

TRANSFORMATION OF ANIMAL PRODUCTION IN BRAZIL AND ITS ENVIRONMENTAL IMPACTS



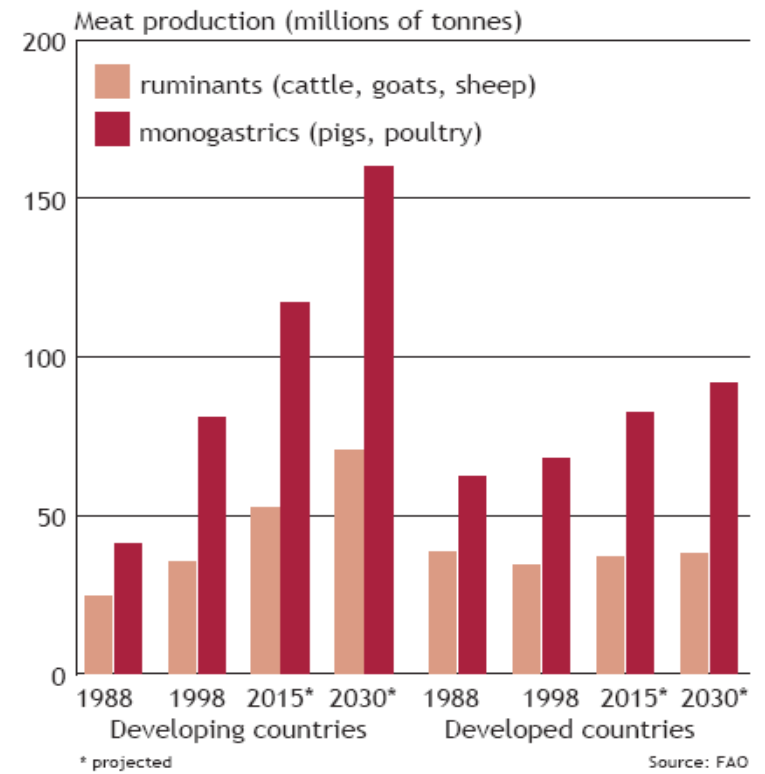
Dr. Airton Kunz
Florianopolis, March, 2009

Meat production in the world

1 - Meat production, 1980-2030



3 - Ruminant vs. monogastric production

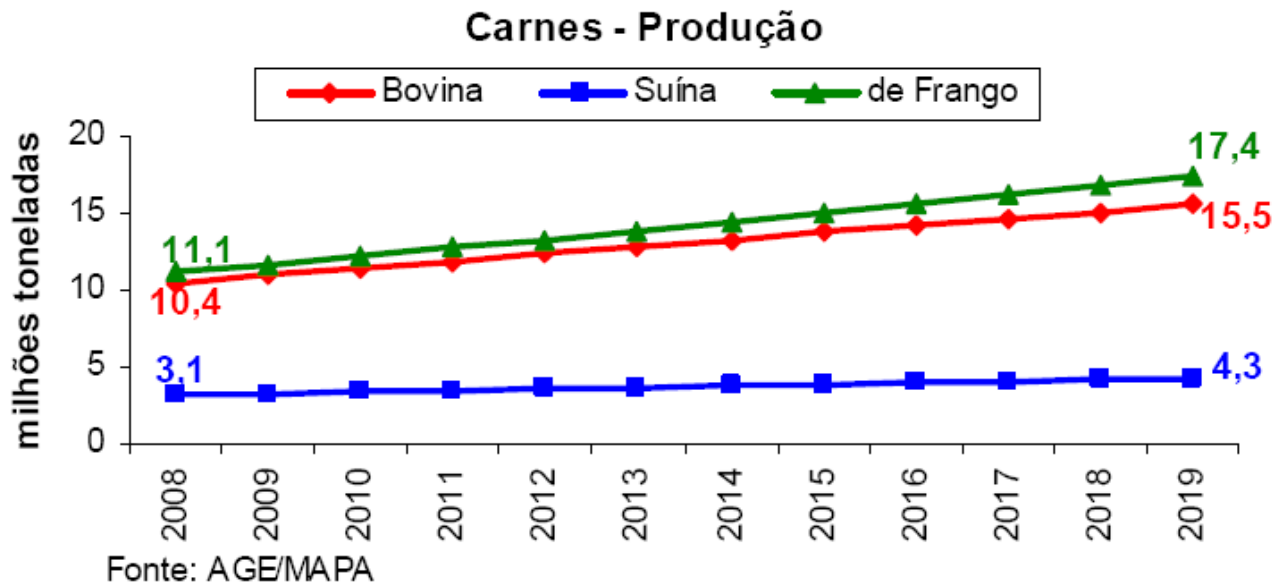


Meat Production in Brazil and United States (Thousand Tons)

Country	Cattle	Swine	Poultry	Total
Brazil	7.463	2.775	10.035	20.273
USA	11.891	9.632	16.233	37.756
World	52.245	97.207	60.901	210.353

