of the competent authorities of both the Member States of origin and destination. When considering giving consent, the competent authorities must have particular regard to the origin of the dung, its destination and animal health and safety considerations.
A health certificate conforming to a model laid down under the procedure referred to in Article 33(2) must accompany the dunge in such cases.
2. Trade of unprocessed poultry dung is subject to the following conditions:
(a) the dung must originate in an area which is not subject to restrictions by threat of Newcastle disease or avian influenza;
(b) in addition, unprocessed dung from poultry flocks vaccinated against Newcastle disease must not be dispatched to a region which has obtained Newcastle disease non-vaccinating status pursuant to Article 15(2) of Directive 90/539/EEC (1); (Council Directive 90/539/EWG from 15 October 1990 r. regarding sanitary conditions of animals, regulating trade within commune and importing from third countries poultry and hatching eggs (P.J. L 303 from 31.10.1990, page 6). Directive recently amended by Councils' decision 2000/505/WE (P.J. L 201 from 9.8.2000, page 8) and
(c) a health certificate conforming to a model laid down under the procedure referred to in Article 33(2) must accompany the dung.
3. Trade of unprocessed dung of equidae is not subject to conditions considering animal health
B. Importation
4. Member States must give permission for importation of unprocessed dung if:
a) it comes from third countries, which are mentioned in the Annex XI part IX;
b) it fulfills, appropriately to considered animal species, the requirements which are mentioned in the reg.1a;
c) it is accompanied with health certificate, as it was foreseen in art.29, reg.6.
II. *Processed dung and processed dung products*
A. Placing on the market:
5. The placing on the market of processed dung and processed dung products shall be subject to the following conditions:
a) They must come from a technical plant, a biogas plant or a composting plant approved by the competent authority in accordance with this Regulation.
b)They must have been subjected to a heat treatment process of at least 70 °C for at least 60 minutes and they must have been subjected to processing according to rules of the procedure stated in Art. 33(2)
c) they must be
i) Salmonella-free (Salmonella is absent in 25 g of processed product
ii) Enterobacter-free (on the ground of aerobic bacteria amount <1000 cfu per 1 g of processed product)
iii) subjected to a treatment that reduce the amount of bacteria that produces endospores form and toxin; and
d) they must be stored in a way that prevents from re-infection or wetting after processing. Hence they must be stores in:
i) sealed and isolated silo; or
ii) properly sealed package (plastic bags or "large bags")
B. Importation
6. Member States must authorize importation of processed dung and processed dung products if they:
(a) come from third countries that appear on the list in Part IX of Annex XI;
(b) come from a plant approved by the competent authority of the third country meeting the specific conditions laid down in this Regulation;
(c) satisfy the requirements of paragraph 5 above; and
(d) are accompanied by a health certificate that conforms to the model laid down in art.29, reg.6;
III. Guano
7. Placing 'guano' on the market is not subject to any animal health conditions.

9. Summary

9a) Problem of storaging animal fertilizers

In the issue of buildings purposed for storaging of natural fertilizers the regulation of the Minister of Agriculture and Food Industry of 7.10.1997 on technical specifications of farm buildings and their location should be pointed to. However this act was applied only in design, construction, reconstruction, deconstruction, superstructure, conversion, modernization, and in changing of the utilization of farm building or its parts (it did not affect earlier developed farms that, after entering into force of this regulation fell outside of investments process mentioned above).

Towards this farms the enuring rules are embodied in the regulation of 10.07.2007 on fertilizers and fertilizing. On January 1, 2009, the entities involved in breeding or raising of poultry above 40 000 places or breeding or raising of pigs above 2000 places for pigs of a weight above 30 kg or 750 places sows, store the natural fertilizers, except cowpat and liquid manure, on impermeable platforms, secured in a way to prevent leakages to the ground. However on 31 December 2010 the entities store the cowpat and liquid manure in tight, adjusted containers.

On January 1, 2011, special regulation on storaging cowpat and liquid manure (they shall be kept only in tight containers of a volume enabling storage of at least 4-month manufacturing of these fertilizers) comes into force. Those containers should be sealed ones, in the meaning of the provisions issued under Article 7(2) of the Act of 7 July, 1994 - Construction Law (Journal of Laws of 2006, No. 156, item 1118, as amended) concerning technical requirements to be met by agricultural facilities and their location.

9b) Problem of utilizing animal fertilizers

The problem of utilizing animal fertilizers for agricultural purpose is an issue of the Regulation of 10.07.2007 on fertilizers and fertilizing. In turn some special methods of this application may have a connection with a character of an area (both based on platforms purposed for limit the Nitrogen ebb from agricultural sources and protected areas) and benefiting from proper European funds (agro-environmental programmes).

9c) Problem of mutual relation between the Annex III of Helsinki Convention and Polish enactments

Polish regulations have not been accommodated to requirements ensuing from the novelized Annex III of Helsinki Convention (the simplest example is the problem of the capacity of the manure tanks). The Annex III of the Helsinki Convention will not be valid in Poland until its proclamation in the Journal of Laws. Beyond the problem of publishing of the Annex, accommodation of polish law to requirements of the Annex should be performed.

Literature:

1. M. Masternak-Kubiak, Umowa międzynarodowa w prawie konstytucyjnym, Warszawa 1997, s.79

Olfactometric measurement techniques

Małgorzata Friedrich
West Pomeranian University of Technology in Szczecin
Institute of Chemical Engineering and Environmental Protection Processes
Laboratory for Odour Quality of the Air
bgocha@zut.edu.pl

Olfactometry is part of sensory analysis, which deals with the qualitative and quantitative odour characteristics. In the environmental aspect, the most important role play quantitative measurements of odour concentration, expressed in odor units per cubic meter. A brief overview of numerous olfactometric measurement techniques was based on the PN-EN 13725 requirements as well as didactic materials of the Laboratory for Odour Quality of the Air [1-3].

DYNAMIC OLFACTOMETRY

According to the PN-EN 13725:2007 standard "Air Quality. Determination of odour concentration by dynamic olfactometry", odour concentration is the number of European odour units in cubic meter (c_{od} [ou_E/m^3]). These are measured by determination of dilution factor of sample necessary to achieve the panel detection threshold (probability of odour detection equals 0.5; and concentration 1 ou_E/m^3).

"The panel" constitutes a group of at least four people that meet the selection criteria for olfactory sensitivity:

- The individual odour detection threshold of n-butanol (Individual Threshold Estimate; $ITE_{n\text{-butanol}}$): 0.020 - 0.080 ppm
- The antilog of the standard deviation calculated from the log *ITE* less than 2.3.

During the measurement, the panel is presented with a dilution series that are obtained by diluting - in olfactometer (Fig. 1) – sample flux in various (Z) degrees, while the following Z values form a geometric series.

Fig. 1. The panel during the measurement with the use of T07 and T08 olfactometers

Most often, the decreasing sample dilution sequence, distorted by random blank test presentations (air reference) is used. The whole series of sample dilutions is defined as a "round". One "measurement" consists of at least three rounds.

The result of a series is the Z_{ITE} value - the geometric mean between the last Z_{NO} (do not feel) and the first of at least two consecutive Z_{YES} (do feel). The measurement result is calculated on the basis of the verified Z_{ITE} values.

The geometric mean from the gathered Z_{ITE} values as well as its quotients via individual values. The values that are fivefold lesser/greater than the geometric mean are rejected. The measurement is valid, if at least four people meet the verification criterion. Odour concentration (c_{od} [ou_E/m^3]) is the geometric mean of the Z_{ITE} value of those people.

Olfactometric samples are collected to the bags made of PTFE, FEP, PET, PVF, Tedlar™ foil. Bags as well as other equipment (pipes, pumps, etc) should always be conditioned (washed with the flux of samples or pre-filled and emptied).

If the gas collected is neither hot nor humid enough, one of the two ways of collecting techniques are recommended:

- "The lung principle" (a typical device - see Fig. 2)

- Direct pumping.

In "the lung principle", an empty sample bag is placed in a firm, hermetic container (cylinder, box, etc) and the outlet tube is placed outside (probe connection). After closing the container and implementing the probe to test gas, the underpressure in the space surrounding the bag is generated (e.g. using the battery powered Vacuum Pump or the manual one). The underpressure in the container makes the bag fill with the sample capacity that equals the one that was removed from the container.

Fig. 2. Collecting samples with "The lung principle"

Direct pumping - the injection of a sample with the use of a syringe or pump directly into the bag - it is generally used when gas is only slightly contaminated (e.g. atmospheric air, ventilation outlets, etc). One should be careful not to contaminate the sample with odorants that were previously adsorbed in the pump (syringe) and tubes.

Since sampling is part of the olfactometric measurement, the equipment used has to meet the same accuracy criteria as olfactometer.

If the flux emitted is hot and highly contaminated with odorants, dynamic dilution with cold, clean and dry air should be applied. Dilutions are performed in the same place as sampling. It is possible to use diluting probes with an ejector pump. Nitrogen gas cylinder (or air) is accelerated in the nozzle, which causes pressure drop in the ejector chamber and suction of test gas. The dilution factor depends on various factors, such as the nozzle diameter, inlet nitrogen pressure, the length of connections, etc. The equipment used should be regularly calibrated in the conditions similar to the ones occurring during sampling.

The initial test gas dilution can also be made with the use of a static method. Before sampling, the exact amount of pure air or nitrogen is let into the bag. Determination of the sample dilution factor may be obtained by measuring the "height of a gas column" in gas cylinder. Measurement uncertainty shall not exceed 3%. Fulfilling this condition is easy to achieve if the initial dilution is at most threefold.

During odor emissions determination, various flux shields such as hoods, wind tunnels etc. are used from surface diffusion sources (which are described in the appendix to the PN-EN 13725 standard).

It is assumed that the processes occurring in the boundary layer between the atmosphere/soil or atmosphere/water do not undergo substantial changes if the part of the surface is covered with a rigid hood with a known surface. Under the hood, a known volume of odorless air flow or a known odor concentration of pollutants is let. The air flow rate is registered.

Shield constructions are diverse but one of the most popular are a Lindvall-type. The common feature is ensuring the flow turbulence above the surface. Figure 3 shows the structure and use principles of the hood used by the Laboratory team.

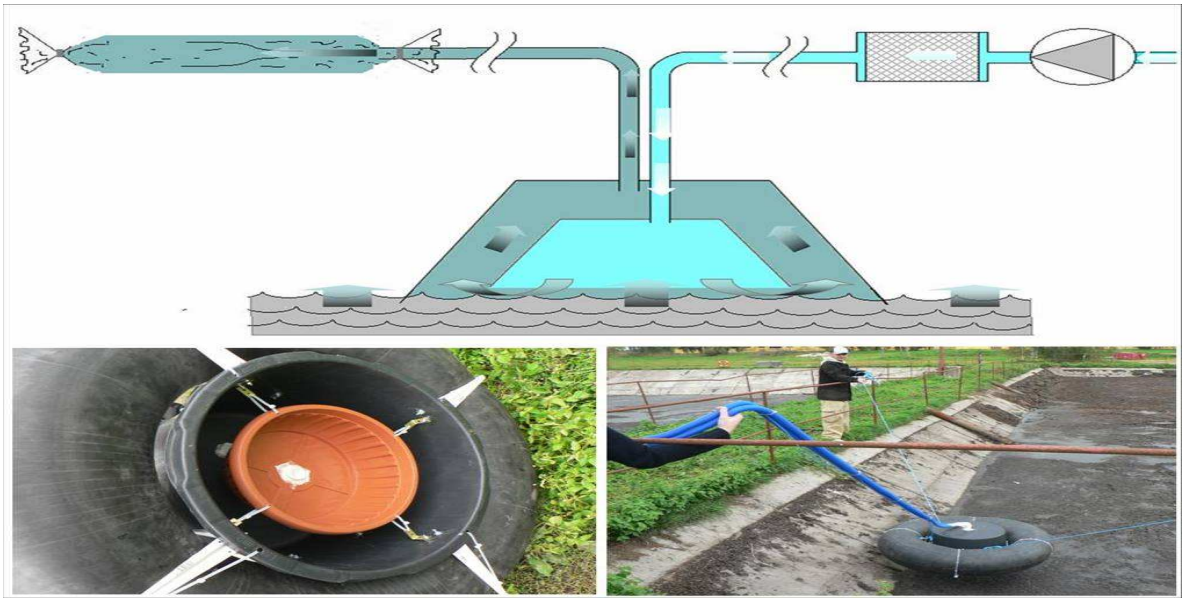


Fig. 3. The hood use from surface diffusion sources

To determine odor emission (q_{od} [ou/s]) from the surface covered with a hood or other shield volume stream (V[m3/s]) flowing under the shield has to be measured as well as the value of odor concentration (c_{od} [ou/m^3]) at the inlet and outlet.

OTHER OLFACTOMETRIC MEASUREMENTS

Dynamic olfactometry method described in the PN-EN 13725 requirements cannot be used when the concentration of odorants is very small and variable. It mainly concerns air quality research in the surrounding of emitters. Under these conditions, the following methods can be used:

- Dynamic dilution to detection threshold methods, performed *in situ* with the use of Nasal Ranger Field Olfactometer (USA),

- Static dilution methods, known as the Triangle Bag Odour Method (Japan),

- Indirect methods, based on *in situ* sensory odor intensity analysis without sampling (extrapolating method).

Nasal Ranger Field Olfactometer (St. Croix Sensory patent) is a type of a gas mask with an active carbon filter, in which the known part of the inhaled air can circumvent filters. Regulating valve allows for choosing one of six purified to contaminated air flow ratio ($V_{purified}$ / $V_{contaminated}$ = 2, 4, 7, 15, 30 and 60 or 60, 100, 200, 300, 400 and 500) and setting of BLANK position (purification of the whole inhaled flux). Accuracy and repeatability of dilutions equals respectively 10% and 5%. The sense of smell of people participating in the measurements is checked with the use of “n-Butanol Odor Pen set" (Fig. 4). During measurements, the stream circumventing filters is gradually increased until reaching the odor threshold. The values $V_{purified}$ / $Vc_{ontaminated}$ = D / T (Dilution-to-Threshold Ratios) that correspond to the adjacent "do feel" and "do not feel" assessments (values Z_{YES} and Z_{NO}) allow for calculating the value of Z_{ITE} (individual threshold estimation). The value of odor concentration c_{od} [ou_E/m^3] is geometric mean from a set of individual estimates (Z_{ITE}), collected by the panel (*n* values Z_{ITE}).

The Laboratory team used four Nasal Ranger Field olfactometers during testing of offensive odor nuisance of swine farm (Fig. 4).

Fig. 4. Pen-Test and measurement with the use of Nasal Ranger Field Olfactometer

The "Odour Triangle Bag Test" method, recommended by the Ministry of Environment in Japan, makes it possible to extend the range of olfactometry measurement into very low concentrations. The assessors compare the smell of three samples: two - clean air, one – clean air with the sample addition (Fig. 5), and their task is to indicate which bag contains the contaminated air. Only those who successfully passed the sensitivity test can participate in the measurements. During the test, five various standard odors compounds and the “two-fifth test" were used (Fig. 5).

Fig. 5. Two-fifth test and Triangle Odour Bag Test

Indirect determination of odor concentration (c_{od}) can be performed based on the Weber-Fechner law, binding this concentration with the odor intensity (S):

$$S = k * \log c_{od}$$

The law allows for calculating odor concentration based on the collective panel results of the odor intensity, prior to the experimental determination of the Weber-Fechner (k) factor.

During the assessment of odor intensity of the outside air (e.g. pollution), the spot-verbal scale is applied: 0 - no odor, 1 - weak smell, 2 - distinct smell, 3 - strong smell. One five-minute measurement of odor intensity concentrates at least 80 individual intensity assessments (4 persons * 5 minutes * 4 assessment per minute). The results of a temporary situation assessments cannot be directly compared with the results of odorants dispersion modeling (average 1-h). It is necessary to repeat the measurement several times (after the compulsory break).

The second method for odor intensity assessment relies on comparing the standard air odour, the atmospheric air or a series of sample dilutions taken from the emitter with n-butanol solution scale patterns of (Fig. 6). Concentration of the successive scale solutions is selected so that the quotient of the two successive values was constant (in the Laboratory: 20/7). The measure of odor intensity is the difference between the number of standard threshold (detection threshold of n-butanol) and the one corresponding to the sample.

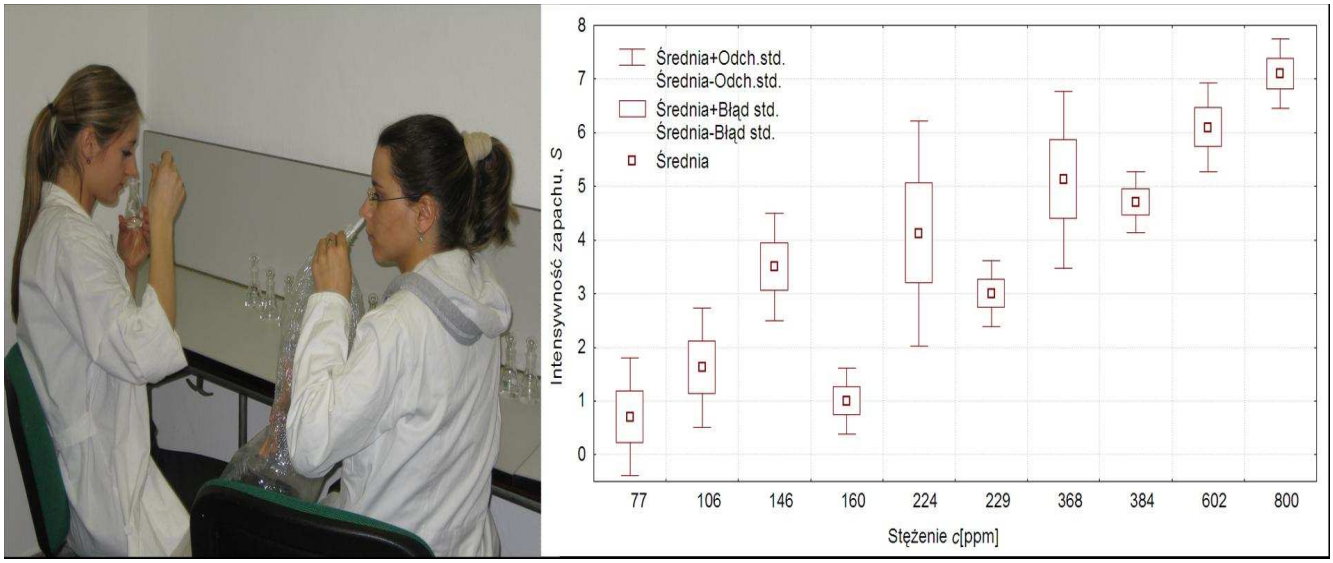


Fig. 6. Indirect determination of odor concentration - odor intensity assessment

Literature:

1. PN-EN 13725:2007 „Jakość powietrza. Oznaczanie stężenia zapachowego metodą olfaktometrii dynamicznej”
2. Kośmider J., Mazur-Chrzanowska B., Wyszyński B., ODORY, Wydawnictwo Naukowe PWN, Warszawa 2002
3. e-SZKOŁA OLFAKTOMETRII, www.odory.szczecin.zut.edu.pl

Birds and agrocenosis

Marek Jobda
Polish Society for Bird Protection
marek.jobda@otop.org.pl

Poland is a middle-size member of the European Union (EU) with the landscape dominated by rural areas. Due to significant size and still relatively extensive farming, Poland plays a role as one of the most important strongholds of farmland birds in EU (Fig. 1). The farmland birds are between most threatened groups of birds in EU because of both extensification and intensification of farming practices. So, the efficient protection of birds in EU depends on the trends in farming development in countries like Poland.

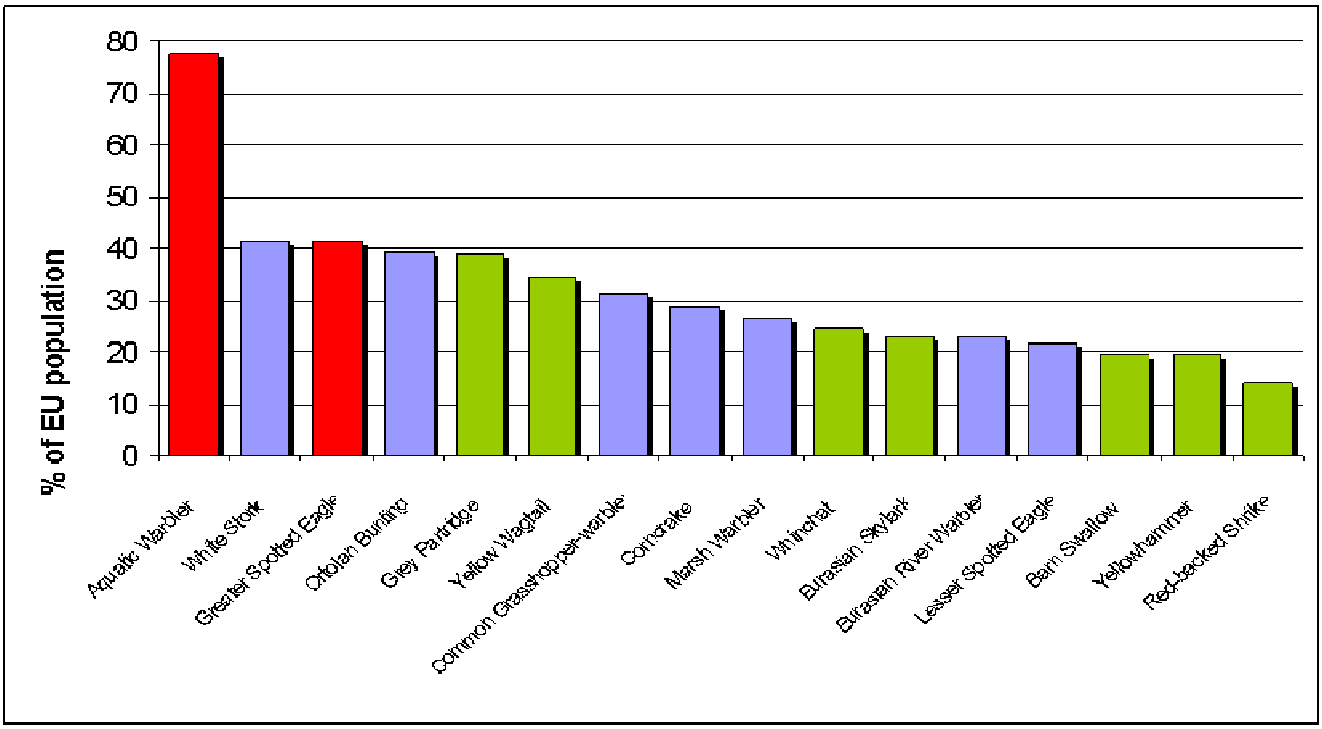


Fig. 1. Poland as the stronghold of farmland birds in the EU. Source: Opracowanie OTOP na podstawie BirdLife International, Birds in Europe: Population Estimates, Trends, and Conservation Status (BirdLife Conservation Series No. 12, BirdLife International, Cambridge, UK, 2004

Different types of grasslands are a crucial habitat for birds on rural areas in Poland; i.e. most of nesting grounds of aquatic warblers and corncrakes or feeding grounds of white storks or spotted eagles are on grass-lands. But in fact, that category contain both high-nature areas and the ecological traps, which potentially are the meadows with very intensive management. Abandonment of mowing or grazing management also is very unfavourable for grassland birds and overgrown of meadows or pastures by succession plants leads to lose their values as a nesting or feeding habitat for many threatened bird species. The way of grassland manage-ment depends on farmers and grassland birds conservation is in their hand.

Most of the agriculture land in Poland is very fragmented. The average size of a farm holding is very small, and an average farm is usually divided by very tiny land parcels. The land parcels are not only small and narrow but often also scattered. All of these factors makes the landscape of Polish village very picturesque. The landscape mosaic from the one hand arose complications for a farm productions, and from the another hand constitute the perfect breeding habitat for many common farmland birds, like partridge or yellow wagtail. What is very

important for birds, there are still plenty small landscape features i.e. trees, bushes or small water bodies, between an arable land in Poland. Also the high-percentage of the land abandonment and the low level pesticides and fertilisers use makes Polish village more attractive for animals, but less similar to the Western-European rural areas. The intensification of the farming practices and simplification of the rural landscape in W Europe, which caused the dramatic decline of the farmland birds, were accelerated by implementation of Common Agricultural Policy (CAP). Nowadays, also in Poland and other new member states the CAP is the leading force influencing the agriculture development. But presently, the CAP is not only the factor threatening the bird populations but also a source of money for their conservation, i.e. by implementing agri-environmental schemes.

The crucial role of the agricultural areas for bird conservation in Poland confirms the fact that the farmland covers 38% of Important Bird Areas (IBA). The IBAs are the key areas for conservation of the most threatened birds in the EU. So called, "improper agriculture" is identified as one of the most important threats to birds on the IBAs (Fig. 2) So, the development of agriculture has a great influence not only on common farmland birds but also on the most valuable European species.

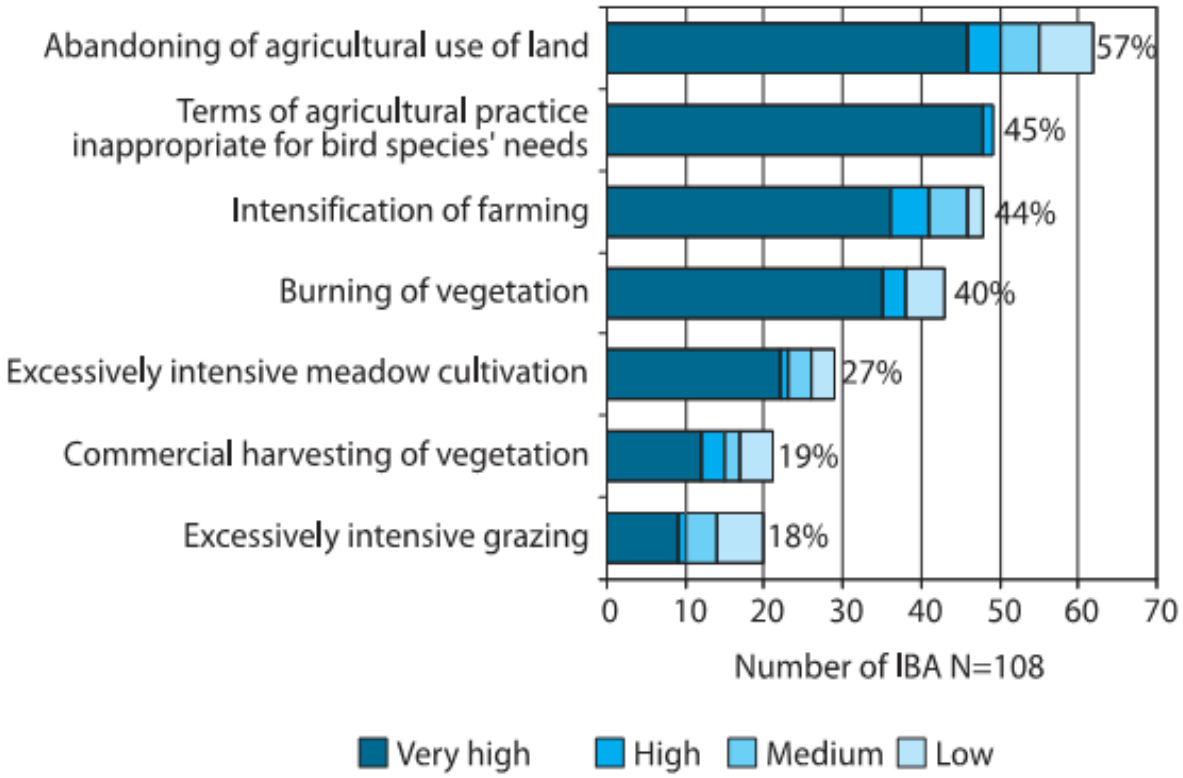


Fig. 2.10. Frequency of individual threat types within "Improper agriculture" category recorded for Polish IBAs (N = 108) in 2008–2009

Source: Wilk T., Jujka M., Krogulec J., Chylarecki P. (red) 2010. Ostoje ptaków o znaczeniu międzynarodowym w Polsce. OTOP, Marki.

The new cross-compliance requirements and new standards for good agricultural and environmental condition in Poland in the year 2010/2011

Karolina Liberadzka – Czubowska
Ministry of Agriculture and Rural Development
Karolina.Liberadzka-Czubowska@minrol.gov.pl

Changes in the cross-compliance requirements The notice specifies the Minister of Agriculture and Rural Development dated 19 March 2009 on the list of requirements specified in the regulations of the European Union taking into account the national legislation implementing these provisions (MP No. 17, item. 224).

From 2010, farmers who carry out activities or projects that may significantly or significantly adversely affect the conservation objectives of Natura 2000, or on the Natura 2000 are required to comply with new requirement. This requirement applies to the prohibition of taking action that may, alone or combined with other activities, significantly adversely affect the conservation objectives of Natura 2000 (with the exception of activities carried out under an overriding public interest). At the same time the requirement to include within its scope the project, which may have significant effects on the Natura 2000, after obtaining the appropriate decision referred to in Article. 96 paragraphs. A law on sharing of information and its protection, public participation in environmental protection and the Environmental Impact Assessment issued after an assessment of the impact of projects on Natura 2000, or the decision referred to in Article. Paragraph 71 or 72. 1, point 1, 3, 6, 7, 8, 9 of the above Act.

Of these decisions include:

- The decision on the construction permit, to approve the building project and to permit the resumption of construction work

- The decision on the urban and regional planning,

- A decision establishing the conditions for conducting work involving the regulation of water and construction of embankments and drainage works, drainage works and other earthworks in areas of particular value in terms of natural,

- The approval of the proposal to merge or exchange of land,

- The decision to change the use of agro-forest.

The above principles are not new regulations imposed by the needs of cross-compliance requirements. Appropriate measures are already in the national legal order, but since 2010, their fulfillment will be controlled under the principle of cross compliance in the case of farmers applying for direct payments to agricultural land, and payments under certain non-investment activities RDP 2007-2013.

For activities that may, alone or in combination with other activities, significantly adversely affect the conservation objectives of Natura 2000 should be:

a) the deterioration of natural habitats or habitats of species of plants and animals for which the protection of designated Natura 2000

b) adversely affect the species for which protection has been designated a Natura 2000 site, or

c) deterioration of the integrity of the Natura 2000 site or its links with other areas.

Under the existing law on providing environmental information, there are two types of impact assessment:

1. Environmental impact assessment for projects likely to significantly affect the environment, which is divided into:

a) the planned projects likely to always have significant effects on the environment, which in accordance with the Council of Ministers on 9 November 2004, includes for example: farming or animal husbandry in the number of not less than 210 Large inventory of LUs (LU).

b) planned projects likely to have potentially significant effects on the environment, it shall be, if the authority competent to issue such a decision the mayor or the mayor said the obligation to conduct such an assessment. For these projects include: rearing or breeding of animals within the administrative boundaries of cities, built-up area within the village or in areas covered by forms of nature protection - In number not less than 40 LU, in other areas - in the number of not less than 60 LU, water use in agriculture, including land reclamation, an area of not less than 20 hectares, with the exception of devices: channels discovered, pipelines, etc.

2. Assessment of the impact on the Natura 2000 if the project is likely to have significant effects on the Natura 2000. Obligation to assess the impact on the Natura 2000 is recognized by the competent authority to issue a decision (eg, mayor, mayor, city president) required before starting the project that may adversely affect the Natura 2000 site. For projects subject to such an assessment could include for example the construction of farm buildings.

The scope will include the requirement to verify that no action has been taken that may individually or in combination with other activities, significantly adversely affect the conservation objectives of Natura 2000. Moreover, the scope of the requirement to check whether the farmer will implement a project affecting a Natura 2000 site following the appropriate administrative decision.

Complement is also subject to the existing requirement imposed on farmers on Natura 2000, concerning compliance with the requirements of conservation plans, tasks and plans in relation to plant species. Changing this requirement obliges farmers to comply with the protective functions of plans or plans for the protection of natural habitat types and species. The purpose of this amendment is for protection of natural habitats and species, to which the Habitats Directive. During an inspection of compliance with the requirements of cross-compliance will be verified whether the farmer complies with the requirements of security plans and plans of protective duties in this regard. Changes in the minimum standards set out in the Regulation of the Minister of Agriculture and Rural Development of 11 March 2010, on minimum standards Coll. U. Nr 39, poz. 211).

The review of the Common Agricultural Policy (Health Check), which took place in 2008, the catalog of standards of good agricultural and environmental protection part of the cross-compliance requirements, from 2010 introduced new standards for: conservation of the characteristic features of the landscape, water licenses and creating and / or maintenance of habitats.

• Retention of landscape features

This rule means the need to preserve agricultural land within a designated landscape elements:

- Natural Monuments,

- trenches up to 2 meters wide.

In order to verify that the farmer at the Annex standard graphic accompanying the request for payment for 2010 will be marked the location of these landscape elements. In addition, since 2011, in addition, the farmer will also be required to preserve agricultural land within the ponds with a total area of less than 100 m2.

• Compliance with the obligation to have legal permits water when using water for irrigation requires such a license

This rule does not introduce new obligations, but only applies to existing national legislation in this area. The rules and issue permits of waterlaw are regulated by Water Law.

In the above standards, the farmer for irrigation of agricultural land with underground water sprinkler or surface water drain, or underground in a quantity greater than 5 m3 per day for irrigation will be required to hold water permit authorization. Will be subject to inspection to verify that the farmer has the water permit.

• Create and / or maintaining habitat

This rule applies to the obligation to respect the prohibition on the destruction of habitats of plants and animals protected species under the provisions of the Law on Nature Protection, and the natural habitat in areas covered by the forms of protection, ie national parks, nature reserves, landscape parks, protected landscape areas , green grasslands, natural-landscape units, positions documentation and monuments of nature.

In addition, the rules have changed the standard for:

• Rotation

Existing since 2008, the provisions of the standard rotation predict that in the case of wheat, rye, barley and oats the same species of plants can be grown on the same surface in the cadastral plot no more than three years. Changing the rules of this standard makes it possible to continue in subsequent years, in the fourth and fifth years of the same crop plant species, provided to maintain an adequate level of soil organic matter. A farmer who wants to take advantage of this opportunity, at the latest before the start of growing the same plants in the fourth year, will be required to comply with one of the following agronomic treatments: plowing straw or manure intercrops or in quantities of 10 tonnes per hectare, and the Informed on June 9, ARMA district office manager of its intention to comply with the above treatments.

By contrast, in the case where a farmer will want to continue growing the same species of plant still in its fifth year, after the harvest in the fourth year, and before the start of cultivation in the fifth year, will be required to re-make one of the above mentioned activities. These treatments aim to restore the level of organic matter in soil. Taking into account the specificities of the systems may be other bezorkowych agrotechnical ie mixing straw with the soil, mixing with the soil or intercrops intercrops cultivation.

• Maintaining permanent crops without weed

This rule means the need to maintain multi-permanent crops such as orchards, berry plantations, nurseries without weed.

Area B will come into force in Poland since 1 January 2011 includes the governance requirements set out in Article. 4 and 5 of Regulation (EC) No 73/2009 (called Statutory Management Requirements - SMR) for:

- Public health, animal health and reporting of certain diseases and use of plant protection and biocidal products.

Characteristics of Area B requirements - requirements in Area B, the result of directives and regulations on:

- SMR 9 - the placing of plant protection products - requires farmers to comply with the application of plant protection products, in particular, maintain a register of plant protection products and their use in accordance with the recommendations set out on the label and the principles of good plant protection practice;

- SMR 10 - prohibiting the use of livestock of some compounds
having a hormonal action, action and β-agonists - requires farmers to protect public health by preserving grace

periods and bans on feeding animals, producing meat and meat products intended for human consumption, as dangerous for the consumer;

- SMR 11 - food law - requires farmers to preserve food and feed safety by prohibiting the marketing of food and feed is considered as hazardous, harmful to health, unfit for human consumption, products of vegetable or animal origin, contaminated with dangerous substances, keep a register of use of biocidal products and their use in accordance with applicable law;

- SMR 12, SMR 13, SMR 14, SMR 15 - control of certain animal diseases: transmissible spongiform encephalopathy, swine vesicular disease, foot and mouth disease, bluetongue disease - require a farmer to immediately notify the authority of the Veterinary Inspection, or the nearest service provider in the field of veterinary medicine or reeve (mayor, city president) of the occurrence or suspicion of these diseases. In addition, the farmer is required to keep animals infected or suspected of being infected with foot away from the places, places where other animals of susceptible species which are vulnerable to infection or infection of the above diseases.

The requirements of the Area C will apply from 1 January 2013 due to requirements of directives and regulations on:

- SMR 16 - calves - obliges farmers to observe how the farming / calves according to age, behavior standards in relation to premises where there are animals, equipment, and microclimate, to control the mines. 2 times a day room with calves, control calves in an open system, to care for sick calves, adjustment of diet and breeding technology adapted to the weight of the calves;

- SMR 17 - minimum standards for pig welfare - obliges farmers to comply with the standards of targeting areas such as lighting, noise, microclimate, gas concentration, floors, provide comfort, feeding and watering on demand, to carry out procedures aimed at reducing aggression only when the measures failed improving conditions of living;

- SMR 18 - protection of farm animals - obliges farmers to have adequate qualifications m.in in the field of animal nutrition, application of appropriate farming technologies, control of animals, care for sick animals and isolating them, providing adequate lighting, ventilation and microclimate in buildings and premises , where there are animals, providing adequate feed, water and feeding and watering the animals and the freedom of movement, proper implementation of treatments.