Source: USDA, 2006

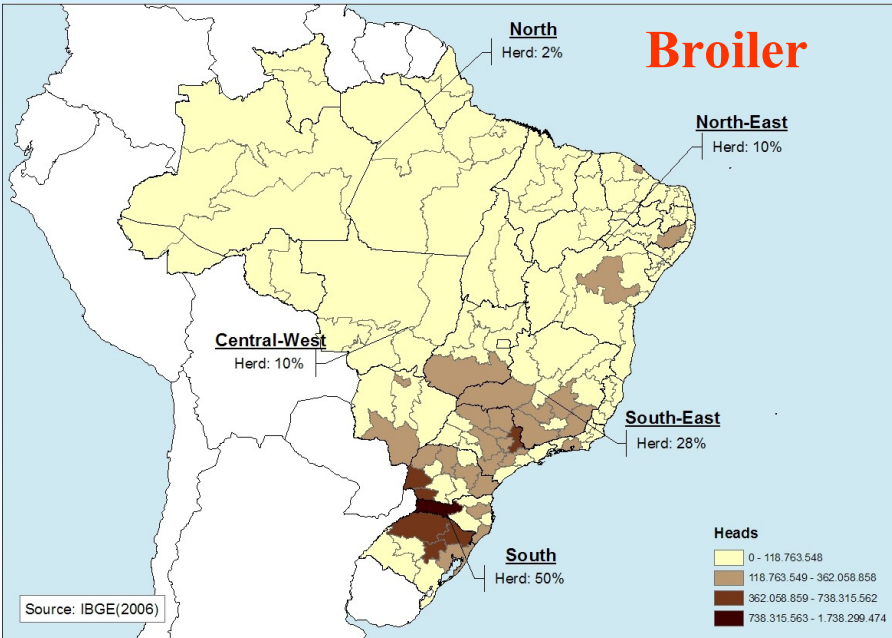
Brazilian meat production



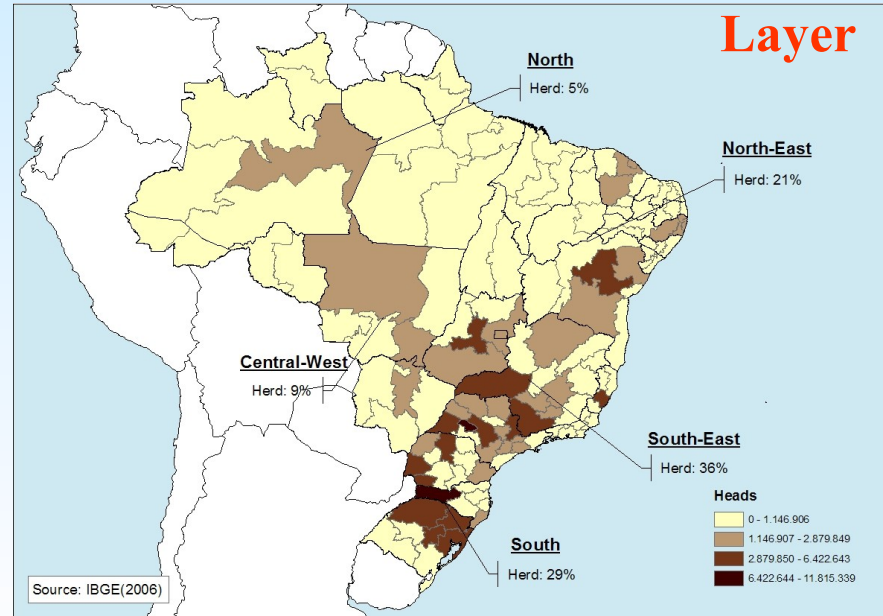
Taxa de crescimento (%) 2008/09 a 2018/19	
Bovina	3,50
Suína	2,84
Frango	4,22