Selection of the institution responsible for conducting inspections will be the basis to develop a national act of law conferring powers of inspection bodies in the Area B and C. Since October 2009, we are working on defining a cross-compliance requirements of Area B. The next step will be to formulate a list of requirements and incompatibilities and developing a system for assessing violations and sanctions imposed as a result of failure to comply.

In summary, the Department recommends the designation of Direct Payments to the control of cross-compliance requirements of the institutions that are responsible for carrying out official controls.

Organic farming and nature conservation problems in Belarus

Svetlana Semenas, PhD
Public Association "Ecohome"
lanas@tut.by

Does an organic farming exist in Belarus? Yes and no. Organic farming in the sense of certified production, managing by strict rules makes only first steps in our country. We have some certified lands, and it's a wild forest area to collect wild herbs and berries. There are no certified agricultural producers in Belarus, no legislation, no state organic label. Other barriers for organic agriculture development are absence of certification body, lack of state financial support for organic farmers, no system of retail sale of organic products. Lack of information about organic farming for producers and decision-makers is very important handicap. Therein Belarus is an exception not only in Europe, but within all post-soviet countries.

The causes of this state are numerous and complicated. The administrative system of agricultural management still persist, huge state collective farms occupy 87,3% of land and private farmers hold only 1,17% of land under lease. Household plots cover 8,6% of land [1]. All lands are state property, private farms have little support as compared to state ones, and organic producers have not preferences or additional support. Prices of agricultural products are regulated by government. Private farmers are supervised by local authorities and some of them started transition to organic methods and lost their farms because of conventional technology violation. Collective farms use conventional methods only, many of them overdose mineral fertilizers and pesticides.

Consequences of such way of agricultural practices are evident. Agriculture contributes many environmental challenges in Belarus. Key areas include water quality, soil degradation, biodiversity losses. Additionally, approximately the sixth part of agricultural lands is contaminated with radionuclides as a result of the disaster at the Chernobyl nuclear power station.

Overdose and violation of schedule for mineral and organic fertilizer application results water pollution. Fertilizers and toxic chemicals causes the rise of chloride concentration in ground water (4-6 times), sulfates exceed background a value 2-4 times, nitrates - 6-10 times. Spot pollutions of underground water are detected in the areas of livestock farms (56 large scale industrial pig farms are the Baltic Sea catchment part of Belarus), storages of mineral fertilizers and toxic chemicals. High concentration of nitrates in water (45.6-75.1 mg/dm3) makes many individual wells unfit to use. In Western Bug basin an average nitrate concentration is 178 mg/l and in some cases reach 505 mg/l; 50% of private wells have polluted water [2]. In the Bug River basin, 79 % of nitrogen discharged into surface waters comes from diffuse sources, mainly connected with agricultural production Today 246 kg of mineral fertilizers and 6,2-6,3 t of organic ones are used per hectare [3], pesticides consumption doubled from 2003 to 2007 and continue to grow [5]. Self-purification ability of lakes and rivers is not sufficient to maintain them pure. The rate of total riverine load of nitrogen and phosphorus from Belarus is more than 5 % of total load to the Baltic Sea. Total load of nitrogen from Belarus is more than 5000 t per year. [4]. In 2009 in the basin of Baltic Sea the rate of river water samples exceeding maximum permissible value for biogenic elements (N and P) consists 50% for Western Bug, 16,8% for Western Dvina and 34,0% for Neman [6]. It is rather important contribution to see eutrophication: 45% of Belarusian land is basin of Baltic Sea and 5 % of the total Baltic Sea catchment area are located in Belarus.

Soil degradation concern all type of soil in Belarus, it is a result of agricultural use of erosion-hazardous soils. The increase of food production has been achieved by expansion of areas under cultivation. In the second half of XX century, large-scale works on drainage amelioration have been carried out in Belarus in order to increase the area of agricultural lands and production. These works have not complied with ecological requirements.

The negative effects include losses in biological diversity and ground water level decreases not only at former swamps, but in neighboring territories. More than 1,1 million hectares of drained peat soils are under cultivation[7]. 17,8% of these soils are completely degraded [8]. At south part of Belarus, Polesie, 30% of land was drained. It has caused climatic changes in the region, which have resulted in more frequent extreme climatic phenomena, such as drought and light spring frosts. The average annual level of precipitation decreased from 20 to 31 mm. The most urgent problem is degradation of peat soils. Today land reclamation is stopped and even re-swamping is planned.

Conventional farming is one of main factors of biodiversity decrease. Except mentioned soil reclamation and pollutions of fertilizers and pesticides, damage of natural landscapes by agricultural practice play an important role in the process of species extinction and ecosystem degradation. Belarusian peculiarity is huge areas of fields, obstructing animal migration. Agrarian ecosystems are impoverished; there is lack of ecotones suitable for wild fauna and flora in rural areas. As a result the relict populations of hamster and ground squirrel got critically endangered, populations of several species of birds (partridge, corncrake, curlew, godwit, etc.) reduced dramatically [9].

We consider organic farming as a method of solution of urgent problems both in agricultural sector and environment protection. Despite of many barriers, the outlooks of organic agriculture in Belarus seems to be promissory. National-wide marketing study of consumers' preferences relating organic products showed that 95,4% of respondents would like to buy organic products, and more than one half of potential consumers (55,8%) are ready to pay more for organic products as compared with conventional ones. So demand for organic products exists. Producers hold an interest in organic production; there are few farms in transition to organic agriculture in Belarus. We lack certified organic farming. However, environment friendly practices exist in our country. Belarusian agricultural traditions correspond with organic agriculture and majority of household plots and summer cottage owners works organically. Belarusian non-governmental organizations created their own eco-label having criteria based on EU organic legislation. We consider it an appropriate mean to stimulate producers to transition to organic methods. Active followers of organic agriculture inform producers and all stakeholders, published books, periodicals and brochures, organize seminars and other events to promote organic agriculture in Belarus. Cooperation with Polish Ecological Club Gliwice, support of Coalition Clean Baltic and sharing experience with other organization is very helpful for us. We do hope that good opportunities for developing organic agriculture exist in Belarus now and it's absolutely real to change the situation.

Literature:

1. Сельское хозяйство республики Беларусь: статистический сборник. – Минск, 2009.
2. А.А. ВОЛЧЕК, В.Н. ЯРОМСКИЙ, Н.В. МИХАЛЬЧУК, М.Ю. КФЛИНИН. Мухавец: энциклопедия малой реки. – Брест: Академия, 2006. – 344 с.
3. В. СУШКО. Анализ особенностей и тенденций развития сельскохозяйственных товаропроизводителей Беларуси / Журнал «Директор». – http://www.economy-law.com/cgi-bin/article.cgi?date=2008/08/30&name=24
4. Helsinki Commission. Baltic Marine Environment Protection Commission, 2005, p 7-9.
5. Ф. ЛАХВИЧ. Пестициды – опасность или необходимость? / Беларуская думка. – beldumka.belta.by/isfiles/000167_120794.pdf
6. Республиканский цунтр радиационного контроля и мониторинга окружающей среды. Результаты мониторинга поверхностных вод (I квартал 2010 г.). -http://rad.org.by/water_1_2010.html
7. Деградация земель Беларуси [Электронный ресурс] / Организация объединенных наций в Беларуси. – http://un.by/theme/yearofderertification/inBelarus/

8. Высыпаем золото сквозь пальцы. Как остановить деградацию белорусских земель и экономические потери сельского хозяйства?/ Народная газета. 31.10.2009. – http://www.ng.by/ru/print?art_id=38766
9. Конвенция о биологическом разнообразии. Республика Беларусь. Четвертый национальный доклад. - Министерство природных ресурсов и защиты окружающей среды Республики Беларусь. – Минск. – 2009. С. 23

Environmental aspects of Large-scale industrial pork production in the Baltic Sea catchment area of Belarus

Eugeniy Lobanov
Center of Environmental Solutions
lobanow@gmail.com

Pork production is one of the important fields of agriculture in Belarus. Annually, around 2.7 millions of pigs are breaded in Belarus, and around 400000 tones of pork were produced in 2008.

Apart playing an important role in agriculture and economy, pork production has a significant impact on environment, and especially water resources. This is particularly important for Belarus – a country, which is very rich in different water resources, lakes and rivers. Being a part of the Baltic Sea catchment area, Belarus plays a role in forming the ecological status of the Baltic marine environment.

The environmental situation in the Baltic Sea has drastically changed over recent decades. Human activities both on the sea and throughout its catchment area are placing rapidly increasing pressure on marine ecosystems. Of the many environmental challenges, the most serious and difficult to tackle with conventional approaches is the continuing eutrophication of the Baltic Sea. The eutrophication is caused by excessive inputs of nitrogen and phosphorous which mainly originate from inadequately treated sewage, agricultural run-off and airborne emissions from shipping and combustion processes. Eutrophication leads to problems such as intensified algai blooms, murky water, oxygen depletion and lifeless sea bottoms.

The aim of the present report was to analyse the situation with manure management on large industrial pig farms in the Baltic Sea cathment area in Belarus. The report is based on field trips and interviews with representatives of management of industrial pig farms in Vitebsk, Grodno and Brest regions of Belarus, representatives of Vitebsk regional committee of natural resources and protection of the environment, Grodno regional committee of natural resources and protection of the environment, association Vitebskzhivprom, Ministry of Agriculture and Food of Belarus, Institute of melioration and grass farming of National Academy of Sciences of Belarus.

Overview of the situation with industrial pig farms in Belarus

Pig-breeding is one of the important spheres of agriculture in Belarus. Pork production takes the leading place in the meat market of Belarus.

In 2003 there were about 3.3 mln of pigs, including about 2.2 mln in agricultural enterprises (66.7%) and 1.1 mln in personal farms and small private agricultural facilities.

On 1st of April 2008 there were 2.7 mln of pigs in all farms, including private household farms.

According to the governmental plan, 395000 tones of pork should be produced in Belarus in 2008, which is on 10.5% more, than in 2007.

At present the majority of pork is produced on large industrial pig farms (complexes), located in different regions of Belarus (up to 80%).

Annually, large-scale industrial pig farms produce 20-22 mln tones of wastewater and manure, which requires significant treatment and management to minimize possible harm for the environment.

All industrial pig farms in Belarus are conventional, and there are no organic pig farms at the moment.

Environmental and legal regulations of possible locations for animal farms and complexes

The legislation of Belarus considers animal farms and complexes as objects that potentially can cause considerable harm to the environment, and, especially, water objects. The reason is the danger of waste water from farms and complexes.

It should be noticed, that in existing practice taking organic substances off industrial animal farms and complexes to fields is considered to prevent water objects pollution, especially when purification plants are out of repair or absent on farms and complexes.

Environmental impact of industrial pig farms

Majority of industrial pig farms are significant sources of pollution of neighboring environment, including air pollution, microbiological pollution, water pollution and other factors, including contribution to formation of acid rain and greenhouse gas effect.

Environmental impact of many pig farms is quite significant, especially of those, which remove their liquid manure to the fields by mobile transport or with outdated reservoirs system.

According to information of the regional structures of Ministry of the Environment in recent years, there were almost no emergency cases with manure treatment facilities, when waste water from reservoirs was able to reach natural water objects.

Fig. 1. Old manure tank on the industrial pig farm, Grodno region

Table 1. Nitrogen content in waste water from an industrial pig farm (for 54000 pigs)

Content of Nitrogen, mg/l / Parameter	Original waste water	Clarified waste water	% of cleaning
General nitrogen	1255.8	522	58.4
Ammonia nitrogen	705.7	481.5	31.8
Nitrate nitrogen	4.5	1.9	57.6

Using of clarified liquid manure for irrigation on designated fields, leads to the surface run off with corresponding impact on open water sources. On many industrial pig farms, construction plans made provisions for direct waste water discharge into open water sources during spring tide, which can also lead to negative consequences on the environment. But such cases are quite rare at the moment.

There are no environmental permits, which should be obtained by industrial pig farms on regular basis. However, all pig farms, as large water consumers are obliged to apply for water usage permits, which are issued by the Ministry of Natural Resources and Protection of the Environment or its regional committees. Such a permit is usually issued for the period of several years (2-4) and determines amount of water, which can be used by pig farm for its production purposes. But it doesn't regulate content of nitrogen or phosphorous in waste water.

Environmental monitoring is organized on periodical basis by local inspections of natural resources and protection of the environment, but without proper laboratory testing, mainly by site visits, and with proper testing in case of emergency situations. Other organizations (centres of hygiene, institutes of academy of sciences and other) did their own monitoring and testing on some of the farms, but the data was not provided to the Ministry of the Environment.

Industrial pig farms in the Baltic Sea catchment area in Belarus

Belarusian part of the Baltic Sea catchment area is formed by basins of 3 major rivers – Zapadnaya Dvina/Daugava in Vitebsk region, Neman/Nemunas in Grodno region, and Zapadnyi Bug in Brest region.

In frame of this study we paid special attention to Vitebsk and Grodno regions with Zapadnaya Dvina and Neman river basins.

There are 56 large scale industrial pig farms, ranging from 3000 to 108000 of pigs in the Baltic Sea catchment part of Belarus (Brest, Grodno, and Vitebsk regions) with app. about 890000 pigs;

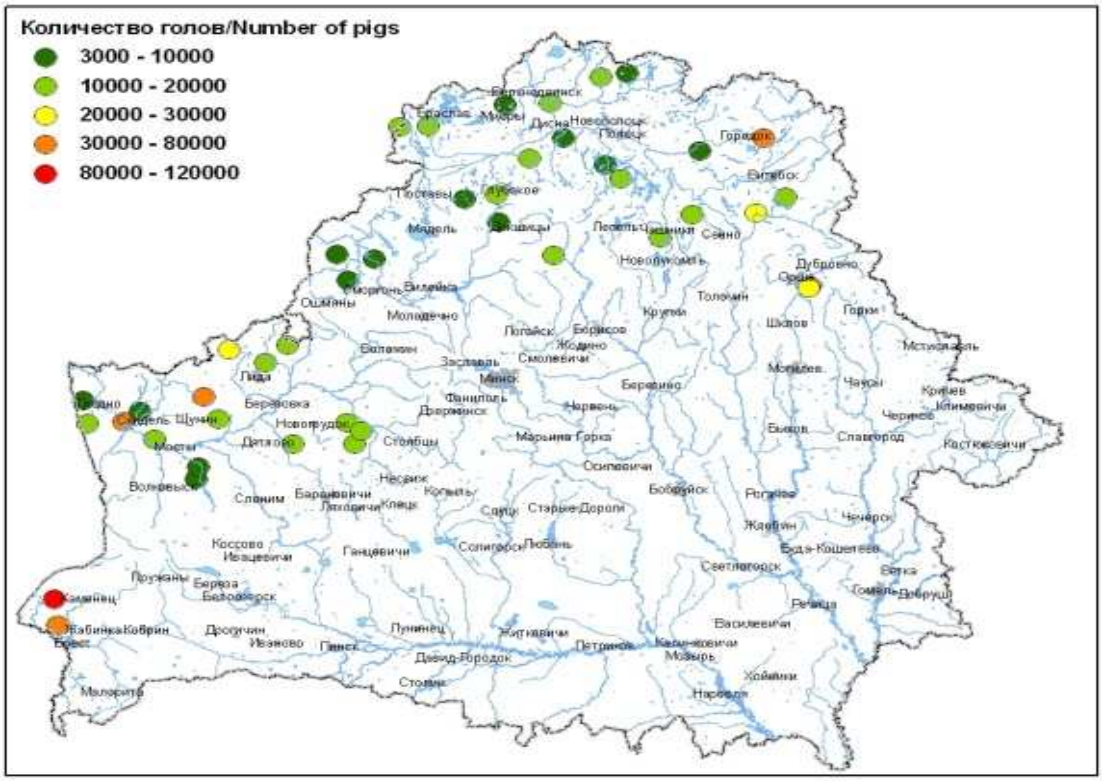


Fig. 2. Location of large-scale industrial pig farms in the Baltic Sea catchment part of Belarus

Applied manure utilization technologies and methods of handling of wastewater from animal housing

Industrial pig farms implement different methods of manure and wastewater utilization and management, starting from direct placing on agricultural fields and concluding with complicated technological processes, including biogas production.

In general, different technologies can be divided into several groups.

These technologies include receiving of clarified liquid manure, which further goes to special reservoirs. From these reservoirs clarified liquid manure is being transported to fields, either through sprinkling machines or through mobile transport, which is quite expensive and costly, from energy and man-power point of view. Clarified liquid manure is further used on limited field territory around the pig farm. In fact, it leads to possible pollution of the environment, including ground water.

Fig.3. Transportation of liquid manure to the field, Vitebsk region.

Fig. 4. Solid manure clamp in the field near the pig farm, Grodno region

Fig.5. System of consecutive cleaning reservoirs on one of the pig farms, Grodno region

At the same time there are some other positive examples of waste water management on industrial pig farms in BS catchment area of Belarus.

There is one example of manure treatment technology, which involves biogas production. This scheme is implemented on large (app. 78000 pigs) industrial pig farm “Zapadnyi” (Brest region, Zapadnyi bug river basin).

The biogas production unit on the pig farm “Zapadnyi” was constructed as an innovation project. The unit was constructed at the end of 2007, and in fact started its operation in 2008. The capacity of the unit is 520 kW (planned). The project allows to treat app. 43 tones of liquid and 43 tones of solid manure daily. The final biological product is used as a fertilizer on fields. Depending on time of the year, the unit produce from 300 to 500 kW of electroenergy and hot water.

Conclusions

- There are 56 large scale industrial pig farms, ranging from 3000 to 108000 of pigs in the Baltic Sea catchment part of Belarus (Brest, Grodno, and Vitebsk regions) with about 890000 pigs;
- There are several large scale pig-farms (e.g. “Zapadnyi”, Brest region, “Mostovskiy kumpyachok”, Grodno region, “Severnyi”, Vitebsk region, and others) which have effective systems of manure management and utilization, including biogas reactors, biological cleaning, and bioengineering constructions, which allow to minimize the negative environmental impact of manure;
- There are quite many pig farms with significant negative environmental impact on the environment, and water resources in the Baltic Sea catchment area part of Belarus;
- General situation with manure management on most of industrial larhe-scale pig farms in the Baltic Sea catchment part of Belarus can be characterised as non-satisfactorily, and requires urgent attention from relevant governmental bodies;
- Manure treatment systems on majority of plants are outdated and requires repairing and updating;
- The situation with local environmental monitoring requires impovement as only a few pig farms have necessary capacity for monitoring themselves;
- There is no exact data available on pig farms on actual run-off of phoshor and nitrogen elements.

Recommendations

For relevant national and regional authorities of the Republic of Belarus, responsible for pork production and environmental control:

1) To ensure proper environmental monitoring of manure discharge on regular basis on all industrial pig farms, including monitoring of final discharge, soil, and water objects in terms of nitrogen and phosphorous contamination.
2) To consider introducing of environmental permits, to be renewed on regular basis, which will also consider measures, taken to reduce nitrogen and phosphorous content in final discharges.
3) To conduct detailed research of manure management systems and environmental impact of large scale industrial pig farms in the Baltic Sea catchment area part of Belarus.
4) To consider the Helcom Baltic Sea Action Plan (Eutrophication segment) as a voluntary guidance document to address the problems of nitrogen and phosphorous run off from the industrial pig farms.
5) To ensure proper implementation of the requirements of Aarhus convention, and organize public hearings during environmental impact assessment processes while constructing new pig farms.
6) To promote installation of biogas production technologies on large-scale industrial pig farms, as well, as biological manure treatment systems and bioengineering constructions, as important elements of manure management system.

For relevant Baltic Sea region authorities and institutions:

7) To ensure funding possibility of infrastructural projects with clear environmental benefits to be implemented on industrial pig farms in Belarus, e.g. the EU Neighbourhood Program, bilateral agreements, and other funding bodies.

Literature:

1) Helsinki Commission, Baltic Sea Action Plan, 2007
2) Shpak A.P., Pestis M.V., Directions of intensifying of pork production, News of National Academy of Sciences of Belarus #3, 2004
3) Agrobaza #5, May 2008
4) Agrobaza #4, April 2008
5) Kavgarenja A.N., Niedziółka I., Tanaś W. Research of resources savings a way of recycling of manure drains, Journal of Research and Application in Agricultural Engineering 2005, Vol. 50 (1)
6) CCB Report on Industrial Hog/Pig Farming in the Baltic Catchment Area, Coalition Clean Baltic, 2007
7) Tivo P.P. et al. Technologies of application of liquid organic fertilizers on meadows, without pollution of soil and natural water and soil incrustation on water supply piping, educational material, Institute of melioration and meadows management of Academy of Sciences of Belarus, Minsk 2005

Swine farm odour nuisance

Joanna Kośmider, Prof. PhD
West Pomeranian University of Technology in Szczecin
Institute of Chemical Engineering and Environmental Protection Processes
Laboratory for Odour Quality of the Air
Joanna.Kosmider@zut.edu.pl

The problem of odour nuisance has long been examined in various countries throughout the world. In this report, a brief account of this widely discussed issue is based on the extensive "Odour Impacts and Odour Emission Control Measures for Intensive Agriculture" [1] report, ordered by the British Environmental Protection Agency, with the aim of formulating the IPPC H4 "Horizontal Guidance for Odour" [2] directive.

The experimental part of the "Odour Impacts and Odour Emission Control Measures for Intensive Agriculture" report was performed on the farms and in the vicinity of the farms in England, Scotland and Ireland, in 1994-2000. In the final report, the results of the previous research from Belgium and the Netherlands were discussed as well.

The report and the IPPC H4 project discuss problems, such as the process of odour formation, deodorization techniques, encapsulation of installation and equipment, various ways of releasing odour flux into the atmosphere, factors determining the degree of dispersion effect and air pollution dispersion modeling in various meteorological and topographic influences, that need to be solved as they are crucial for establishing the legal framework for odour quality of the air.

Psychological, psychophysical and sociological problems are also of great significance, though difficult to describe clearly. This is due to the fact that the level of subjectively experienced discomfort is difficult to predict as the boundary between acceptable and unacceptable nuisance level is fuzzy and movable.

Despite the aforementioned problems, steps aimed at improving comfort of residents should be taken from the authorities' part, in a way, however, that does not impede the economic development. Thus, nuisance complaints raised by local residents should not be disregarded for decisions to build a plant of a high level of odor production nearby a residential area should be based on knowledge rather than negotiations between supporters and opponents of an investment. Usually, however, neither opponents nor supporters have sufficient knowledge.

According to the IPPC H4, when considering applications to start a new business, the recommended levels of odour nuisance have to be determined. These levels will vary in certain cirumstances.
Determination of a 'nuisance level' along with indication of an acceptable nuisance level should be the basis for both new and existing installations. Taking into account the relatively easy to estimate odour nuisance factors (*UZ*) only, it can be concluded [3, 4] that:

$$UZ = f(S, H, N).$$

The *S, H* and *N* values can be expressed in numerical values, for example, in a five-point scale. It allows for distinguishing five levels of odour nuisance, if there is a linear relationship:

$$UZ = w_S \cdot S + w_H \cdot H + w_N \cdot N$$

The w_S, w_H and w_N symbols indicate the importance of the *S, H* and *N* values in determining an overall impression of odour nuisance. Fig. 1 shows an example of calculation made on the assumption that $w_H = 0.4$, $w_S = w_N = 0.3$ (the most important is the hedonic quality; the importance of odour intensity and the frequency of its occurrence are similar; the assumption requires sociological and olfactometric verification) [4].

The research on classifying business activities in terms of hedonic characteristics of odors was conducted in the Netherlands, in 1997 [1]. A similar list was also compiled in the UK and both lists were used in the IPPC H4 project. Classification of business activities into three groups of different potential nuisance levels, for which different $c_{od}98\text{-}1h$ [ou_E/m^3] percentile values were used, was suggested ([2], App. 6, p. 50).

The threshold values and odor concentration relations correspond to different levels of odour intensity. The dependence of odour concentration in swine and chicken farms upon emitted aerial pollutants is shown in Fig. 2 [1].

Predicting various levels of odour concentration, including odour intensity is possible with the use of a well-known air pollution dispersion model. The calculations are based on the odour emission rate values, expressed in odor units per second (q_{od} [ou_E/s]).

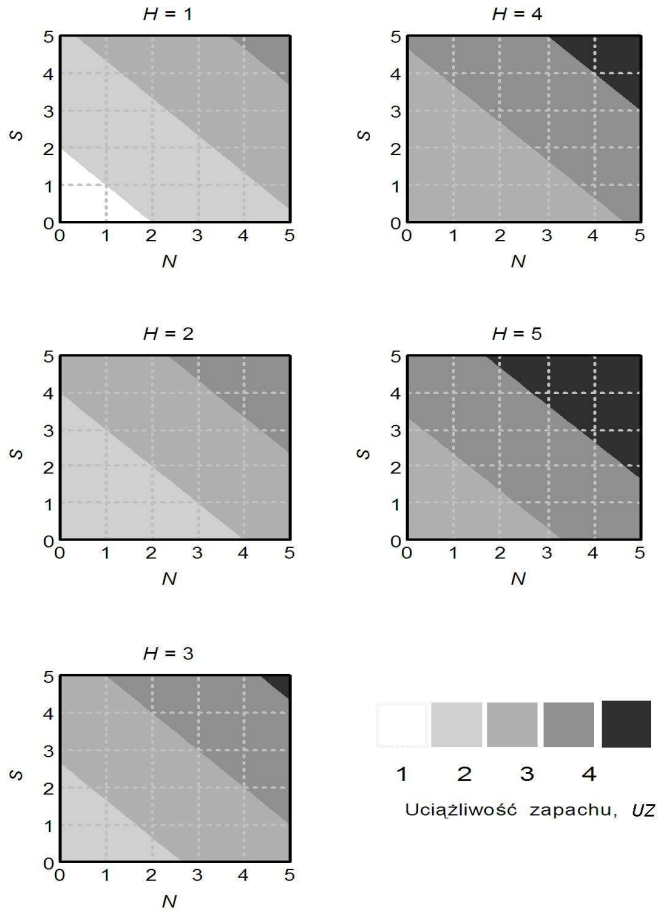


Fig. 1. Five classes of odour nuisance based on the information about the intensity (*S*), hedonic quality (*H*) and frequency of occurrence (*N*); using a scale from one to five [3, 4]

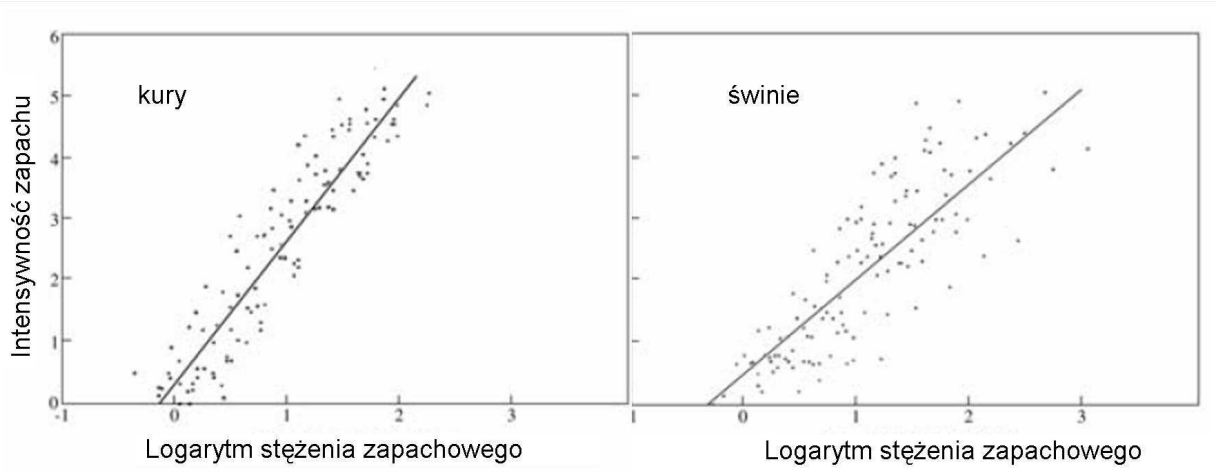


Fig. 2. The dependence of odour intensity upon odour concentration of pollutants emitted from swine and chicken farms

Numerous odour emission rate values from swine farms were included in the "Odour Impacts and Odour Emission Control Measures for Intensive Agriculture" report [1]. These values were determined by the professional laboratories- British, Belgian and Dutch. According to the British laboratory, pig emits 18.7 ou_E/s annually, according to the Dutch laboratory – 22.4 ou_E/s, and according to the Belgian one – 25.4 ou_E/s. Although meansurements were performed at different times, in different farms and by different teams, the results correlate.

Fig. 1 shows an example of modeling results for the farms of different sizes. The area where odour concentration is less than 1.5 ou_E/m^3 for at least 98% of the hours a year is delineated by isolines- odour nuisance is then treated as acceptable.

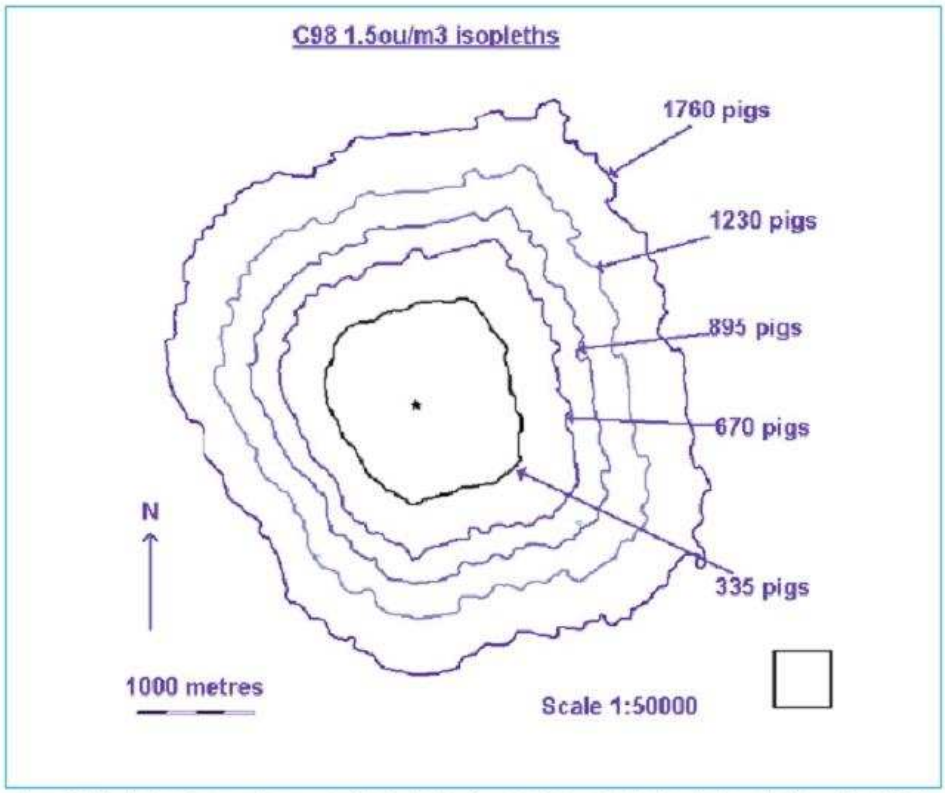


Fig. 3. The dependence of odour nuisance intensity (c_{od}98-1h > 1.5 ou_E/m^3) upon the size of a swine farm [1]

In the IPPC H4 project [2], three threshold percentile values (percentile 98) for three production plants were established:

- 1.5 ou_E/m^3 for production plants with the highest odour nuisance (a very unpleasant smell);
- 3 ou_E/m^3 for production plants with an average odour nuisance;
- 6 ou_E/m^3 for production plants with low odour nuisance.

The research, carried out by the Laboratory for Odour Quality of the Air in the West Pomeranian Province in 2008, aimed at:

- checking the correlation of the results of odour concentration calculations in a swine farm with the field measurements;
- estimating the odour emission factors based on own measurements and comparing the results with the above-mentioned values determined by the leading laboratories;
- comparing the estimated level of odour nuisance in a swine farm with the reference level defined in the odour nuisance prevention act [5].

Odour dispersion modeling was performed with the use of a reference method [6] and taking into account the weather conditions during the measurements. The odour emission factor was assumed to be 30ou_E/s·pig. The measurements were conducted with the use of the Nasal Ranger Field Olfactometer under different meteorological situations and pollution plumes (Fig. 4). The correlation of the calculation results of odour concentration in a swine farm with the field measurements are considered satisfactory [7].

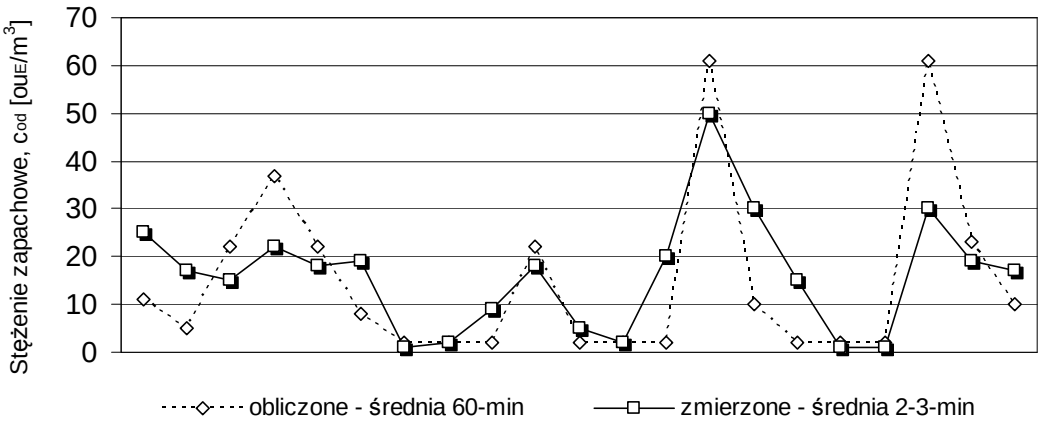


Fig. 4. The comparison of the calculation results of odour concentration in a swine farm- c_{od}-1h [ou_E/m^3] with the field measurements, carried out with the use of the Nasal Ranger Field Olfactometer - c_{od}-2-3min [ou_E/m^3]

The correctness of the assumption regarding odour emission factor was checked at random only. Air samples from one out of several swine farms and one surface point out of two farmyard manures were taken. In accordance with the PN-EN 13725, the samples were analyzed with the use of dynamic olfactometer. The estimated values of odour emission factors: 16 ou_E/s (average), 45 ou_E/s [8] (maximum), proved to be similar to the values obtained by the Dutch laboratory in summer.

The level of odour nuisance in a swine farm was estimated on the basis of own odour emission results and the wind roses in Szczecin-Dąbie, which enabled to draw a conclusion that in near built-up areas, an average 60-minute odour concentration is higher than 1 ou_E/m^3 no more than 8% of hours a year. It means that the farm would meet the statutory odour nuisance legislation under the odour nuisance prevention bill (2009) [5].

CONCLUSIONS:

1. The values of odour emission factors from a swine farm expressed in odour units per second and swine that are available in literature, are reliable.
2. The results of odour dispersion modeling confirmed the outcomes of olfactometric measurements.
3. All reports about the impact of farms on the environment should provide a framework to estimate potential odour nuisance, i.e., calculations based on odour emission factors and information about a type and size of a farm.
4. Until relevant Polish legal acts are promulgated, interpretation of calculation results can be based on the standards of other European countries, for example $c_{od}98\text{-}1h = 1.5\ ou_E/m^3$ or $c_{od}98\text{-}1h = 1.0\ ou_E/m^3$.

Literatura:

1. Environmental Protection Agency: Odour Impacts and Odour Emission Control Measures for Intensive Agriculture. R&D REPORT SERIES No. 14, FINAL REPORT 2001
2. Integrated Pollution Prevention and Control, IPPC H4 DRAFT, Horizontal Guidance for Odour
3. Kośmider J.: Uciążliwość zapachowa. Klasyfikacja terenów i źródeł emisji zanieczyszczeń powietrza. Archiwum Ochrony Środowiska 1-2, 31-41, 1994
4. Kośmider J., Mazur-Chrzanowska B., Wyszyński B.: ODORY, Wydawnictwo Naukowe PWN, Warszawa 2002
5. Projekt ustawy o przeciwdziałaniu zapachowej uciążliwości, Ministerstwo Środowiska, luty 2009
6. Rozporządzenie ministra środowiska z dnia 26 stycznia 2010 r. w sprawie wartości odniesienia dla niektórych substancji w powietrzu, Dziennik Ustaw 2010 nr 16 poz.87, załącznik nr 3: Referencyjne metodyki modelowania poziomów substancji w powietrzu
7. Friedrich M., Kośmider J.: Weryfikacja prognozy zapachowej uciążliwości. Przykład fermy trzody chlewnej, Ochrona Powietrza i Problemy Odpadów nr 4, 128-136, 2009
8. Friedrich M., Kośmider J.: Oszacowanie wskaźnika emisji zapachowej. Przykład tuczu świń, Ochrona Powietrza i Problemy Odpadów (w druku)

Best available technologies for manure treatment, for intensive rearing of pigs the Baltic Sea region

Lotta Samuelson
Baltic Sea 2020
lotta.samuelson@balticsea2020.org

The Baltic Sea continues to be in a poor state, and one of the most eutrophied waters in the world. To prevent leaching of nutrients from farms with intensive production of livestock has been identified, e.g. by the Helsinki Commission, as a prioritized action to reduce eutrophication.