Livestock distribution on Brazilian territory

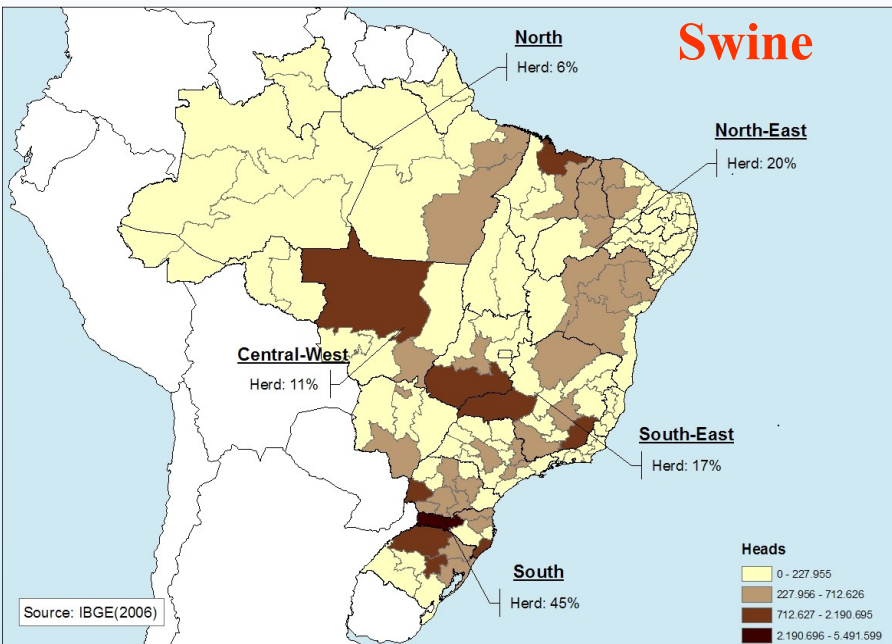
Broiler



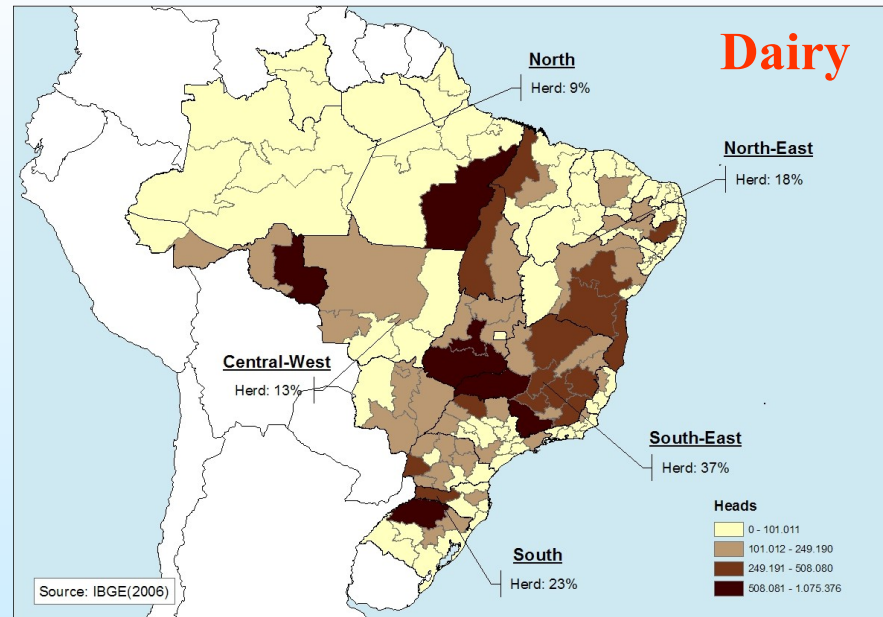
Layer



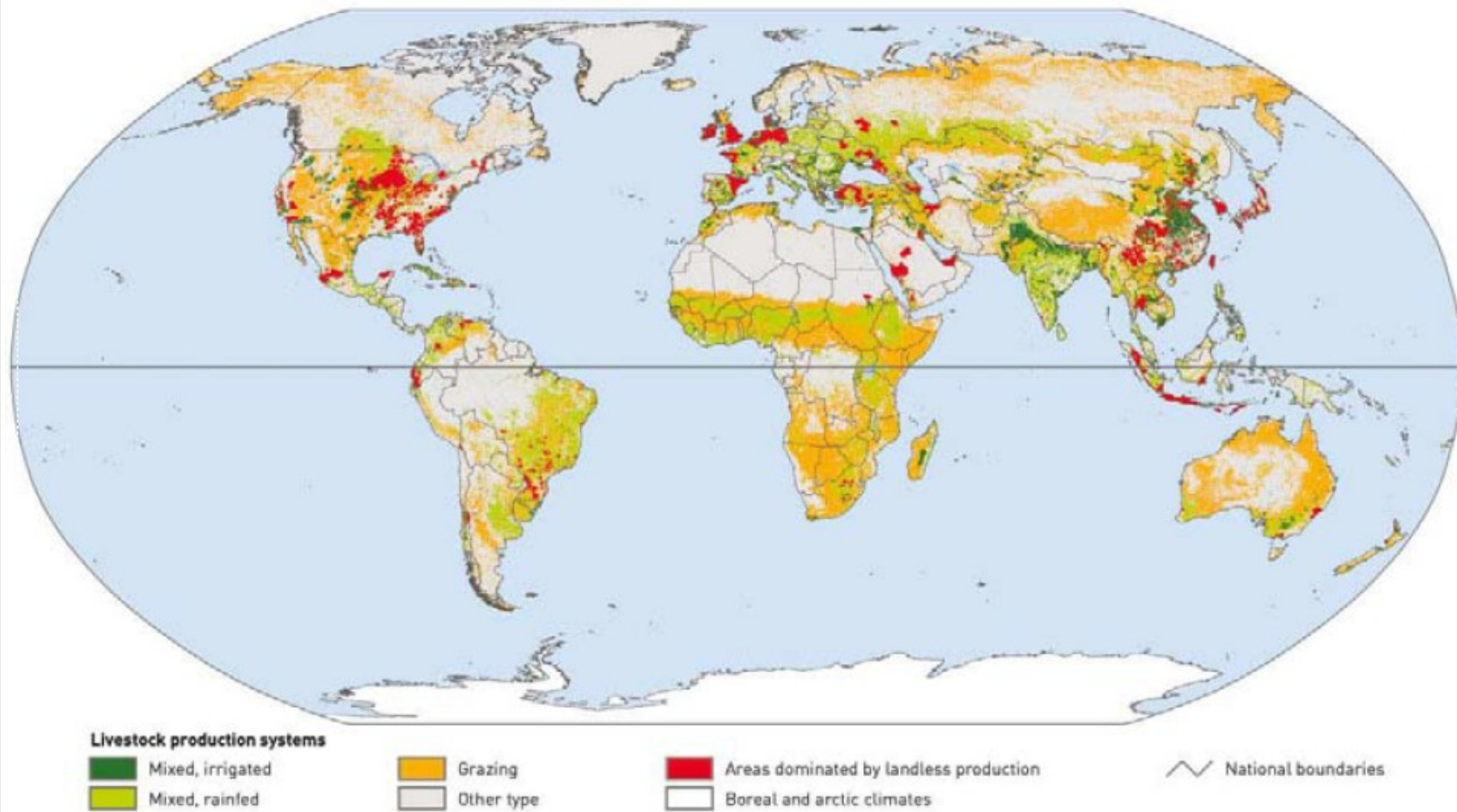
Swine



Dairy



Map 13 Estimated distribution of livestock production systems



Land Cover 2000, available at www-gvm.jrc.it/glc2000/ and irrigated areas (Global Map of Irrigated Areas, Version 2.1, Siebert *et al.*, 2001). Industrial (landless) production dominated areas refers exclusively to monogastric production. Land-based system held pig and poultry populations are estimated locally according to the approach of Gilbert *et al.* (2004), using total local animal population data (see Maps 16 and 17), national level land-based production estimates (Groenewold, 2004), national human agricultural populations (FAO, 2006b) and a global rural population density grid (LandScan, 2003). Areas dominated by industrial production systems are sub-national administrative areas in which the aggregated land based system populations produce less than half of the areas total production, accounting for the higher productivity of industrial systems.

Animal Production

Classical concerns

- Genetic
- Sanitary
- Nutrition



Efficiency

New concerns

- Animal well-fare
- Environment

Table 1: Fresh manure production and characteristics per 1000 kg live animal mass per day.

Parameter	Unit		Dairy	Swine	Broiler	Layer
Total Solids	Kg	Means	12	11	22	16
		S.D.	2.7	6.3	1.4	4.3
Volatile Solids	Kg	Means	10	8.5	12	12
		S.D.	0.79	0.66	0.84	0.84
BOD	Kg	Means	1.6	3.1	**	3.3
		S.D.	0.48	0.72	**	0.91
COD	Kg	Means	11	8.4	16	11
		S.D.	2.4	3.7	1.8	2.7
pH		Means	7.0	7.5	**	6.9
		S.D.	0.45	0.57	**	0.56
TKN	Kg	Means	0.45	0.52	1.1	0.84
		S.D.	0.096	0.21	0.24	0.22
N-NH ₃	Kg	Means	0.079	0.29	**	0.21
		S.D.	0.083	0.10	**	0.18
Total Phosphorus	Kg	Means	0.094	0.18	0.30	0.30
		S.D.	0.024	0.10	0.053	0.081
Zinc	g	Means	1.8	5.0	3.6	19
		S.D.	0.65	2.5	**	33
Copper	g	Means	0.45	1.2	0.98	0.83
		S.D.	0.14	0.84	**	0.84
Total coliform bacteria	Colonies ²	Means	1100	45	**	110
		S.D.	2800	33	**	100
Fecal Coliform bacteria	Colonies ²	Means	16	18	**	7.5
		S.D.	28	12	**	2.0

¹All value wet basis.

² Mean bacteria colonies per 1000 Kg animal mass multiplied by 10¹⁰.

S.D. = Std. deviation

(Modified from ASAE, 2003)

Soil Absorption Capacity

X

Nutrient Balance




Eutrofization effects (N and P)



“New” Environmental Concerns for Brazil!

Legislation





Agriculture

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You are here: [EPA Home](#) » [Agriculture](#) » [Sectors](#) » [Animals](#) » [Animal Feeding Operations](#)

Animal Feeding Operations

You will need Adobe Reader to view some of the files on this page. See [EPA's PDF page](#) to learn more about PDF, and for a link to the free Acrobat Reader.

Information about environmental requirements specifically relating to the production of livestock in animal feeding operations (AFOs) and concentrated animal feeding operations (CAFOs).

- [About Animal Feeding Operations](#)
- [Regulations for AFOs Related to Water Programs](#)
- [Regulations for AFOs Related to Air Programs](#)

Success Stories

- [EPA Celebrates California County's First Methane Digester](#)
- [EPA Presents Water Stewardship Award to Ohio Swine Operation](#)

Animal Feeding Operations Highlights

- EPA Extends Animal Feeding Operations Water Deadline
- EPA Region 3 Clean Bays Agreement with Perdue Farms, Inc.
- Production
- Best Management Practices
- Education & Training
- Laws
- Research
- Compliance & Enforcement
- Related Publications
- Sign Up for News Service

About Animal Feeding Operations

Animal feeding operations (AFOs) are agricultural enterprises where animals are kept and raised in confined situations. AFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland. There are approximately 450,000 AFOs in the United States.

Related publications from the Ag Center

- [Animal Feeding Operations](#)
- [Poultry](#)

Related topics


- [Biosecurity](#)
- [Homeland Security for Agriculture](#)

Information from EPA Regions

To determine which region applies to you, please visit [Where You Live](#).

[Region 3](#) - Contains general information, statistics, maps, and data tables

[Region 5](#) - Contains AFO Sector Profile, EPA contacts, Federal and State program information, and technical and financial assistance information





Concentrated Animal Feeding Operations

Clean Water Act Requirements

What Are the Federal Requirements for Swine CAFOs?



In December 2002, EPA revised the Clean Water Act regulation for Concentrated Animal Feeding Operations, or CAFOs. If you own or operate a swine CAFO, you must apply for a permit. This pamphlet gives general information about what your permitting authority might require in your CAFO's permit.

Information Series Pamphlet

Other Pamphlets in EPA's CAFO Clean Water Act Requirements Information Series

- Will My Operation Be Regulated?
EPA 833-F-02-006
- What Are the Federal Requirements for Chicken and Turkey CAFOs?
EPA 833-F-02-008
- What Are the Federal Requirements for Dairy Cow and Heifer CAFOs?
EPA 833-F-02-009
- What Are the Federal Requirements for Beef Cattle and Veal Calf CAFOs?
EPA 833-F-02-0010
- What Are the Federal Requirements for Horse and Sheep CAFOs?
EPA 833-F-02-0011
- What Are the Federal Requirements for Duck CAFOs?
EPA 833-F-02-0012
- What Are the Federal Record-Keeping and Reporting Requirements?
EPA 833-F-02-0013

How do I contact my permitting authority?