Large pig and poultry farms are (among other industrial activities) regulated by the Integrated Pollution Prevention and Control (IPPC) Directive[1]. The directive aims to prevent, or if this is not possible, reduce pollution from these farms to air, water and land. Farms regulated under the directive must apply for an environmental permit in order to operate. The Directive also determines that farms must use Best Available Techniques (BATs) to minimize emissions. The BATs are listed in a guiding document (BREF).

There are around 16.000"IPPC farms" (pigs; sows and poultry) in the EU-25. This is less than 0,1% of the total number of farms in the EU-25 but these farms keep 16% of the total number of production pigs, 22% of the total number of sows, and around 60% of the total number of poultry (2008). There are 1.328 IPPC installations for the intensive rearing of pigs in the Member States surrounding the Baltic Sea.

Baltic Sea 2020 carried out a study 2009 with the objective to identify the most cost effective technologies to reduce leaching of nutrients from farms with intensive rearing of pigs to waters. The objective is to communicate and support the implementation of these technologies, in order to reduce the eutrophication of the Baltic Sea.

Methodologies and organization
The study and report was made by Henning LyngsØ Foged at the Innovation Centre for Bioenergy and Environmental Technology in Denmark. Current manure treatment technologies were compiled in a desk study and by visits to farms and research institutes in Holland, Denmark and USA. They were evaluated based on their potential to reduce nutrient leaching in a cost effective way. Technologies that reduce emissions to air or for storage and spreading of livestock manure were not considered; neither were various trademarks, brands, solutions or concepts offered by individual producers.

A list of more than 40 technologies with the potential to reduce leaching on N and P from large quantities of pig manure was compiled during the desk study.

Five farm scenarios were developed to estimate the cost efficiency for the complete list of identified manure treatment technologies to reduce leaching of N and P.

The complete list of identified livestock manure treatment technologies was reduced in different ways in relation to the purpose of this project. Priority was given to technologies with proven potential to reduce leaching of nutrients and that are commercially implemented, with no apparent negative impacts on the environment or ethical considerations and with proven and acceptable economic performance.

Recommended best available technology for manure treatment for intensive rearing of pigs, to reduce leaching of nutrients cost effectively
Based on reviews, study tours meetings and discussions, the following technologies are recommended to reduce leaching from intensive pig production:

I.3.1.1. 1 Farms with more than 2000 production pigs, 750 sows or 40 000 poultry are regulated by the directive.

Anaerobic digestion – to reduce leaching of nitrogen

1. Digested pig slurry has a well validated higher field effect[2], enabling more N to be re-circulated in agricultural production. Consequently less N leaches to waters, ultimately to the Baltic Sea. Each cubic meter of pig slurry which is digested anaerobically would result in around ½ kg less leached N, provided the digestate is used according a fertilizer plan[3].
2. Digested slurry is furthermore much more homogenous and can be spread on the fields with higher accuracy as fertilizer. It also incorporates and binds better to the soil.

Break-even for the economic performance of an anaerobic digestion plant is calculated to be around € 0,1 per kWh electricity that can be sold, with a reasonable use of the heat. Anaerobic digestion plants are found in all target countries, except Latvia (Birkmose et al., 2007), although two third of the around 100 plants in the target countries are found in Denmark. Anaerobic digestion is internationally a well known technology, considered to contribute to international targets for waste, environment, climate and renewable energy.

The wider use of anaerobic digestion is promoted by financial support for installation and running costs, ensuring the market (sale of electricity, biogas and/or heat, grid connection, guaranteed prices for a number of years), designation of location and incentives for the cooperation to establish and operate the plants.

Separation technologies – to reduce leaching of phosphorous

Separation of slurry to a nitrogen rich liquid phase and a phosphorus rich fiber fraction enable farms with intensive production of pigs to balance fertilization on own agricultural lands. The P rich fiber fraction can be transported to regions where it can be used according to the needs of the crops. Storage and transport of the fiber fraction must take place in a way that avoids seepage and evaporation of ammonia and laughter gas. Alternatives to export of the fiber fraction might be to combust or thermally gasify it, possibly after further drying and maybe pelletizing, in which case the charcoal or ash can be used as fertilizers at other farms. These technologies however, need further research to verify their environmental and economic performance when used for fiber fraction from pig slurry.

Separation can be an integrated part of an anaerobic digestion plant, but it can also be a stand-alone technology. It is relatively easy to implement on a farm basis, but solutions have been seen with mobile separators, shared by farmers in this way ensure a high utilization of the investment. Separation technologies are well known in the BSR and internationally, and 3% of slurries in Denmark were separated in 2007 (Hjorth, 2009).

Phosphorous Management Measures

Official P fertilizer norms

Complying with the Nitrate Directive regarding the maximum amount of manure spread on fields[4] carry a risk of overdosing with phosphorus. States should take the necessary steps to develop scientifically based, official norms for phosphorus fertilization, based on prevailing crop rotations on land where manure from intensive pig farms are used as fertilizer. The HELCOM Convention regulates that official P norms should be taken into use in all target countries, but this has so far only happened in four of the target countries.

Official manure standards

A pre-requisite for an efficient introduction of official P fertilizer norms is that official manure standards are developed and enforced in all countries. As a minimum they should describe the amount (tons) of livestock manure produced per animal per year or per produced animal, as well as the composition of that livestock manure regarding the percentage dry matter and the content of phosphorus (information on nitrogen and potassium is normally part of the manure standard as well).

I.3.1.2. [2] Bio/plant availability

I.3.1.3. [3] The estimate of ½ kg less leaching is based on a field effect of digested slurry, which is reported to be 17–30% higher than non-digested slurry (Birkmose et al., 2007), but considering as well that the increase in field effect is in the lower range for pig slurry, a conservative estimate of 10% increase in field effect is used (10% x 5 kg N per m3 slurry = ½ kg N/m3).

I.3.1.4. [4] 170 kg N/ha and year

Official P-index

is a technology that supplements the P norms by indicating where there is high risks of P leaching despite keeping the dosing under the P norms. P-indexes are compulsory for installations for the intensive rearing of pigs in Iowa, USA, and are being tested on pilot basis in Denmark, Sweden and Finland.

The empirical models behind the indices should be developed regionally or country-wise by researchers, as the relevance of the parameters as well as the associated risk for loss of phosphorus varies between regions and countries.

Certification for spreading and transporting large quantities of manure

would be a precaution against accidental spills, leading to both N and P leaching. The certification would be a very cost-efficient way to ensure that persons who deal with slurry are aware of its potential harmful effect on the environment, and of all regulations related with the transport and disposal of slurry. Certification requirements are compulsory in Iowa, USA, and are internationally comparable with the required certification of personnel that deal with pesticides.

The full report (102 pp) can be downloaded from the Baltic Sea 2020 website, www.balticsea2020.org

Utilization of ash from

thermal gasification of fermentation residue from a biogas plant – experience from Denmark and Australia

Ksawery Kuligowski, PhD[1], Tjalfe Gorm Poulsen, Prof. PhD[1], Robert John Gilkes, Prof.[2], Peter Sørensen, PhD[3]
[1]Pomorskie Centrum Badań i Technologii Środowiska POMCERT
[2]School of Earth and Environment, The University of Western Australia
[3]Faculty of Agricultural Sciences, Department of Agroecology and Environment, Aarhus University
kk@pomcert.pl

Abstract
Fermentation residue (FR) from a biogas plant, according to the polish law, is a waste, which utilization must be properly managed. In addition, methane fermentation allows for the recovery of not more than 45-50% of the energy contained in the raw biomass, therefore alternative energy recovery techniques after the anaerobic digestion as well as management of the FR should be in focus. This paper presents the possibility of thermal treatment of dewatered, dried and pelletized FR via thermal gasification and reuse of the ash for agricultural purposes. Research has been carried out in Denmark and Australia, and the ashes originated from a pilot scale 500 kW gasifier, located at the Danish Technical University (DTU) in Lyngby. This technology allows for the recovery up to 60% of energy from biomass, including the energy lost for dewatering and drying of the FR prior to thermal treatment. The ashes had 54.4 g/kg total phosphorus (P) and 34.7 g/kg total potassium (K) and low content of heavy metals (i.e. Zn, 3.4 g/kg, 0.47 g Cu/kg). High content of calcium carbonate (calcite, $CaCO_3$), reaching 70% of the ash mass showed its strong liming abilities when applied to acidic soils, which was demonstrated during greenhouse experiments in Australia. Barley and ryegrass yields on sandy soils were relatively lower compared to commercial, mineral fertilizer (Na_2HPO_4, $Ca(H_2PO_4)_2$), but P leaching from soils fertilized with ashes was up to 80 times lower, which is crucial in the reduction of eutrophication of water bodies. Heavy metals uptake by plants fertilized with ashes was marginal. Ashes can also provide raw material for phosphate fertilizer industry, where P can be recovered by extraction with sulfuric acid with 94 % efficiency and sulphuric acid demand of 19.2 kg H_2SO_4/kg P recovered.

1. Introduction

1.1 Intensive animal production and eutrophication of water bodies

Between 1997 and 2007, global production of pork was increasing by 2.5 % per year exceeding 100 million tons in 2005 [1]. It roughly corresponds to the production of 1.5 billion tons of pig manure and 1.5 million tonnes of total P. Danish farmers produce nearly 24 million pigs per year. 85% of this production is exported, which makes Denmark one of the largest exporters of pork in the world. Over the years, larger producers replaced the smaller ones, which resulted in the concentration of vast amounts of manure within one farm. As a result of excessive production of P in Danish farms, its content in soils is significantly elevated above crop requirements. As a result, P is washed from the soil, causing eutrophication of water bodies. This problem has already been noticed on a global scale in Europe [2], USA [3], [4] and Australia [5].

1.2 Biogas production and problem of the fermentation residue (FR)

Currently in Poland, we observe a strong interest in bioenergy, in particular biogas, which mainly relies on German and Scandinavian experiences. Governmental programs promoting the development of bioenergetics (Innovative Energetics. Energy in Agriculture, Biogas Programme 2020) encourage investors to build plants and trade produced biogas, which falls within the EU policy on increasing the share of renewable energy production. However, it is impossible to obtain the environmental decision to start investing in biogas plant if the problem of the FR is not solved. Although FR is a natural fertilizer, but in light of the Polish law, it is still regarded as waste. In addition, the anaerobic digestion in biogas plants only allows for the recovery of 45-50% [8] of the energy contained in biomass raw material (usually a mixture of manure, corn silage and waste from

the food industry), and therefore additional thermal energy recovery technologies of initially biologically degassed biomass (FR) should be in focus.

1.3 Handling of the fermentation residue (FR)

To solve the problem of excessive quantities of agricultural wastes and P balance in the environment without a necessity to restrict animal production, animal waste must be utilized on site or transported to places with a deficit of P. Since the transport of raw slurry with high water content is expensive, the mechanical separation of the FR into solid and liquid fraction in the farm-scale may be the optimal solution [6], [7]. The liquid fraction can be used as nitrogen fertilizer, whereas P-rich solid fraction, could be further dried and incinerated or thermally gasified to recover heat and electricity. Previous studies have shown that the technological chain consisting of anaerobic digestion in the biogas plant and thermal gasification of pellets from the FR in the gasifier, allows for the recovery up to 60 % of the energy contained in biomass, which is more than anaerobic digestion solely (45-50 %). The calculations take into account the energy loss during the dewatering and drying of the FR and the loss of nitrogen during thermal processes [8]. For comparison high heating value (HHV) of the dewatered and dried (90 % dry matter) FR is only slightly lower (11.4 GJ/t) compared with the dry fraction of raw manure (input to the biogas plant) (15.2 GJ/t) [9]. Ash produced via this process could possibly be reused. The characterization and usefulness of this ash as fertilizer and alternative source of P is a subject of the research presented in this article.

Methodology

1.4 Thermal gasification of the fermentation residue (FR)

Pellets from dewatered and thermally dried FR (90 % dm) were produced in the Fangel biogas plant (Denmark). Thermal gasification process was carried out in the pilot, low-temperature (700-750^{o}C) circulating fluidized bed (LT-CFB) 500 kW gasifier, which was built by Danish Fluid Bed Technology and its partners in the Biomass Gasification Group, Technical University of Denmark, Lyngby (Denmark). During 1 week, about 7 tons of pellets were gasified, producing more than 3 tons of ash. The device was especially designed for biomass fuels with low calorific value (straw, energy crops, manure, fermentation residue). Details of this process are available in the literature positions marked with [9], [10], [11], [12].

1.5 Chemical analyses of the ash

The chemical composition of the ash was determined by spectrometric methods (UV-VIS, FAAS, ICP-OES) on acid extracts as well as directly on solid samples using X-ray methods (EDXRF, XRD). Optical methods (SEM, TEM combined with EDS) were used to examine the morphology and chemical composition of individual minerals in the micro scale. Also a method for removing lime (calcite $CaCO_3$) from the ash through stepwise extraction with sodium acetate ($CH_2COOHNa$) was proposed, bearing in mind that this could contribute to the increased solubility and bioavailability of phosphorus. Optimization of dissolution of P from ash using industrially available sulfuric acid (H_2SO_4) was tested for different acid concentrations (0.2-2 M), acid loads (0.39-0.98 kg H_2SO_4/kg), time and type of extraction. Buffer capacity of ash for each pH of the mixture was as well calculated. In parallel to the recovery of P, the solubility of zinc (Zn) as a representative heavy metal was monitored. The exact description of the methods can be found in literature positions marked with [12], [14], [15]. Analyses were carried out at Aalborg University (Denmark).

1.6 Field plot and glasshouse experiments

Effect of ash on the growth of barley was measured in field conditions in sandy soil with neutral pH and relatively low content of phosphorus (total P 277 mg/kg and available P (Olsen), 0.09 mg/kg). The experiment took place in the Research Centre Foulum, Aarhus University (Denmark) and lasted for 2 seasons (April 2007 - August 2008). Three raw materials were used as a fertilizer: (1) pellets from FR (2) gasifier ash (GA), and (3) ash from the incineration of pellets at 1000^{o}C (IA). In addition, (4) a liquid extract from the GA using sulfuric acid neutralized by potassium hydroxide (ExL) was included in the test. Mineral liquid fertilizer used for compara-

tive purposes was disodium phosphate (Na_2HPO_4) labeled as DSP. Effect of ash on the growth of grass and soil properties were also measured in the acidic, sandy Australian soil (pH 4.5) during a 3-month greenhouse experiment at the University of Western Australia, Perth (Experiment 3). The following materials: (1) mineral liquid fertilizer calcium phosphate $Ca(H_2PO_4)_2$, marked with MCP, (2) raw GA ash and (3) lime-free gasifier ash (lf-GA.) Detailed information on the methodology and additional scenarios can be found in literature positions marked with [16], [17].

1.7 P leaching measurements

One of the main risks associated with P fertilizers is eutrophication of water bodies. In this study P mobility in ash has been tested using water loads ranging from 0.1 to 200 ml/g. Leaching of P from soil columns amended with GA was investigated for one critical P application rate (205 kg P/ha corresponding to 91 mg P/kg soil dm, which is 10 times barley normal dose) as a function of precipitation rate (9.5 and 2.5 mm/h). Two kinds of soil were used: sandy soil from Jyndevad (Denmark) with high P sorption capacity (agricultural soil) and filter sand (97.5 % coarse sand) supplied from Dansand A/S, Silkeborg (Denmark) with low P sorption capacity (reference soil).

Ash characterization

Indirect spectrometric and direct X-ray analyses of ash showed that the main component of GA is calcium (Ca). The relatively high content of P (54.4 g/kg) and K (34.7 g/kg) makes the ash a good candidate for fertilizer. Other elements are iron (Fe), sulfur (S), magnesium (Mg) and sodium (Na). Among heavy metals, the greatest concentrations were recorded for zinc (Zn), strontium (Sr) and copper (Cu). Main minerals found in the ash are calcite and quartz. P in ash occurs in the form of a mixture of carbonate- and hydroxy-apatite, which forms various, irregular crystals with dimensions up to 100 μm.

Tab. 1. Concentration of chosen elements in the ash (ICP-OES). SD denotes standard deviation.

Chemical Composition	GA mg/kg	(SD)	Chemical Composition	GA mg/kg	(SD)
Total Ca	310867	12185	Total Na	9132	635
Total P[1]	54371	4326	Total Mn	703	42
P soluble in water[2]	0.1	0.043	Total Zn	1044	17
P soluble in ammonium citrate[2]	45	2.4	Total Sr	402	19
Total K[3]	34736	363	Total Cu	255	0.26
Total Fe	29230	1753	Total Ni	20	0.09
Total S	21114	135	Total Pb	0.93	0.21
Total Mg	20672	1190	pH (1:25 H_2O)	12.0	

[1] Measured by UV-VIS spektrometry on H_2SO_4 extracts 12

[2] Shown as % of Total P

[3] Measured by Energy Dispersive X-Ray Fluorescence (EDXRF) 12

For more information on the distribution of nutrients and heavy metals in various fractions of ash (depending on ash particle diameter) and the fraction of water-soluble elements and concentrations in the ash lf-GA after the removal of lime can be found in literature positions marked with [12], [15].

2. Fertilization with ash

2.1 Plant yield and P uptake

Figure 1 a-b shows that the growth of barley fertilized with GA ash in field conditions on neutral soil in Denmark was 20% higher compared with unfertilized soil, but a bit weaker than the growth of barley fertilized with mineral fertilizer DSP for a dose of 20 kg P/ha. However, calculated total P uptake by plant per unit area, the ashes were comparable to the DSP (1.2-1.4 g P/m^2). This property evidences that ash could be used to

maintain normal P over long time without a necessity of re-fertilization in the next growing season. Fertilization with ExL extract was comparable to the use of DSP, both in terms of plant yield and P uptake. An additional advantage of using ash as a fertilizer is the neutralization of acidified soil (soil pH increased from 4.9 to 7.9 within 3 months). Studies on the growth of grass on acidic soil showed that only in the first month, ash with no lime (lf-GA) provided a slightly higher plant yield than the untreated GA (data not shown) because lime was being gradually dissolved by the acidity of the soil. However P uptake from lf-GA was 2-3 times higher in each month of growth in comparison with GA (Figure 2 a-b).

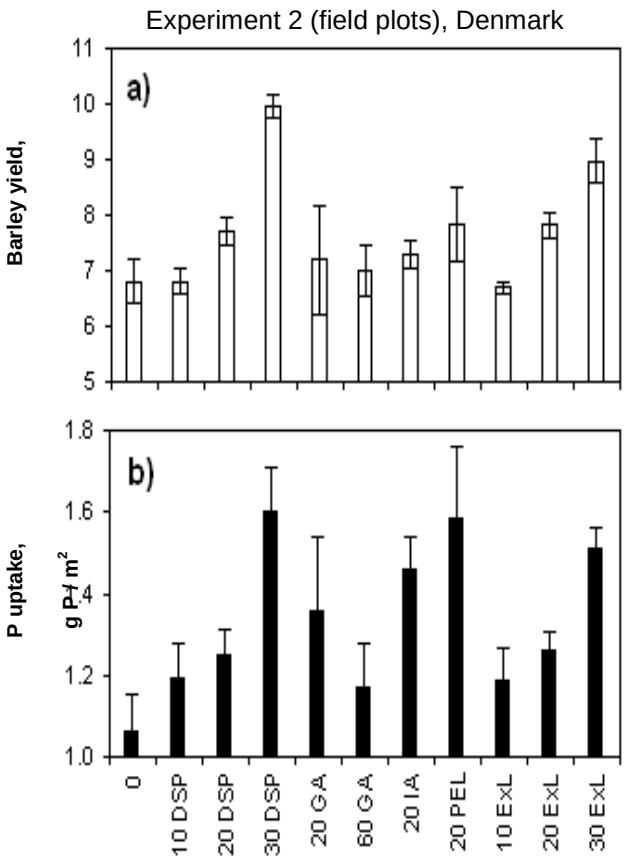


Figure 1. The effect of fertilizers (ashes, pellets and extract) on a) barley dry matter yield and b) P uptake on sandy, Danish soil with neutral pH in comparison to mineral fertilizer (DSP)

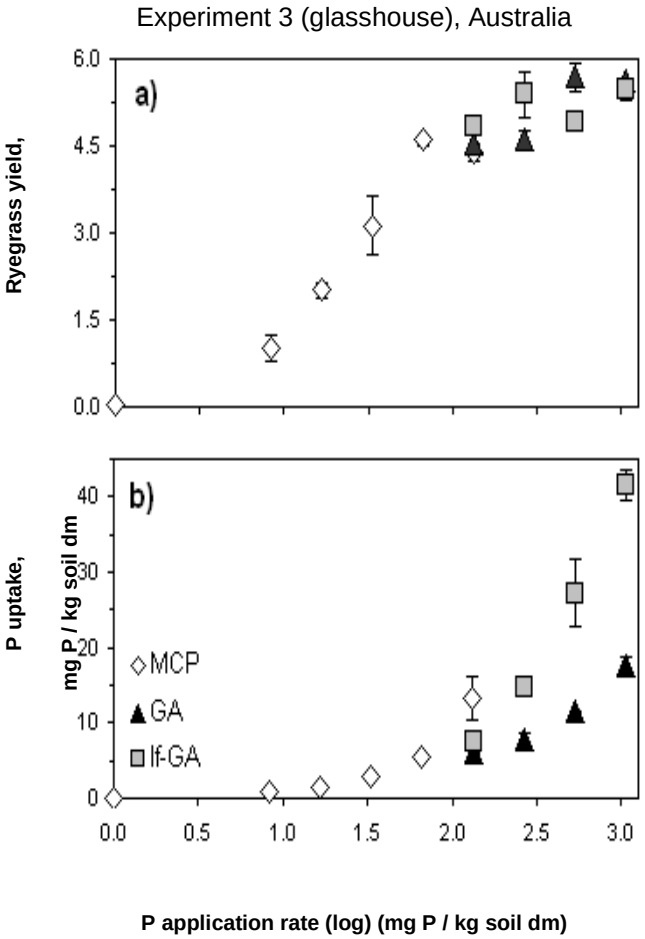


Figure 2. The effect of fertilization of untreated ash (GA) and ash with no lime (lf-GA) on a) ryegrass yield and b) P uptake in Australian, acidic, sandy soil in comparison with mineral fertilizer (MCP). Data only for the third, last harvest (after 3 months)

2.2 Reducing the eutrophication of water bodies

P leaching from the ash GA was very insignificant in a wide load range of solvent (water) and was less than 54 mg/l (about 0.1 % of total P in the ash). The content of P in leachate from the reference soil fertilized with ash was up to 40% higher compared with unfertilized soil for both irrigation levels (Figure 3a), while it was difficult to estimate ash originating P from the agricultural soil at high irrigation rate (9.5 mm/h) (Figure 3b). This was due to high sorption properties of this soil. For lower irrigation rate (2.5 mm/h), P leaching from this soil fertilized with ashes was 66 % lower compared with higher irrigation rate (Figure 3b). The length of the response time of ash with the soil before watering (5 weeks) had no effect on reducing P leaching from fertilized soils.

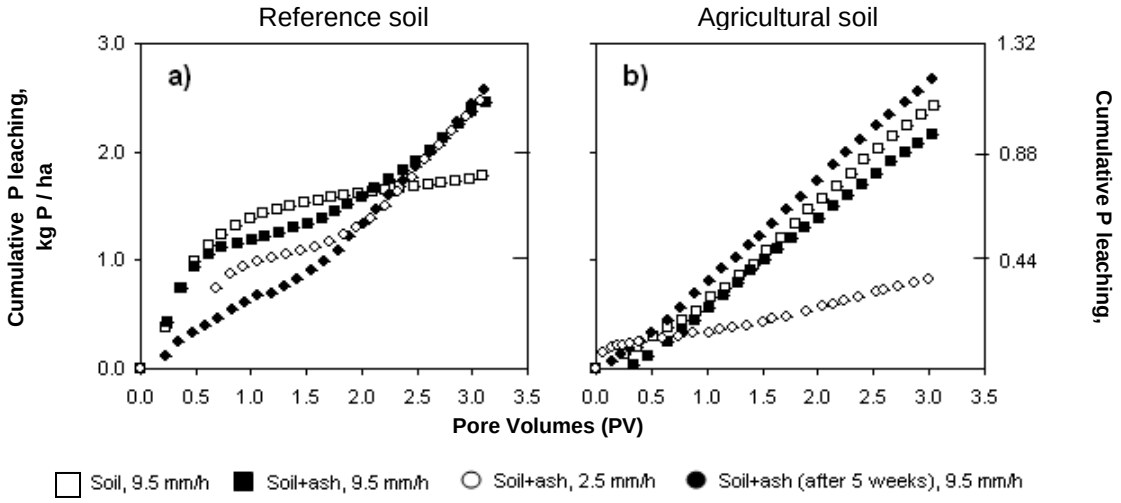


Figure 3. Cumulative P leaching from (a) reference soil and (b) agricultural soil, fertilized with ash (GA) for 3 scenarios; soil and ash and immediate, high irrigation (black square), light to moderate irrigation (white circle), high irrigation after 5 weeks of ash-soil self hardening (black circle) compared with unfertilized soil (white square), as a function of pore volumes leached

As a result, the total amount of P released from soils fertilized with ashes was only 2.5-2.7 kg P/ha (Figure 3) which was almost 80 times (reference soil) and more than 10 times (agricultural soil) less than the soil fertilized with DSP (data not shown). During the flow of water through the soil column packed with reference soil, only 0.35 % of total P leached from the ash while the DSP has lost even 97 % of its P. In all cases, the amount of water transported through the column was 730-760 ml which corresponded to three soil pore volumes (PV) and this is equivalent to a 6-month precipitation in most European countries. More information can be found under the literature position labeled with [13].

Extraction of P with sulfuric acid

Measurements of the solubility of P and Zn from the ash GA through single-, 3-hour extraction using 4M H_2SO_4 showed that the optimal conditions for recovery of 94% P and 55% Zn acid load was 0.98 kg H_2SO_4/kg GA (10 mol H_2SO_4/kg GA) and concentration of 0.6 M. This corresponds to 19.2 kg P H_2SO_4/kg P recovered, which is about 3 times more than the acid requirements for P recovery in phosphate fertilizer industry. Step-wise extraction using the same acid at constant concentration (4 M), but with increasing load allowed to recover 63% of P with lower solubility of Zn (4%) for the maximum load (29 mol H_2SO_4/kg GA), but the acid requirements in this case were significantly higher (82 H_2SO_4 / kg P recovered). Most of the P and Zn were eluted in the range 1.5<pH <4.

Summary

Ash from thermal gasification of the fermentation residue from agricultural biogas plants is suitable for the reuse as phosphate fertilizer phosphorus in the cultivation of barley and ryegrass contributing to the circulation of P and other elements in the ecosystem. The presented thermal treatment technology not only provides the reduction of agricultural waste, but also through the positive impact on P balance in the ecosystem, helps to reduce the effects of eutrophication of water bodies. In addition, the control of alternative sources of P is becoming more significant in light of shrinking phosphate rock resources, as evidenced by the increasing price of P fertilizers. Another advantage is the production of renewable energy. However, further research on long-term (> 2 years) fertilization studies as well as distribution and transportation of various fractions of ash elements in soil and plants are in need to better understand the mechanisms of interaction of this material with the environment.

Literature:

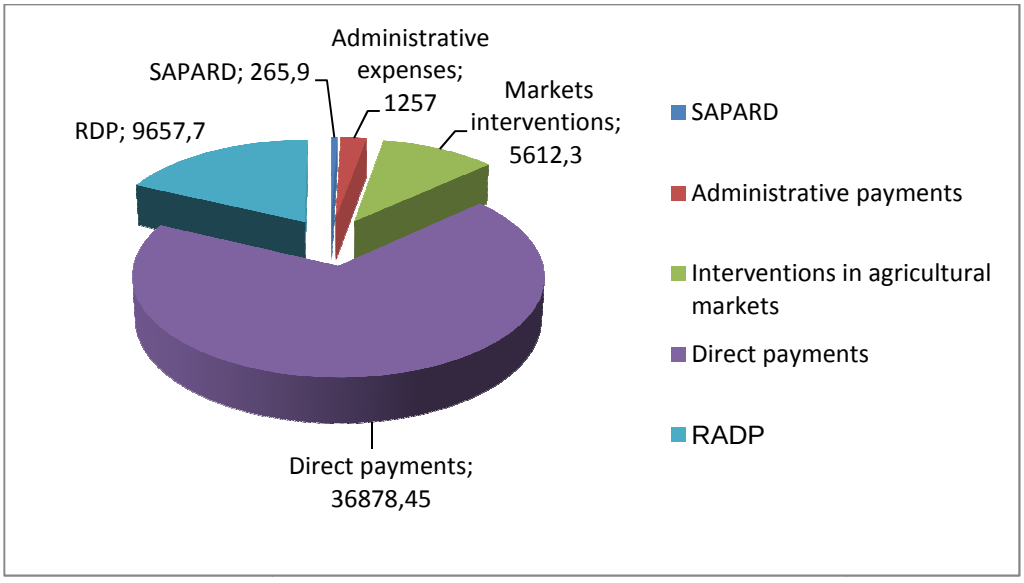
1. Pig International World market Review, 2008. Pig International, 38, 6-10.
2. De Jonge, L.W., Møldrup, P., Rubæk, G. H., Schelde, K., Djurhuus, J., 2004a. Particle leaching and particle-facilitated transport of phosphorus at field scale. Vadose Zone Journal, 3, 462-470.
3. Yang, J., He, Z., Yang, Y., Stoffella, P., Yang, X., Banks, D., Mishra, S., 2007. Use of amendments to reduce leaching loss of phosphorus and other nutrients from a sandy soil in Florida. Env Sci Pollut Res, 14, 266–269.
4. Yang, Y., He, Z., Stoffella, P. J., Yang, X., Graetz, D.A., Morris, D., 2008. Leaching behavior of phosphorus in sandy soils amended with organic material. Soil Science, 173, 257-266.
5. Weaver, D.M., Ritchie, G.S., 1994. Phosphorus leaching in soils amended with piggery effluent or lime residues from effluent treatment. Environmental Pollution, 84, 227-235.
6. Møller, H.B, Lund I., Sommer, S.G., 2000. Solid-liquid separation of livestock slurry: efficiency and cost. Bioresource Technology, 74, 223-229.
7. Zhang, R.H., Lei, F., 1998. Chemical treatment of animal manure for solid-liquid separation. Transactions of the Asae, 41, 1103-1108.
8. Poulsen, T. G., T. Prapaspongsa, Hansen, J. Aa., 2008. Energy and greenhouse gas balances for pig manure using alternative treatment options. Proceedings of the ISWA/WMRAS World Congress, Singapore, November, 2008.
9. Stoholm, P., Ahrenfeldt, J., Henriksen, U., Gómez, A., Krogh, J., Nielsen, G. R., Sander, B., Danish Fluid Bed Technology ApS (DFBT), c/o CAT, Technical University of Denmark (DTU-Risø), University of Castilla – La Mancha, Anhydro A/S, DONG Energy A/S., 2008. The Low Temperature CFB Gasifier – 500 kW test on biogas fiber residue. Proceedings of the 16th European Biomass Conference, 2-6 June, Valencia, Spain.
10. Babu, B.S., 2006. Perspectives on biomass gasification, IEA Bioenergy Agreement. Proceedings of the workshop; Task 33: Thermal Gasification of Biomass, Vienna, 3 May 2004, 5-7.
11. Stoholm, P., 2007. Gasification of problematic biofuels. Bioenergy research 20, 8-10.
12. Kuligowski, K, Poulsen, T. G., Stoholm, P., Pind, N., Laursen, J., 2008. Nutrients and heavy metals distribution in thermally treated pig manure. Waste Management and Research 26, 347-354.
13. Kuligowski, K., Poulsen, T. G., 2009. P leaching from soils amended with thermally gasified piggery waste ash. Waste Management 29, 2500-2508.
14. Kuligowski, K., Poulsen, T. G., 2010. Phosphorus and zinc dissolution from thermally gasified piggery waste ash using sulphuric acid. Bioresource Technology 101, 5123-5130.
15. Kuligowski, K., Gilkes R. J., Poulsen, T. G., Yusiharni, E. B. The composition and dissolution in citric extractants of ash from the thermal gasification of pig manure. Submitted to Chemical Engineering Journal (April 2010).
16. Kuligowski, K, Poulsen, T. G., Rubæk G. H. and Sørensen, P. Plant availability to barley of phosphorus in ash from thermally treated manure. Submitted to European Journal of Agronomy (May 2010).
17. Kuligowski, K., Gilkes R. J., Poulsen, T. G., Yusiharni, E. B. Ash from the thermal gasification of pig manure – effects on ryegrass yield, element uptake and soil properties. In preparation for Australian Journal of Soil Research.

Supporting Polish agriculture by cap compatible to the nature and environment protection rules

Maria Staniszewska
Polski Klub Ekologiczny
mw.staniszewska@gmail.com

Since May 2004 Poland as the EU Member, is obliged to introduse the rules of Common Agricultural Policy (CAP). Main goals of CAP still have been: increasing agricultural productivity, ensuring adequate supply of agricultural products, stabilisation of agricultural markets, ensuring suitable life conditions to the rural residents, enabling at the same time to the consumers to buy agricultural products for "reasonable prices" (low *for consumers*). To keep this two last goals, being contradictory to each other by themselves, in 1992 direct payments have been introduced that recompensed to the farmers decreasing incomes caused by significant decrease of warranted prices, because after all the consumer had right to low prices. Result: EU produced mountains of cheap food. Only serious problems with the environment, increasing contamination level of surface waters with nitrates and decline of the biodiversity have caused the pressing on reforms and in 2003 the payment system partly separated from produce quantity has been introduced, because its primary goal would be supporting agricultural incomes. The intervention in agricultural markets has been not given up totally. Also the Rural Development Plan (RDP) has appeared, with dedicated initially ca. 10% of the CAP budget. Such an amount in the years 2004–06 Poland has dedicated for RDP.

Total CAP budget in EU for the years 2007–2013 is 52 628,7 billions € and its share is following:



From this share it arises that ca. 20% is dedicated for RDP. Compared with preceding budget period the percentage of expenses for RDP has been duplicated. This percentage in Poland is similar.

Single Area Payment Scheme (SAPS) is obligatory in our country. Means are paid on hectare of arable land maintained in Good Agricultural Culture. Receiving direct payments by farmers has been conditioned of maintaining grounds composing the farm in Good Agricultural Culture according to the standards of environment

protection and observing the requirements of the environment, identification and registering animals (A area), public health, animal and plant health (B area) and animal welfare (C area). In 2010 C area is obliging. The rules of Good Agricultural Culture in 2010 are: cultivate the same plant species not longer than three year, laying fallow arable ground, removing grass from meadows and pastures, maintaining small ponds, ditches, buffer areas, having water supply and sewage effluent disposal consents to water arable areas in amount greater than 5 m^3. These are rules not especially sharp and far from Good Agricultural Practice, which are obliging e.g. in agro-environmental programs.

When analyzing the way of spending the direct payments we must realize that 20% of biggest farms received in 2004 64% of direct payments. It results from this that from payments great industrial farms profited most, but not smaller family farmers. One may risk the statement that the CAP in actual form supports agricultural corporations but not the farmers. Estimated share of payments depending on the number and size of farms indicates that about 60% of smallest Polish farms (up to 5 ha) receives ca. 16% of total amount of direct payments. Then 1 % of the greatest farms (>50 ha) receives about 26% of payments. The greatest farms and agricultural companies in Poland received payments of 1 million PLN/year [1]. Such a kind of direct payments distribution causes unequal share of payments, not ensuring safety at work and adequate live conditions to small farms. This evidently influences on the development of industrial agriculture preferred by great farms, and by this, it increases the pressure on the environment.