Visit www.epa.gov/npdes/afp/statercor for information on your permitting authority.

Where can I get copies of these more information?

Call the Office of Water Resource Cent (202) 566-1729 to request copies of other documents. Call the CAFO Phon (202) 564-0766 with questions or visit USDA web sites.

EPA:
www.epa.gov/npdes/caforules
www.epa.gov/agriculture

USDA:
www.usda.gov

Photos courtesy of USDA
EPA 833-F-02-007
December 2002

Regulation to avoid water pollution

Internet Explorer browser window showing the EPA pamphlet content.

Address bar: http://www.epa.gov/npdes/pubs/cafo_brochure_swine.pdf

Navigation: Arquivo, Editar, Ir para, Favoritos, Ajuda

Search: Pesquisa Rápida [F3], Digite seu termo de pesquisa...

Page: 1 de 2

Taskbar: Adobe Reader, abraves, Microsoft Word, palestras, Microsoft Po...

Content:

Is my swine operation a CAFO?

Your operation is a CAFO if it is an animal feeding operation (AFO) and it meets one of the following conditions:

- Large CAFOs**
Your swine AFO is a Large CAFO if it has at least:
 - 2,500 swine, each weighing 55 pounds or more
 - 10,000 swine, each weighing less than 55 pounds
- Medium CAFOs**
Your swine AFO is a Medium CAFO if it has at least:
 - 750 swine, each weighing 55 pounds or more
 - 3,000 swine, each weighing less than 55 poundsand
 - a man-made ditch or pipe carries manure or wastewater from your operation *or*
 - your animals come into contact with surface water running through the area where they're confined
- Designated CAFOs**
No matter what size your operation is, if it is an AFO, it can be designated a CAFO. If your permitting authority inspects your operation and finds that it's adding pollutants to surface waters, your operation might need a CAFO permit.

My operation is a CAFO. What do I have to do?

You must apply to your permitting authority for a permit. Most states have the authority to manage CAFO programs and issue permits. State CAFO programs are based on the revised national CAFO regulation. You can use this pamphlet to help you learn about the *minimum* requirements for a permit. You should contact your permitting authority to find out what your *state-specific* requirements are and how to apply for a permit. Check the insert to this pamphlet for your permitting authority's contact information.

What will my operation's permit require?

Your CAFO permit will require you to meet certain conditions for your production and land application areas. The specific requirements of your permit will depend on whether your operation is a Large, Medium, or designated CAFO.

- Requirements for all swine CAFOs**
You can expect your permit to require you to:
 - Implement a nutrient management plan
 - Submit annual reports to your permitting authority
 - Keep your permit current until you completely close your operation and remove all manure
 - Keep records of your nutrient management practices for at least 5 years (See the pamphlet *What Are the Federal Record-Keeping and Reporting Requirements?*)
- Nutrient management plans for all swine CAFOs must include provisions for**
 - Assuring adequate manure storage capacity
 - Proper handling of dead animals and chemicals
 - Diverting clean water from the production area
 - Keeping animals out of surface water
 - Using site-specific conservation practices
 - Developing ways to test manure and soil
 - Assuring appropriate use of nutrients when you spread manure
 - Keeping records of your nutrient management practices

Your permitting authority might set more requirements for any size CAFO.

Requirements for Large swine CAFOs

Nutrient management plans for Large swine CAFOs have more requirements for production and land application areas.

Production area

- Design your production area to contain all of your CAFO's manure plus the runoff from a 25-year, 24-hour rainfall event (large storms). (Overflows from large storms are allowed only if your operation is designed and operated to meet these specifications.)
- Install depth markers in liquid manure storage structures
- Inspect your production area weekly and all water lines daily
- Correct any problems you find as soon as possible
- Properly handle dead animals

Requirements for Medium and designated swine CAFOs

Your permitting authority might set more requirements for your nutrient management plan. These requirements will depend on the permit writer's best professional judgment and could be like the requirements for Large swine CAFOs.

Land application area

- Apply manure at rates that meet your permitting authority's standards
- Analyze manure for nutrient content at least once a year
- Analyze the soil from your land application fields for phosphorus amounts every 5 years
- Avoid applying manure to any land within 100 feet of surface water
- From time to time, inspect your land application equipment for leaks

Transferring manure to other persons

- Keep records for at least 5 years on the date, recipient, amount, and nutrient content of the manure you transferred
- Information about the nutrient content of your manure must be given to the recipient

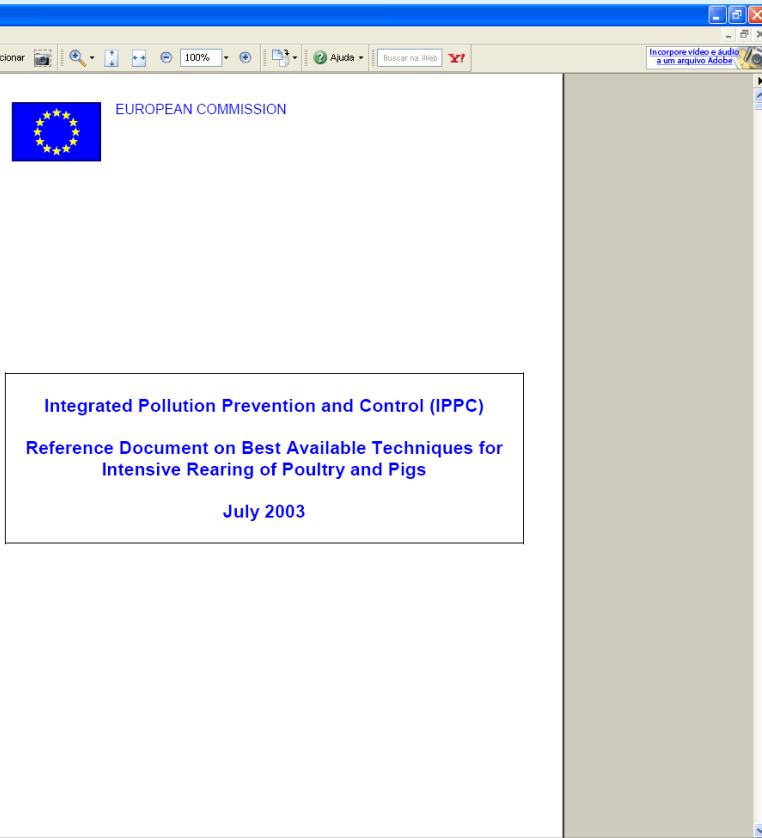
Information Series Pamphlet

New to Large swine CAFOs
Must design your production area to completely contain all manure plus the runoff from all storm events, or to contain manure and runoff from a very large storm. (Overflows are allowed if your operation is designed and operated to meet these specifications.)

The land application area includes all the land under your control where you spread manure.

www.epa.gov/npdes/caforules

In Europe Integrated Pollution Prevention and Control (IPPC)



europa.eu

Prevenção e controlo integrados da poluição: Directiva IPPC - Windows Internet Explorer

http://europa.eu/scadplus/leg/pt/lvb/l28045.htm

Actividades da União Europeia
Sínteses da legislação

português (pt)

PA - Sínteses da legislação > Prevenção e controlo integrados da poluição: Directiva IPPC

Página inicial

- Agricultura
- Ajuda humanitária
- Orçamento
- Indústrias
- Meio ambiente
- Assuntos institucionais
- Diálogo e meios de comunicação social
- Comércio externo
- Coerência
- Consumidores
- Justiça
- Desenvolvimento
- Relações do homem e o ambiente
- Economia e finanças
- Emprego, Formação, Juventude
- Legislação e assuntos sociais
- Pressões ambientais
- Segurança alimentar
- Transportes

GESTÃO DOS RESÍDUOS >
POLUIÇÃO ATMOSFÉRICA >
PROTECÇÃO DOS SOLOS >
PROTECÇÃO E GESTÃO DAS ÁGUAS >

Prevenção e controlo integrados da poluição: Directiva IPPC

A União Europeia definiu as obrigações a cumprir pelas actividades industriais e agrícolas de forte potencial poluente. Para tal, estabeleceu um procedimento de licenciamento dessas actividades e definiu exigências mínimas a incluir em todas as licenças, nomeadamente em termos de emissões de substâncias poluentes. O objectivo é evitar ou reduzir as emissões poluentes para a atmosfera, a água e o solo, bem como os resíduos provenientes das instalações industriais e agrícolas, de modo a alcançar um nível elevado de protecção do ambiente.

ACTO

Directiva [96/61/CE](#) do Conselho, de 24 de Setembro de 1996, relativa à prevenção e controlo integrados da poluição [[Ver Actos Modificativos](#)].

SÍNTESE

A presente directiva (designada «Directiva IPPC») faz depender as actividades industriais e agrícolas de forte potencial poluente da obtenção de uma licença. Esta licença apenas pode ser concedida mediante o respeito de determinadas condições ambientais, por forma a que as empresas assumam a responsabilidade pela prevenção e redução da poluição que elas próprias possam provocar.

A prevenção e a redução integrada da poluição referem-se às actividades industriais e agrícolas de forte potencial poluente, novas ou existentes, tal como definidas no Anexo I da directiva (indústrias do sector da energia, produção e transformação de metais, indústria mineral, indústria química, gestão de resíduos, criação de animais, etc.).

Condições ambientais a respeitar

Para obterem uma licença, as instalações industriais ou agrícolas devem satisfazer determinadas condições fundamentais, nomeadamente em termos de:

- Utilização de todas as medidas úteis que permitam lutar contra poluição, designadamente o recurso às melhores técnicas disponíveis (as que produzem menos resíduos, utilizam substâncias menos perigosas, permitem a recuperação e reciclagem das substâncias emitidas, etc.).
- Prevenção de qualquer poluição importante.
- Prevenção, reciclagem ou eliminação o menos poluente possível dos resíduos.
- Utilização eficaz da energia.
- Prevenção dos acidentes e limitação das suas consequências.
- Reabilitação dos sítios após a cessação da actividade.

Natural Resources

-Water

Revista Brasileira de Saneamento e Meio Ambiente
ISSN 0103-5134 - Ano XV Nº 40 - Outubro/Dezembro de 2006

Bio

Água Virtual

Trocando trigo por joio

Exportação de água, através de commodities, pode comprometer sustentabilidade brasileira e recursos hídricos nacionais

Editorial
Aprovação do Marco Regulatório traz um novo desafio para o setor

Água Potável
Necessidade de Plano de segurança para água potável

Metas de Investir e cenários dos

Revista Brasileira de Saneamento e Meio Ambiente
ISSN 0103-5134 - Ano XVI Nº 48 - Janeiro/Março de 2008

Bio

Efeito bumerangue

Poluição das bacias hidrográficas dificulta cada vez mais o processo de tratamento da água

Entrevista
ONU elege 2008 o ano do saneamento e anuncia metas

Tecnologia
Empresas mostram os avanços na área de tratamento de esgoto

A (NOVA) RIQUEZA DAS NAÇÕES: EXPORTAÇÃO E IMPORTAÇÃO BRASILEIRA DA ÁGUA VIRTUAL E OS DESAFIOS FRENTE ÀS MUDANÇAS CLIMÁTICAS

Andréa Leda R. de O. Ojima¹; Ricardo Ojima²; Thais T. do Nascimento³; Roberto L. do Carmo⁴

¹ Eng. Agr.; Pesquisadora Científica, Instituto de Economia Agrícola APTA - APTA, Doutoranda em Desenvolvimento Econômico (IE/UNICAMP), Av. Miguel Stéfano, 3900, Água Funda, CEP: 04301-903, São Paulo - SP, andrea@iea.sp.gov.br.

² Doutorado, Pós-doutorado em; Fundação de Amparo à Pesquisa do Estado de São Paulo (Fapesp), Pesquisador colaborador IFCH/UNICAMP) e do Núcleo de Estudos de População (NEPO/UNICAMP);

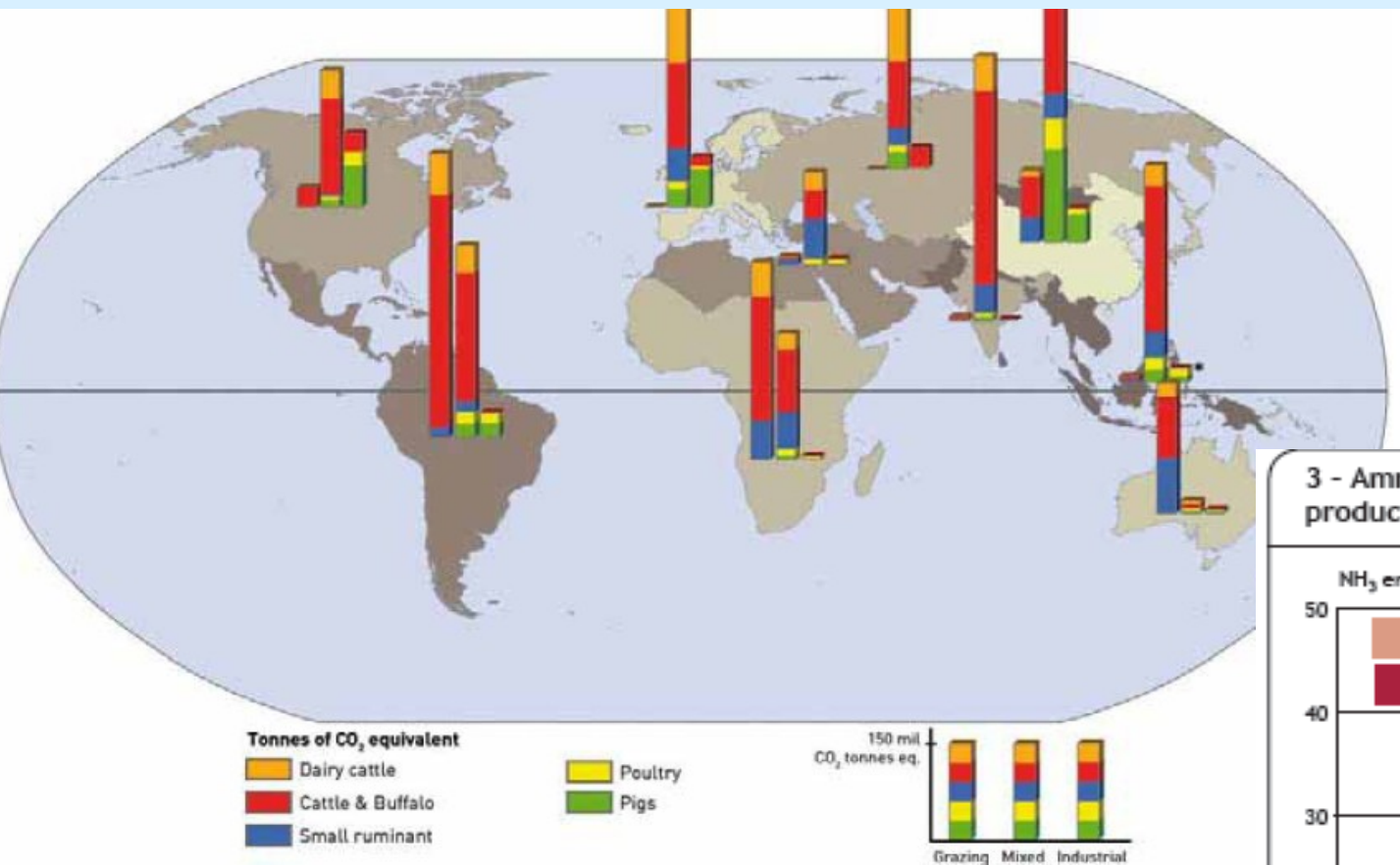
³ H/UNICAMP), Pesquisadora colaboradora do Centro de Estudos Rurais da revista Ruris;