Looking at the realization in Poland of RDP that the objective is to modernize agriculture and quicker development of rural areas – total budget is 17,2 billions €. Sharing money into individual axes is presented in the table below [2]:

	RDP	State budget	Total	%
Axis 1. Improving competitiveness of agricultural and forestry sectors	5,4	1,8	7,2	41,9
Axis 2. Improving natural environment and rural areas	4,4	1,1	5,5	32,0
Oś 3. Life quality in rural areas and differentiating rural economy.	2,6	0,9	3,5	19,8
Axis 4. LEADER	0,6	0,2	0,8	4,7
Technical assistance	0,2	0,1	0,3	1,7
TOTAL	13,2	4,0	17,2	100

Axis 2 is hardly 1/3 of measures which we really dedicate for environment protection in connection to agriculture. Axis 1 – are mainly structural rents, payments for the Less Development Areas (LDA), supporting producers groups and afforestation, and, first of all, new activities launched RDP, such as modernizing farms, differentiating non-agricultural activity, increasing basic added value or agricultural and forestry produce, improving and developing the infrastructure connected to development and adjustment of the agriculture and forestry, farmers' participation in food quality systems. Axis 3 is mainly the social development of rural areas realized through such activities as: differentiating towards non-agricultural activity, creating and developing micro-enterprises, basic services for rural economy and residents of rural areas, renovation and rural development. Axis 4 LEADER is to create the co-operation and implementation local development strategies. Poland's accession to EU has brought out many profitable changes in the agriculture and rural areas. Rural residents have received ability to profit from economic, social and environmental changes. Since the accession the Agriculture Development and Modernization Agency has paid for farmers, processors and rural residents more than 75,3 billion PLN, in this – 10,2 billion PLN in the scope of RADP 2007–13. Significant part of these measures (63%) arose from EU budget [3]. Unfortunately, the environment did not profit at this, the effluence from non-point sources still contaminates surface waters, because the use of nitrogen fertilizers in the years 2007–08 has already exceeded the use of years 1989–90 [4]. Besides, the biodiversity decreases and indicating 1,47% areas sensitive on contamination with nitrates of agricultural in country scale will not improve the quality of waters.

Looking at the rules of payment arising from the 1st Pillar – direct payments, as well 2nd Pillar – RADP, really on the system protecting environment we are dedicating hardly 6,2%, so they will not influent on improving environment of rural areas, what more, natural resources, we were proud of them at the moment of accession to EU, will be spoiled in the result of uncontrolled development of industrial agriculture stimulated additionally with the payments. It seems that existing reforms of CAP does not fulfil their pro-environmental task and still CAP more damages than helps to the environment, not ensuring also the food safety to consumers, but they contribute only to lowering price of food products.

Literature:

1. Przyszłość polityki rolnej przegląd budżetu UE w latach 2008-9 – opracowanie UKIE
2. Program Rozwoju Obszarów Wiejskich na lata 2007-2013
3. Biuletyn Informacyjny 11-12.2009 str. 21-24
4. GUS Ochrona środowiska 2009

Can large-scale animal production be sustainable?

Jakub Skorupski
Federacja Zielonych GAJA
jakub@gajanet.pl

INTRODUCTION

Intensive animal farming causes a number of hazards, which may have a negative impact on the Baltic Sea Region environmental conditions. The possible impact concerns all components of the environment: air, soil and – what is most important for the Baltic Sea – water (surface water, subsoil water, rainwater). Negative effects of industrial animal farming have also social, economical and legal connotations.

The most inconvenient sources of pollution are big factory farms, in which even a few thousands of animals are kept. This particular kind of animal farming is called **industrial** (or **factory**, **intensive**) **animal** (**livestock**) **farming**. In the *Council Directive 96/61/EC of 24th September 1996 concerning integrated pollution prevention and control* industrial animal farms are defined as plants, that are obligated to posses **integrated permits** (which includes all pollutant emission from particular plant to all environment components), that is with livestock density for unless 40 000 individuals (poultry), 2 000 pigs over 30kg, or 750 sows.

The most disadvantageous, from environmental point of view, is litter-free breeding, which causes great amounts of liquid manure[5]. The manure is a natural, liquid fertilizer, which contains of feces, urine and water. This is a highly concentrated fertilizer with heavy content of mineral components, microbiologically polluted. Improperly stored, managed and utilized manure can cause many serious threats, both to natural environment and to man's health[6].

In comparison, dung is less concentrated animal natural fertilizer, produced in litter rearing farms. Dung contains more organic matter, has higher temperature than liquid manure (worse development conditions for pathogenic microorganisms) and for that reasons is considered as more environmentally-friendly[7].

Negative influence of industrial animal farming depends on the level of livestock density and on the other hand – on technology of the breeding and management of the produced liquid manure.

It can be said, considered all above mentioned arguments and species' (livestock's) –quantity's (density's) structure, that the less environmentally-friendly and bringing about the most serious social conflicts in Poland (likewise in whole the Baltic Sea catchment area) is industrial pigs farming, which will be considered by present paper[8].

LEGAL STATUS OF INDUSTRIAL ANIMAL FARMING IN POLAND

The industrial animal sector (business) is being regulated by number of European Union's legal acts, from among which the most important are *Council Directive 96/61/EC of 24th September 1996 concerning integrated pollution prevention and control* (***IPPC Directive***) and *Council Directive 91/676/EEC of 12th Decem-*

I.3.1.5. [5] Wojewódzki Inspektorat Ochrony Środowiska w Szczecinie. Analiza oddziaływania rolnictwa na środowisko wodne w województwie zachodniopomorskim. Potencjalne ograniczenia w rozwoju produkcji zwierzęcej. Szczecin 2005, Łysko A. Phd, Cyglicki R. Report on agricultural pollution from industrial hog Rising farms In Poland. Szczecin 2004
I.3.1.6. [6] Wojewódzki Inspektorat Ochrony Środowiska w Szczecinie. Analiza oddziaływania rolnictwa na środowisko wodne w województwie zachodniopomorskim. Potencjalne ograniczenia w rozwoju produkcji zwierzęcej. Szczecin 2005, Łysko A. Phd, Cyglicki R. Report on agricultural pollution from industrial hog Rising farms In Poland. Szczecin 2004
I.3.1.7. [7] Łysko A. Phd, Cyglicki R. Report on agricultural pollution from industrial hog Rising farms In Poland. Szczecin 2004
I.3.1.8. [8] Skorupski J. (red.). Report on industrial swine and cattle farming in the Baltic sea catchment area. Uppsala 2007

ber 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (***Nitrates Directive***).

There are also some general recommendations, like *Reference Document on Best Available Techniques* (**BAT**) *for Intensive Rearing of Poultry and Pigs*, European Commission, July 2003 (**BREF**), *BS EN 13725:2003 Air quality. Determination of odour concentration by dynamic olfaktometry* (standard of odour air quality of European Committee of Standardization), ***Good Agricultural Practice Code***, ***Best Environment Practice*** (**BEP**), as well as international conventions and agreements, e.g. *Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area*, 1992, entered into force on 17 January 2000 (**The Helsinki Convention**), an *Agenda 21 for the Baltic Region* (an agricultural sector activities).

On the national level intensive livestock rearing is regulated by number of legal acts. The rules of manure application (as natural fertilizer) are defined in the *Fertilizer and Fertilization Act*, *Good Agricultural Practice Code,* and in *Ministry of Agriculture Decree on application of fertilizers and education in fertilization (Dz. U. Nr 60, poz. 616 of June 1st, 2001)*. According to the legislation spreading of manure is not allowed: between 1st December and 28th February, during poor weather conditions (flooded, frozen, or snow covered ground), near the water intake protection zone, water reservoirs, watercourses or seaside resorts, on slope fields without plant cover, nor directly on crops intended for food and fodder production. There are also specific regulations on fertilization methods, e.g. order of ploughing the fertilized soil after the fertilization, technical solution of manure spreading, etc.

Fertilizing in the Nitrate Vulnerable Zones is restricted through the *Water Low Act (Dz. U. Nr 115, poz. 1229 of July 18th, 2001)*, the *Environmental Protection Act (Dz. U. Nr 62, poz. 627 of April 27th*, 2001) and through two Ministry of Environment Decrees regarding Nitrate Vulnerable Zones (*Dz. U. Nr 241, poz. 2093 of December 23rd, 2002* and *Dz. U. Nr 4, poz. 44 of December 23rd, 2002*).

According to the *Fertilizer and Fertilization Act* the minimum level of capacity for storing of manure should allow for 4 months storing or 6 months in the Nitrate Vulnerable Zones. *Annex III* to *Helsinki Convention*, concerning the 6 months period of storing manure, is not obeyed. Also *Good Agricultural Practice Code* recommends such storage period.

Polish law requires enclosed reservoirs for manure. *The Good Agricultural Practice Code* contains a number of non-obligatory recommendations for reducing ammonia emission from manure storage.

Owners of IPPC-farms in Poland are obliged to dispose 70% of produced manure on their fields in accordance with fertilization plans, which have to be approved by Regional Agricultural Station.

It is noticeable that above mentioned legal acts are not common obeyed, as it is said in a document of the Polish Supreme Chamber of Control's, published after the newest control of industrial animal farms in Poland[9].

STATISTICAL DATA

There are 18 812 200 pigs in Poland (November 2006)[10] and the livestock density is equivalent to 100 pigs per 100ha of farmland[11]. The stocks of pig in the whole Baltic region counts around 50 000 000 animals[12].

I.3.1.9. [9] Informacja o wynikach kontroli sprawowania nadzoru nad wielkoprzemysłowymi fermami trzody chlewnej. Najwyższa Izba Kontroli. Warszawa 2007

I.3.1.10.[10] Pogłowie trzody chlewnej w dniu 30 listopada 2006 roku. Central Statistical Office. http://www.stat.gov.pl/dane_spolgosp/rolnic_lesnict_srodowi/poglowie_trzody/2006/30_XI/index.htm

[11] Wojewódzki Inspektorat Ochrony Środowiska w Szczecinie. Analiza oddziaływania rolnictwa na środowisko wodne w województwie zachodniopomorskim. Potencjalne ograniczenia w rozwoju produkcji zwierzęcej. Szczecin 2005

There are 126 industrial pig farms and 524 industrial poultry farms obligated to posses integrated permits in Poland.

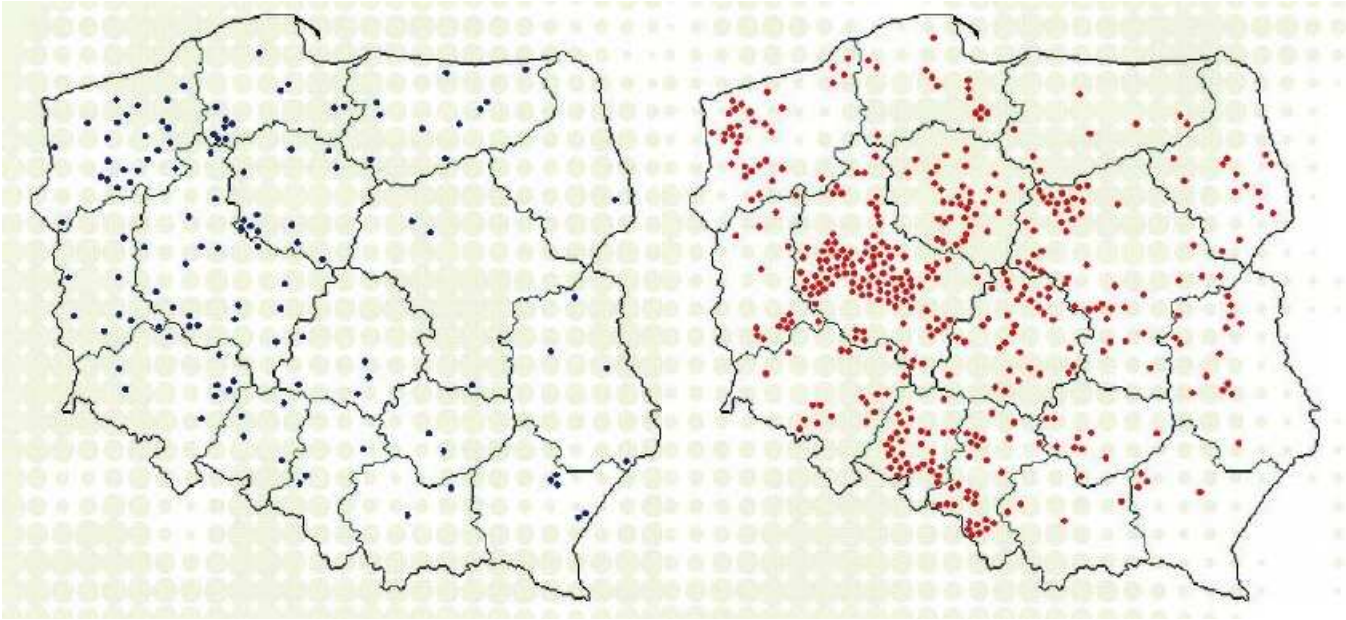


Fig. 1. Location of pig (red dots) and poultry (blue dots) industrial large-scale farms in Poland.

Till the end 0f 2007 40 of those farms did not posses integrated permits and 18 have never applied to get it[13] (according to Environmental Protection Law Act large-scale industrial pig farms are obliged to obtain integrated permits before 30th October 2007). Nowadays 4 more factory farms are being set[14].

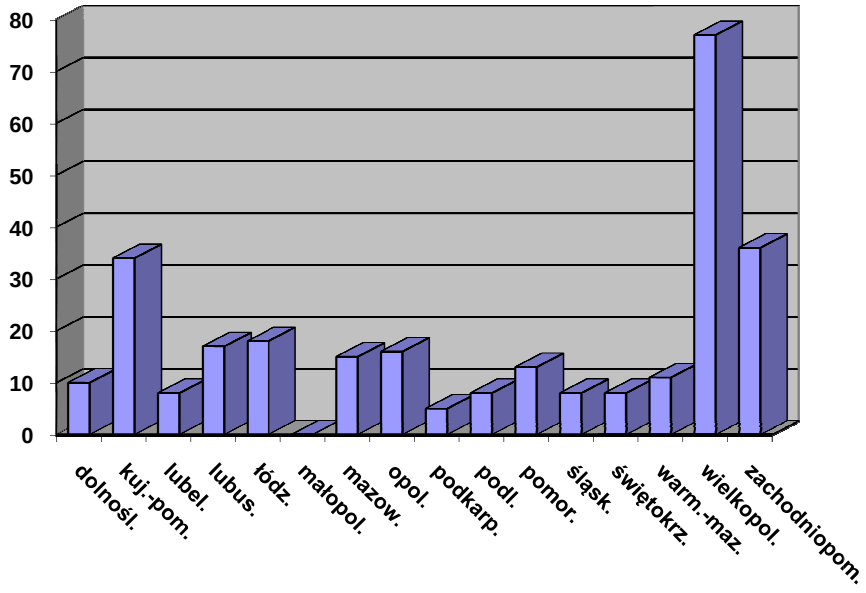


Fig. 2. The number of integrated permits given to industrial pigs and poultry farms located in particular provinces of Poland (http://ippc.mos.gov.pl/preview/pl/wnioski.html).

I.3.1.11.[12] Skorupski J. (red.). Report on industrial swine and cattle farming in the Baltic sea catchment area. Uppsala 2007
I.3.1.12.[13] Informacja o wynikach kontroli sprawowania nadzoru nad wielkoprzemysłowymi fermami trzody chlewnej. Najwyższa Izba Kontroli. Warszawa 2007
I.3.1.13.[14] Skorupski J. (red.). Report on industrial swine and cattle farming in the Baltic sea catchment area. Uppsala 2007

In 2006 there were 8 686 farms holding 200 or more pigs. The total number of animals breed on those farms was 3 694 211[15].

In 2004, the organic production included 1 169 500 tons of pork, 1 551 sows, 10 453 porkers and 5 914[16]. According to the Centre of Agricultural Consultancy there are 57[17] organic pig farms accordant with Organic Farming – EC Control System (*Regulation (EEC) No 2092/91*) (in comparison, in Denmark the overall number of such farms is approximately 364[18]).

3 GROUPS OF THE MAIN PROBLEMS CONNECTED WITH INTENSIVE ANIMAL REARING

A) ENVIRONMENTAL PROBLEMS

- **water pollution** – the main danger related to agricultural usage of liquid manure is leakage of the nutrition microelements (like nitrogen and phosphorus) to the ground water and surfaces water, connected with **overfertilization** of fields[19];
- **eutrophication** – "overfertilization" of inland and sea waters (algal blooms, decrease of fish population, , ecosystems modifications, loss of bottom fauna, lack of oxygen in waters);
- **microbiological pollution** – *Staphylococcus sp.*, fecal streptococci, *Escherichia coli*, rubella bacilli, tubercle bacilli, foot-and-mouth disease viruses, various fungi and parasites are microbes connected to the liquid manure produced by pig farming; this kind of microbiological water pollution constitutes a sanitary danger[20];
- indirect and secondary effect that contributes to formation of **acid rain** and increased **greenhouse effect**. (greenhouse gas emission harming the ozone layer)[21].

B) SOCIAL AND ECONOMICAL PROBLEMS

- **air pollution** – the anoxic (without oxygen) fermentation of manure, produces such gases as ammoniac, hydrogen sulfide, carbonyl compounds, amines, mercaptans, dinitrogen monoxide etc. These gases causes offensive **odours**, danger for human health (e.g. pernicious effect on air-stream mechanism transformation of haemoglobin into hematine, plugged nose, lacrimation, headache, stress6[22];
- **loss of recreation places** – for example, the liquid manure from farms in the Goldap's health resort neighborhood caused massive fish oxygen starvation in nearby lakes (2006)[23];
- **high costs of drinking water purification**;
- **degradation of cropland** – improper storage and usage of liquid manure;
- farms' location in direct neighborhood of **Natura 2000** areas and different protected or valuable areas and the **Nitrate Vulnerable Zones**[24].