⁴ Departamento de Demografia (IFCH/UNICAMP) e Pesquisador do Núcleo de Estudos de

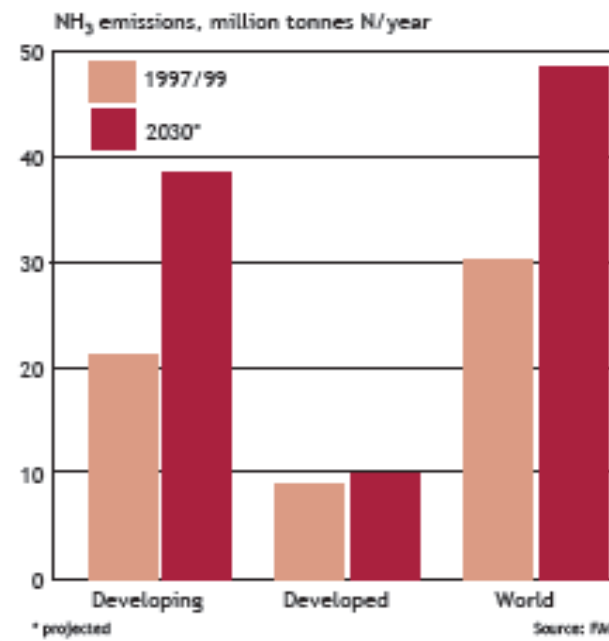
gua virtual traz a idéia da água que é consumida e que não é visível junto ao a quantidade de água utilizada na produção de um bem desde o início de sua produto final. Em sua essência, o que esta abordagem pretende explorar é o a que está embutida em outros produtos, especialmente as *commodities* agrícolas. como objetivo atualizar o debate sobre a água virtual brasileira, incluindo os levância dentro da nossa pauta de exportação e importação. Em seguida, busca-ssão dentro do debate sobre mudanças climáticas globais, apontando para os frente aos cenários de mudanças nos regimes de chuvas e o aumento das médio prazo. Como principais resultados, observa-se que os saldos calculados veis ao Brasil, pois não apenas nos posicionamos como um grande exportador as também privilegiamos a exportação de produtos altamente demandantes de portamos produtos que carregam consigo um menor volume de água virtual.

gua virtual, *commodities* agrícolas, mudanças climáticas

Ammonia and greenhouse gas emission



3 - Ammonia emissions from livestock production 1997/99 - 2030



Source: LEAD, 2006



Total greenhouse gas emission from enteric fermentation and manure per species and main manure production system.

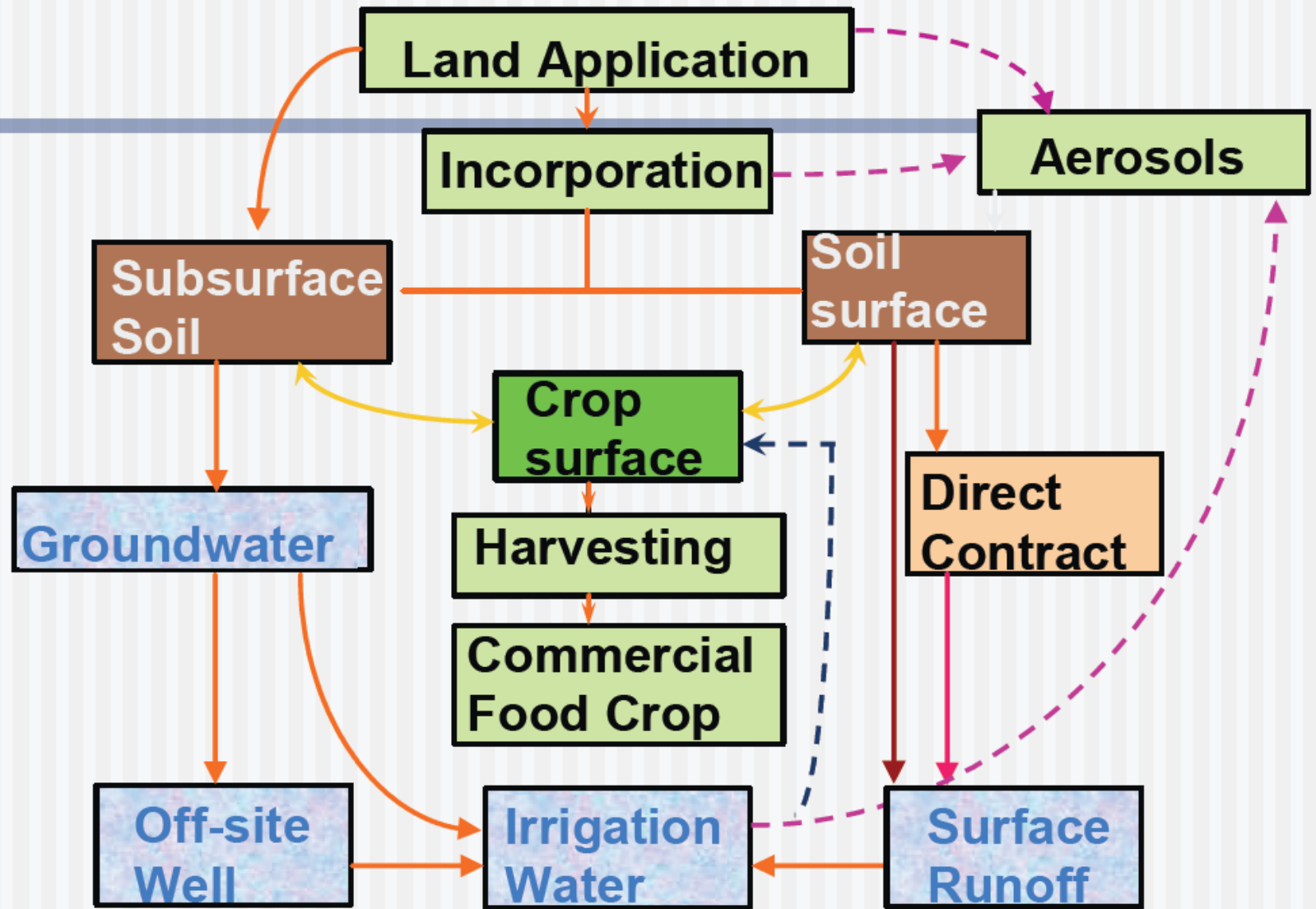
Pathogens in animal wastes

Persistence in liquid manure depends on:

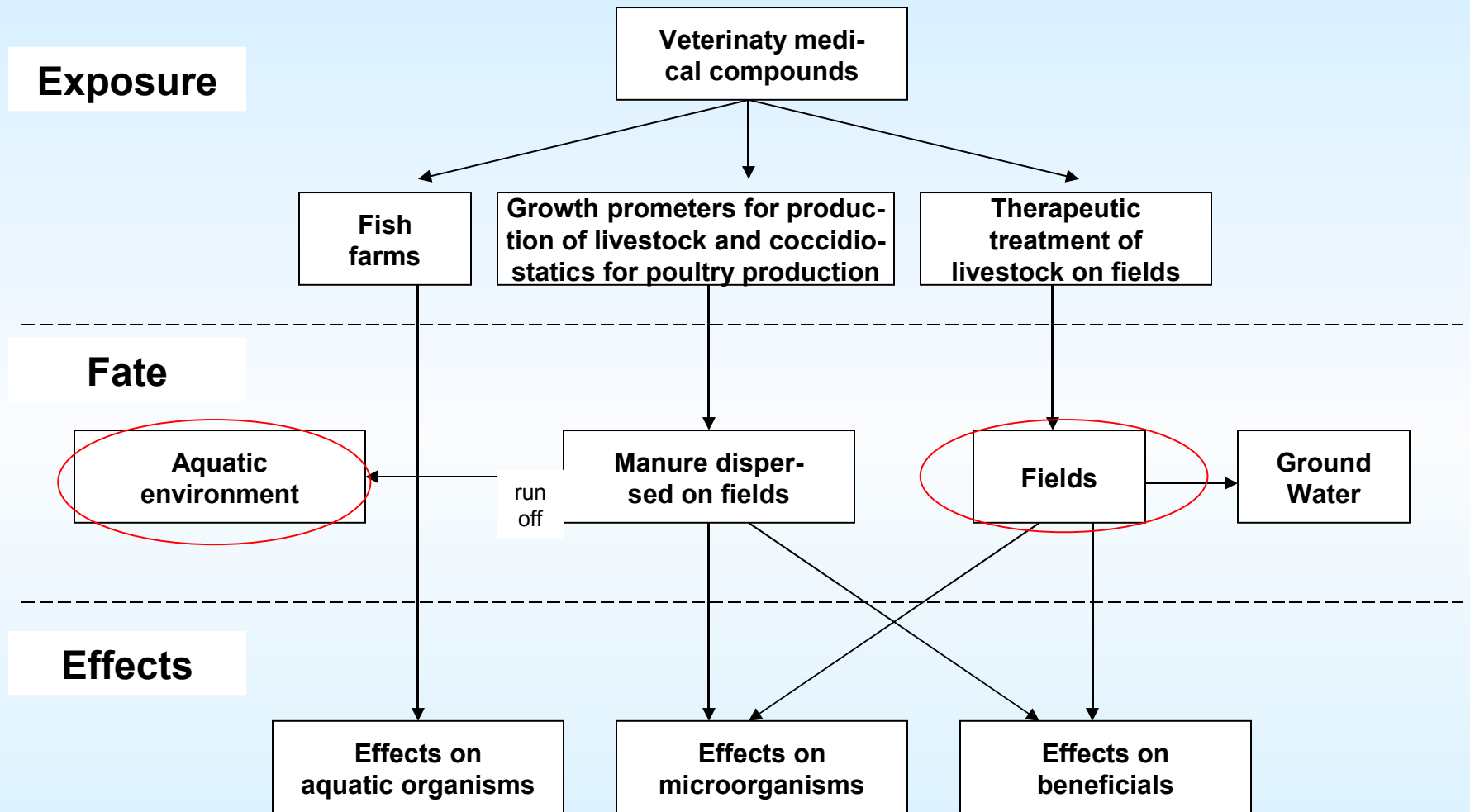
- Storage/treatment conditions
- Type of slurry
- Storage temperature
- Pathogen type

They will be inactivated after exposure to the environment but can survive long enough to be of public and/or animal health concern.

Possible Pathways of Pathogen Dissemination



Antibiotics in animal manure



Animal waste....

- ✓ **How the problem can be managed?**
- ✓ **What is the big challenge for Brazil?**

Production systems

X

Waste management

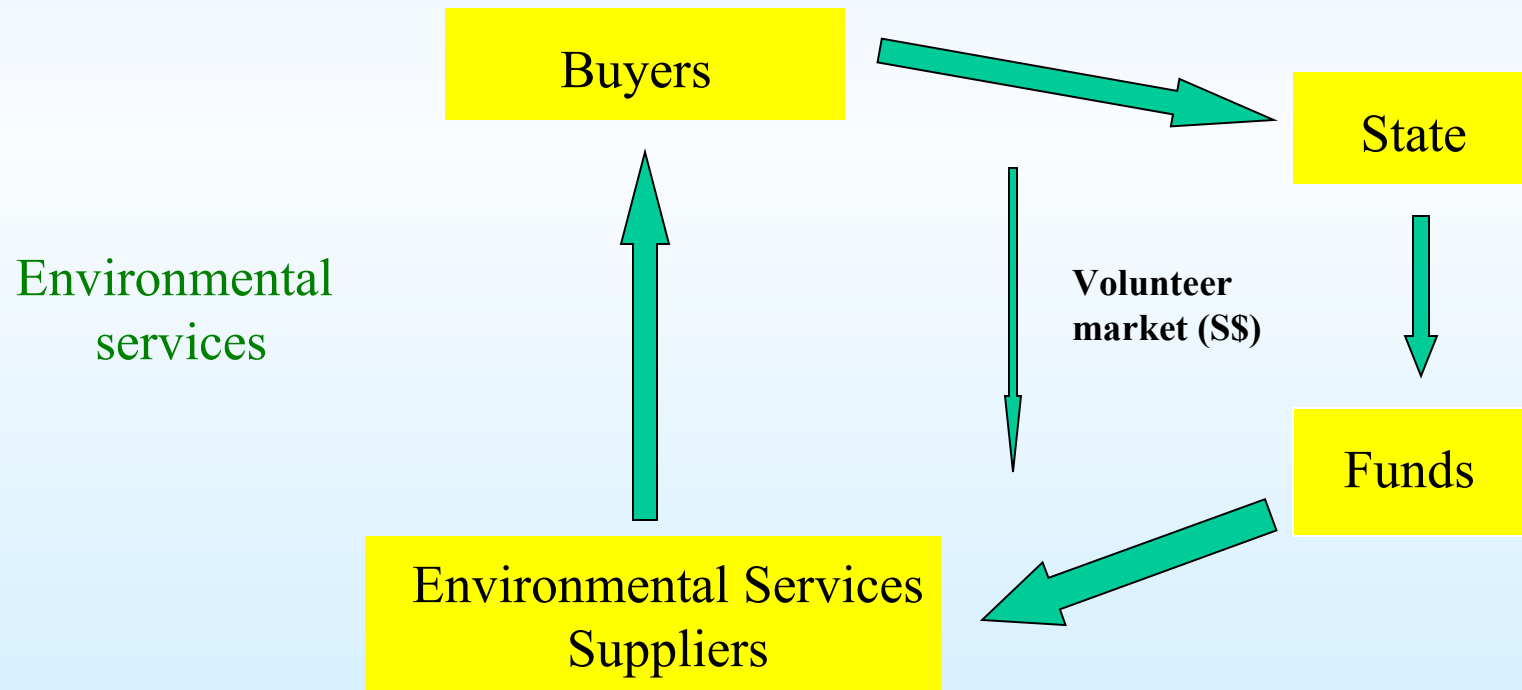


Systemic view

Some alternatives...