C) LEGAL PROBLEMS

- **fertilization plans are not taken into account when issuing integrated permits**;
- fertilization plans are the only document, which can prevent excessive nitrogen input; unfortunately, they do not contain detailed **fertilization programmes** nor do they oblige the owner to conduct detailed nitro-

[15] Pogłowie trzody chlewnej w dniu 30 listopada 2006 roku. Central Statistical Office. http://www.stat.gov.pl/ dane_spolgosp/rolnic_lesnict_srodowi/poglowie_trzody/2006/30_XI/index.htm

I.3.1.14.[16] Rolnictwo ekologiczne w Polsce w 2004 roku. Agricultural and Food Quality Inspection . Warszawa 2005
I.3.1.15.[17] http://www.odr.net.pl/rolnictwo_ekologiczne/?
I.3.1.16.[18] Danish Plant Directorate, 2002 http://www.sinab.it/sezioni/sint/allegati_sint/22/StatsDK2.pdf
I.3.1.17.[19] A Strategy for Ending Eutrophication of Seas and Coasts. Swedish Environmental Advisory Council Memorandum 2005:1. Stockholm 2005 Antonowicz A.. Report on polish industrial farming as a source of pollutions for the Baltic Sea. Szczecin 2006
I.3.1.18.[20] Łysko A. Phd, Cyglicki R. Report on agricultural pollution from industrial hog Rising farms In Poland. Szczecin 2004
I.3.1.19.[21] Łysko A. Phd, Cyglicki R. Report on agricultural pollution from industrial hog Rising farms In Poland. Szczecin 2004
I.3.1.20.[22] http://www.halat.pl/meatfactory.html , Steinheider B. Environmental odours and somatic complaints. Zentralblatt für Hygiene und Umweltmedizin 202. 1999, Nimmermark S. Odour influence on well-being and health with specific focus on animal production emissions. Annals of agricultural and environmental medicine.11. 2004
I.3.1.21.[23] http://elk.wm.pl/?&main=17&c=110,3,21317,,
I.3.1.22.[24] Król K., Sokol A. Poskramianie azotu. Ekoprofit. 82. Katowice 2006

gen balance twice a year in order to define the current capacity of the soil (**the lack of permanent monitoring of the soil quality**);

- the Polish Ministry of Agriculture refuses public access to information about fertilization plans claiming that this is market sensible, private information; local communities around big farms have been entirely deprived of the possibility of controlling proper manure management; present situation shows that ***Aarhus Convention*** **principles regarding access to environmental information not are followed in Poland**;
- **deficiency of the Helsinki Convention implementation** – common failure to observe the Annexe III;
- **the lack of correspondence between EU law and national law, with regard to the definition of installations** – the Polish definition attributes the obligation of possessing integrated permits to the owner of the system, not to the installation itself (the latter is clearly stated in EU *IPPC Directive*);
- **Poland does not have any regulations concerning air odour quality** (the *Limitation of Odour Emission Act* is being discussed); in this situation there are no legal procedures that can be used if a farm causes odour emissions, which is often troublesome for local societies;
- since the nineties last century there has been several examples of **infringements of the law connected to activities of the pig farms** belonging to the Smithfield Foods concern (American enterprise) and the Poldanor Company (Danish enterprise)[25];
- **problems with inspection authorization of Regional Environmental Protection Inspectorates and local authorities**, which in some cases has powers, but do not make use of it;
- despite the fact that the ***Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs*** (**BREF**) is available in polish language, it **is not commonly applied**;
- **ineffectiveness of industrial farms controls** run by the Veterinary Inspection, the Environmental Protection Inspection and Sanitary Inspection[26];
- **insufficient cooperation and coordination** of activities, connected with industrial animal farms control, between institutions mentioned above[27];
- **disregard of building regulations** by factory farms, stated during Main Office of Architectonic Supervision's controls[28];
- **not taking local community voice** under consideration during IPPC license process and farms localization.

THE WAYS TO ACT AGAINST NEGATIVE EFFECTS OF INDUSTRIAL ANIMAL FARMING

Efficient ways to act against negative effects of the factory fattening, recommended many times by Green Federation GAJA, Coalition Clean Baltic, HELCOM and also enclosed in Baltic Action Plan or the Polish Supreme Chamber of Control conclusions and recommendations, are[29]:

- considering factory farms as HELCOM'S POINT HOT SPOTS;
- detailed inspection of abiding legal standards in regards to the deadline of 30th October 2007 – until then factory farms were obliged to get integrated permits;
- increasing local authorities participation in control and law enforcement process, connected with industrial animal sector;
- information about IPPC-plants should be published and common available (actualization and expanding of the Ministry of Environment's internet database and European Pollutant Emission Register (EPER), which contains information only about 13 factory fattening farms, 2 poultry farms and 4 farms with mixed way of production)[30];

[25] http://www.gajanet.pl/rubrique.php3?id_rubrique=76, http://www.ppr.pl/artykul.php?id=120843

I.3.1.23.Łysko A. Phd, Cyglicki R.. Report on agricultural pollution from industrial hog Rusing farms In Poland. Szczecin 2004

I.3.1.24.[26] Informacja o wynikach kontroli sprawowania nadzoru nad wielkoprzemysłowymi fermami trzody chlewnej. Najwyższa Izba Kontroli. Warszawa 2007

I.3.1.25.[27] Informacja o wynikach kontroli sprawowania nadzoru nad wielkoprzemysłowymi fermami trzody chlewnej. Najwyższa Izba Kontroli. Warszawa 2007

I.3.1.26.[28] Informacja o wynikach kontroli sprawowania nadzoru nad wielkoprzemysłowymi fermami trzody chlewnej. Najwyższa Izba Kontroli. Warszawa 2007

I.3.1.27.[29] www.gajanet.pl, www.ccb.se, www.helcom.fi, HELCOM Balic Sea Action Plan. HELCOM Ministerial Meeting. Kraków 2007, Informacja o wynikach kontroli sprawowania nadzoru nad wielkoprzemysłowymi fermami trzody chlewnej. Najwyższa Izba Kontroli. Warszawa 2007

[30] http://ec.europa.eu/environment/ippc/eper/index.htm

- promotion and increase the number of ecological livestock farms;
- using of biotechnological ways of liquid manure treatment (decrease foul smell emission, biological disinfection and sanitization, organic matter mineralization, biogas production, purification in farm's biological refineries – controlled fermentation, making use of "efficient microorganisms")[31];
- setting efficient law regulations on air's smell quality;
- full implementation of ratified Helsinki Convention;
- increasing the meaning and popularization of the *Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs* (BREF), *Good Agricultural Practice Code* and works of Agenda 21 in sector of industrial farms production;
- using of well balanced fodder for animals, to prevent animals from excretion a high number of nitrogen and phosphorus compounds.

I.3.1.28.[31] Szymański M. Wykorzystanie fermentacji beztlenowej do unieszkodliwiania gnojowicy przed jej rolniczym wykorzystaniem. Warszawa 1998, Engler C.R., Jordan E.R., McFarland M.J., Lacewell R.D. Economics and Environmental Impact of Biogas Production as a Manure Management Strategy. Dallas 1997, Chantsavang S., Sinratchatanun C., Ayuwat K., Sirirote P. Application of Effective Microorganisms for Swine Waste Treatment Bangkok 1991

Agri-environmental Programme 2007-2013

Aneta Kozłowska
Federacja Zielonych GAJA
anetak@gajanet.pl

After the accession to the European Union, Poland, the same as all member states, is using instruments of the Common Agricultural Policy which was appointed with Treaty of Rome on 25 March 1957 r. Primary objectives of the CAP focused on:

- increasing agricultural productivity by supporting, among others. technological progress,
- stabilize the agricultural markets,
- ensuring that rural populations of good living conditions,
- ensuring an adequate level of supply of agricultural products,
- enabling consumers to purchase products at low prices.

Objectives have been achieved, but unfortunately during the transition, shows a negative phenomenon from the perspective of economic and production, but mainly environmental, because the intensification of production has not proceeded in accordance with the principles of sustainable development.

In the case of agriculture, sustainable development means that apart from the basic function of agricultural production, rural areas also play an important role in environmental protection, landscaping, protection and conservation of natural habitats and a high level of biodiversity. Such problems have forced the Common Agricultural Policy need to carry out appropriate reforms.

One of the most important reforms was the Mc Sharry's reform, which began creating a new image of agriculture, involving the position of special emphasis on creating conditions for sustainable and balanced development of all rural areas and promotion of agriculture-friendly environment.

It is within this reform introduced instruments that accompany the Common Agricultural Policy, such as agri-environmental programme.

Agri-environmental programme is one of the actions of Rural Development Programme 2007-2013, whose primary objective is to prevent deterioration of the environment and natural values of rural areas.

The condition of accession to the agri-environmental programme is to have at least 1 hectare, prepering - using agri-environmental consultants –agri-environmental action plan, compliance unpaid minimum requirements, compliance with the requirements of the individual packages, and keeping a record of agri-environmental activities.

Agri-environmental payment is paid as a lump sum and constitutes compensation for the income foregone, additional costs incurred and transaction costs.

The programme is 5 years an action, during which the farmer agrees to comply with the minimum unpaid requirements:

- the minimum standard, ie good agricultural culture;
- cross-compliance requirements:

- environmental protection,
- public health, animal health, to report certain diseases and plant health,
- animal welfare,

- minimum requirements for fertilizer and plant protection products.

In addition, the farm, qualified for the payment must maintain the areas of permanent grassland and elements of the landscape which are not used for agricultural purposes.

The agri-environmental programme is available 9 packages:

1. Sustainable farming
2. Organic farming
3. Extensive permanent grassland
4. Protection of endangered bird species and natural habitats outside of Natura 2000 areas
5. Protection of endangered bird species and natural habitats in Natura 2000 areas
6. Preservation of endangered genetic plant resources in agriculture
7. Maintenance of genetic resources of endangered animal species in agriculture
8. Soil and water protection
9. Buffer zones

Packages are divided into variants, which are assigned to specific requirements.

Package 1 - sustainable agriculture

Management in sustainable farming consists in rational use of natural resources, allowing for limiting the negative impact of agriculture on the environment.

The sustainable management prevents the depletion of organic substance in the soil. The decomposition of organic substance has a very adverse impact on the environment due to the release of a large amount of mineral compounds, particularly nitrates, which may lead to the pollution of waters.

Observance of the correct selection and sequence of crops guarantees that the agrophagus population development may be limited, weed development is reduced and nitrate losses are limited.

Objective: Promotion of sustainable management system.

As part of this package is only one variant:

1.1 sustainable management system.

Package 2 - organic farming

The package covers agricultural holdings switching to organic farming methods and organic farms with valid certificate issued by authorised certifying unit in accordance with relevant legislation on organic farming.

Objective: Promotion of sustainable management system.

Available variants:

2.1/2.2 agricultural cultivations certified / in transition period

2.3/2.4 extensive permanent pasture with a certificate / in transition period

2.5/2.6 vegetable cultivations certified / in transition period

2.7/2.8 herbs cultivations certified / in transition period

2.9/2.10 horticultural and berry cultivations certified / in transition period

2.11/2.12 other horticultural and berry cultivations certified / in transition period

Package 3 - extensive permanent grassland

The package consists in the limitation of fertilization, quantity and dates of harvest cuts or intensity of grazing. Meeting the package requirements leads to retaining the existence of rural meadows and pastures.

Objective: Retaining of the conservation status of natural habitats used for agricultural purposes.

Available variant:

3.1 Extensive menagement meadows and pastures

This variant may be implemented on land used as permanent meadows or pastures. The area covered by the variant may be used as a meadow, pasture or used as hay and pasture land. The change of land utilisation during the agri-environmental obligation period is possible in one of the following ways.

Package 4 and 5 - protection of endangered bird species and natural habitats outside of Natura 2000 areas and in Natura 2000 areas

The Package consists in the limitation of fertilization, quantity and dates of mowing or intensity of grazing in nature-value areas outside Natura 2000. Meeting the requirements of Variant 4.1. leads to improvement of living conditions of endangered bird species, whose breeding sites are connected with extensive green pastures.

Variants 4.2.-4.10. include habitat types under Natura 2000 classification and other nature-value habitats in meadows and pastures. Nomenclature is compliant with the Regulation of 16 May 2005 (Dz.U. of 2004 No 94, item 95) relating to Annex I to the Habitats Directive.

Elaboration of habitat documentation is a condition for the classification of permanent green pastures to the package and implementation of tasks in a given habitat area.

Objective: Retaining the conservation status of the nature-value habitats used for agricultural purposes

Available variants:

4.1/5.1 protection of bird breeding habitats

4.2/5.2 small sedge-moss communities

4.3/5.3 tall sedge swamps

4.4/5.4 litter meadows Molinion and Cnidion

4.5/5. xerothermic Grass

4.6/5.6 semi-natural wet meadows

4.7/5.7 semi–naturalfresh meadows

4.8/5.8 species-rich Nardion grasslands

4.9/5.9 salt marshes

4.10/5.10 natural lands

Package 6 preservation of endangered genetic plant resources in agriculture

The package provides an opportunity of supporting farmers who actively participate in protection and improvement of local or old varieties of crop species, as well as of presently endangered crop species and accompanying species.

The package provides an opportunity of maintaining the existing genetic resources of crop plants by farmers and practical utilization of best genotypes available in gene banks.

Objective: preservation of local crop varieties

Available variants:

6.1. local crop varieties commercial production

6.2. seed production of local crop varieties

6.3. seed production at the request of the gene bank

6.4. traditional orchards

Package 7 maintenance of genetic resources of endangered animal species in agriculture

The package is designed in order to protect particularly valuable farm animal breeds, the low number of which threatens their existence. Farm animals' genetic resources in Poland are under protection pursuant to Article 21(a) of the Act of 20 August 1997 on the organization of breeding and reproduction of farm animals (consolidated text Dz.U. 02.207.1762 as amended).

Local cattle breeds are perfectly adapted to local conditions, which often are very difficult. They can be kept under extensive production conditions and on scarce fodder resources. Their products are often of unique quality.

Maintenance of the animals makes it possible to manage such areas, which otherwise would not be managed at all. They are also of great significance because of role played by them in the history of their region of origin and are linked with tradition and culture of local communities.

The package is divided into variants according to animal species.

Objective: Preservation of domestic animal breeds

Available variants:

7.1. Preservation of local cattle breeds

7.2. Preservation of local horse breeds

7.3. Preservation of local sheep breeds

7.4. Preservation of local pig breeds

Package 8 soil and water protection

The major sources of water contamination of agricultural origin include the following: nutrients (nitrogen, phosphorus) provided in natural and mineral fertilisers, residues of plant protection products and other toxic substances, including hard metals, as well as organic an non-organic soil particles. In general, water contamination with nitrates of agricultural origin

is present in regions having high concentration of livestock production and intensive crop production, including vegetable and fruit production regions where large dozes of fertilisers and plant protection products are applied.

Maintaining plants in arable land in the form of sowing one species or a mix of several species of plants in the period between two main harvests

prevents water contamination and erosion. This also influences structural diversification of biodiversity in rural landscape through creation of living environment for various plants and animals, and it also constitutes an additional source of feed for animals.

Objective: Proper use of soil and water protection

Available variants:

8.1. undersown catch crop

8.2. winter catch crop

8.3. stubble catch crop

Package 9 buffer zones

The Measure consists in preservation of the existing buffer zones and field baulks forming longitudinal strips of plants aimed to reduce water contamination, reduce erosion and increase biodiversity.

There is an obligation to maintain the area of permanent grasslands and landscape elements not used for agricultural purposes in the whole area of an agricultural holding covered by the agri-environmental programme.

Objective: Proper use of soil and water protection

Available options:

9.1. maintenance of 2-metre buffer zones,

9.2. maintenance of 5-metre buffer zones,

9.3. maintenance of 2-metre field baulks,

9.4. maintenance of 5-metre field baulks.

Organizing Committee

Chairman: **Jakub Skorupski**

Vice-chairman: **Aneta Kozłowska**

Scientific Secretary I: **Bożena Prajs, PhD**

Scientific Secretary II: **Jacek Kaliciuk, PhD**

Administrative Assistant: **Agnieszka Kłosowska**

Organizational Supprt:

Dawid Zyskowski

Karolina Romaniszyn

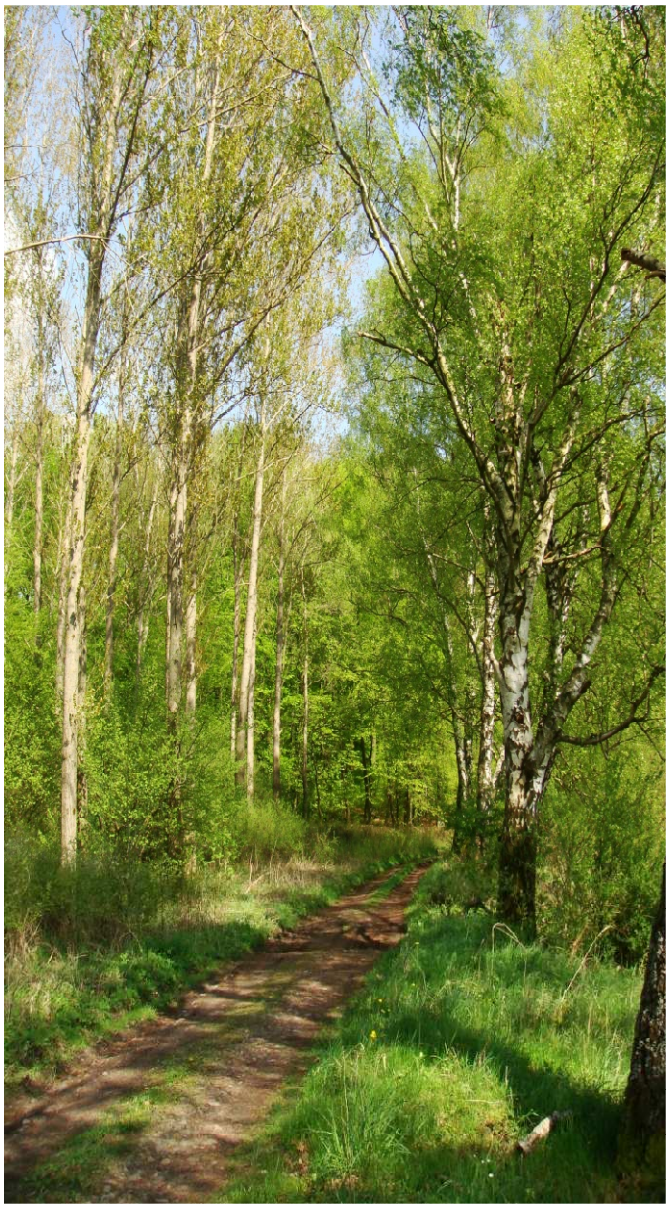
Conference Office:

Federacja Zielonych GAJA

5 Lipca 45 St., 70-374 Szczecin

tel. +48 091 489 42 33

fax +48 091 489 42 32



FEDERACJA ZIELONYCH GAJA

organizacja pożytku publicznego
istniejemy od 1993 roku

Green Federation GAJA was founded more than fifteen years ago. The Association is an independent, non-political organization, working for environmental protection and development of civil society. Organization pursues its goals through a number of projects in natural sciences, sozological and social.

Green Federation GAJA is a representative of environmental organizations in the Polish-German Environmental Council, the Polish-German Neighbourhood Commission for Environment Protection, Social Council of the Consultative Committee for Construction of the "Gazoport", the National Commission for Environmental Impact Assessment, the Regional Implementation Monitoring Committee of Operational Program of Westernpomeranian Region, Scientific and Social Promotional Council of Forest Complex "Puszcze Szczecińskie", Panel on Urban Greenery in Szczecin, the Provincial Council for Nature Conservation, the Regional Commission for Environmental Impact Assessment.

Currently the Federation is a member of the international organization Coalition Clean Baltic, union of associations of Polish Green Network and the Coalition "Poland free of GMOs".

Green Federation GAJA is a signatory to the Charter of Ethics of environmental NGOs, whose main purpose is to promote transparency and accountability of environmental organizations.

Green Federation GAJA, was awarded a number of prestigious awards, for their active and broad range of activities in the field of environmental protection: The Sea Sassakawa Environmental Award (2000) for "Asylum for wild birds"project, Hewlett – Packard "In harmony with nature" (2001) for the project "Curb waste paper collection", Ford Motor Company (2002) for "Restitution of salmon in the rivers of West Pomerania", "Klon, 2002" Bank of Environment Protection Award for exemplary financial management for the protection of the environment.

Coalition Clean Baltic

Polska Zielona Sieć