Environmental services:

“Environmental preservation must be more profit that its destruction.”



Examples of Environmental Services

“Nutrient trading”

The screenshot shows a web browser window displaying the EPA's National Water Quality Trading Assessment Handbook. The browser's address bar shows the URL: <http://www.epa.gov/owow/watershed/trading/handbook/>. The page features the EPA logo and the text "U.S. Environmental Protection Agency". The main heading is "Water Quality Trading" with the subtext "To achieve water quality goals." Below this is a search bar and a breadcrumb trail: "You are here: EPA Home » Water » Wetlands, Oceans, & Watersheds » Watersheds » Water Quality Trading Assessment Handbook". The primary section is titled "Water Quality Trading Assessment Handbook" and includes the document ID "EPA 841-B-04-001, Nov. 2004". It lists several resources: a "Factsheet: Water Quality Trading Assessment Handbook: Will Trading Help You Achieve a Cleaner Watershed?", a "Full Document in PDF Format" (1.4MB, 120 pages), and a "Water Quality Trading Assessment Handbook Errata Sheet". A note states that the errata sheet is needed for bound copies. A call to action at the bottom of the main content area asks if users would like to order a free copy of the handbook, providing contact information for the National Service Center for Environmental Publications (NSCEP). A sidebar on the left contains navigation links for "Water Quality Trading Home", "Trading Basics and Policy", "Frequent Questions", "Trading Programs", "Awards", "Conferences/Training", "Contacts", and "Related Links". The bottom of the browser window shows the Windows taskbar with several open applications, including Microsoft PowerPoint and the handbook page itself.

National Water Quality Trading Assessment Handbook | Water Quality Trading | US EPA - Windows Internet Explorer

US EPA <http://www.epa.gov/owow/watershed/trading/handbook/>

Arquivo Editor Exibir Favoritos Ferramentas Ajuda

US EPA National Water Quality Trading Assessment Handbook...

U.S. Environmental Protection Agency

Water Quality Trading
To achieve water quality goals.

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You are here: [EPA Home](#) » [Water](#) » [Wetlands, Oceans, & Watersheds](#) » [Watersheds](#) » Water Quality Trading Assessment Handbook

Water Quality Trading Assessment Handbook

EPA 841-B-04-001, Nov. 2004

[Factsheet: Water Quality Trading Assessment Handbook: Will Trading Help You Achieve a Cleaner Watershed?](#)

[Full Document in PDF Format](#) (PDF, 1.4MB, 120 pages)

[Water Quality Trading Assessment Handbook Errata Sheet](#)

You will need this errata sheet if you have a bound copy of the Handbook. If you are downloading a copy of the handbook from this Web site, the corrections on the errata sheet have already been incorporated into the document.

You will need Adobe Acrobat Reader to view the Adobe PDF files on this page. See [EPA's PDF page](#) for more information about getting and using the free Acrobat Reader.

If you would like to order a free copy of the Handbook, please call the National Service Center for Environmental Publications (NSCEP) at 513-489-8190 or 800-490-9198 or send an email to nscep@bps-imit.com. When you request a copy of the Handbook, please refer to EPA document number: EPA-841-B-04-001.

Can Water Quality Trading Advance Your Watershed's Goals?

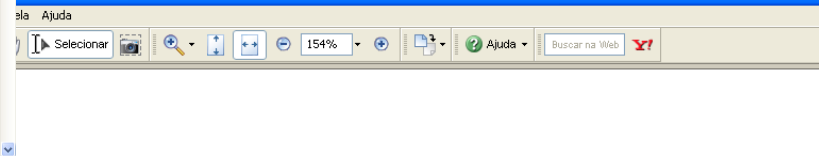
Water quality trading has gained increasing attention as an innovative approach for achieving water quality goals at lower cost. Where it is the appropriate tool, water quality trading (WQT) is a powerful and effective market-based approach to cleaner water. As an innovation unfamiliar to many watershed managers and stakeholders, however, questions about trading often arise such as:

Internet 100%

Iniciar Microsoft PowerPoint ... water quality trading ... National Water Qualit... PT 15:46

<http://www.epa.gov/owow/watershed/trading/handbook/>

- “PRODUTOR DE ÁGUA”
 - Parceria desenvolvida entre ANA, SMA-SP, SAA-SP (Programa Microbacias) e TNC
 - Proposto na Bacia Hidrográfica Piracicaba-Capivari-Jundiá
- “CONSERVADOR DAS ÁGUAS”
 - Iniciativa da Prefeitura Municipal de Extrema (primeira iniciativa de PSA baseado em água): em parceria com a SABESP, IEF-MG, ANA E TNC
- “PRODUTORES DE ÁGUAS E FLORESTAS”
 - Parceria entre SEA-RJ, PM Rio Claro, Instituto Terra, Comitê BH Guandu e TNC



Revista Brasileira de
Engenharia Agrícola e Ambiental
v.12, n.2, p.200-204, 2008
Campina Grande, PB, UAEAg/UFPG – <http://www.agriambi.com.br>
Protocolo 117.06 – 13/09/2006 • Aprovado em 28/09/2007

Eficiência técnica na suinocultura: Efeitos dos gastos com meio ambiente e da renúncia fiscal

Benedito D. Pereira¹, João C. de S. Maia² & Rosalina Camilot³

RESUMO

A criação de suínos em escala industrial resulta em intensa produção de dejetos nas propriedades rurais, conseqüências que se manifestam no solo, no ar, na fauna, na flora e no ambiente socioeconômico; neste contexto, externalidades negativas podem interagir com outras variáveis ou ações econômicas representadas, por exemplo, pelos gastos com a conservação do meio ambiente e, em particular, em Mato Grosso, pela participação no Programa Granja de Qualidade,

Biodigestors

➤ CDM - carbon credits



Final Remarks

The importance of SBERA



- Create a Brazilian Scientific network on this issue.
- Share and discuss the advances in knowledge.
- Provide technical subsidies for decisions and establishment of environmental policy for residues of agriculture and livestock production.

Environmental topic is important for...

- ✓ New markets
- ✓ Added value to Brazilian products
- ✓ Sustainability of livestock production activities

And finally...

There are no easy answers!!!!



Sometimes this is
our feeling!!!!



Thank you for your attention!

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