SUSTAINABLE DEVELOPMENT OF THE PIG INDUSTRY IN QUEBEC

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Director-Environment
Pereira July 17-19, 2012
PRESENTATION

1. PIG INDUSTRY IN CANADA
2. ENVIRONMENTAL REGULATIONS
3. MANURE MANAGEMENT STRATEGIES
4. SUSTAINABLE DEVELOPMENT
5. GREENHOUSES GASES
6. LIFE CYCLE ANALYSIS (LCA)
7. BIOSECURITY PROGRAM
8. GLOBAL AGENDA OF ACTION (FAO)
PIG INDUSTRY IN CANADA
# PIG PRODUCTION IN CANADA AND QUEBEC (2012)

<table>
<thead>
<tr>
<th></th>
<th>QUEBEC</th>
<th>CANADA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Sows and Bred Gilts</td>
<td>364 100</td>
<td>1 293 400</td>
</tr>
<tr>
<td>Number of Farms</td>
<td>1 750</td>
<td>6 820</td>
</tr>
<tr>
<td>Average Number of Pigs on Farm</td>
<td>2 240</td>
<td>1 762</td>
</tr>
<tr>
<td>Number of Pigs Sold</td>
<td>7 760 825 (2010)</td>
<td>22 158 807 (2010)</td>
</tr>
</tbody>
</table>
ENVIRONMENTAL REGULATIONS
# ENVIRONMENTAL REGULATIONS IN QUEBEC

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Date</th>
<th>Threshold</th>
</tr>
</thead>
</table>
| Nitrogen   | 1981 | Animal Unit (a.u.):  
1 a.u. = 4 sows + unweaned piglets  
1 a.u. = 5 finishers (20-100 kg)  
4.13 a.u./ha corn or 0.50 a.u./ha soybean  
Example:  
Pig Operation = 2 000 finishers/place (400 a.u.)  
Land needed = 97 ha of corn to spread manure |
## ENVIRONMENTAL REGULATIONS IN QUEBEC

<table>
<thead>
<tr>
<th>Regulation</th>
<th>Date</th>
<th>Threshold</th>
</tr>
</thead>
</table>
| Phosphorus   | 1997 (P-Reg # 1) | Soil P Test (Mehlich-III)  
                    Soil P Saturation (%)  
                    Nutrient Management Plan |
|              | 2002 (P-Reg # 2) | Soil P Test (Mehlich-III)  
                    Soil P Saturation (%)  
                    Nutrient Management Plan  
                    **Phosphorus Report** |

**Example:**

Pig Operation = 2 000 finishers/place (6 000 pigs sold per year)  
P205 output by the operation: 9 000 kg P205 based on  
1,50 kg P205/pig sold  
Land needed = 150 ha of corn to spread manure based on a crop removal of 60 kg P205/ha of corn
## ENVIRONMENTAL REGULATIONS IN QUEBEC

<table>
<thead>
<tr>
<th>Surface water or Surface Watercourse Feature</th>
<th>Setback Distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Water Supply Well</td>
<td>Manure &amp; Fertilizer Application Setback = 30 m</td>
</tr>
<tr>
<td></td>
<td>30 m Setback from Manure Storage Structures and Livestock Operations</td>
</tr>
<tr>
<td></td>
<td>75 m from Confined Feedlots</td>
</tr>
<tr>
<td></td>
<td>300 m from Field Storage of Solid Manure</td>
</tr>
</tbody>
</table>
## ENVIRONMENTAL REGULATIONS IN QUEBEC

<table>
<thead>
<tr>
<th>Surface water or Surface Watercourse Feature</th>
<th>Manure Application Setback Distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lakes</td>
<td>3 m setback</td>
</tr>
<tr>
<td>Rivers, creeks, and all other types of surface water or surface watercourses</td>
<td>3 m setback</td>
</tr>
<tr>
<td>Roadside and Cultivated Field Ditches</td>
<td>1 m setback</td>
</tr>
</tbody>
</table>
MANURE MANAGEMENT STRATEGIES
FEEDING STRATEGIES

Nutrient requirements (g/MJ)

Time or weight

- Daily
- 3 phases
- 10 phases
NUTRIENT EXCRETION MODEL

BILAN ALIMENTAIRE : QUANTITÉS INGÉRÉES* - QUANTITÉS RETENUES = QUANTITÉS REJETÉES

Q ingérées de phosphore ou d’azote

Q retenues de phosphore ou d’azote

Q rejetées de phosphore ou d’azote

MOULÉE

LISIER

Pertes d’éléments au bâtiment

* Les quantités ingérées correspondent aux quantités servies d’éléments nutritifs provenant des moulées. Les pertes d’aliments au bâtiment sont comprises dans le calcul du bilan alimentaire.
# Phosphorus Regulation in Quebec

<table>
<thead>
<tr>
<th>Type of Animal</th>
<th>Category</th>
<th>Phosphorus (P) Excretion (kg P/animal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1998</td>
</tr>
<tr>
<td>PIG</td>
<td>Sow (+ unweaned piglets)</td>
<td>8.09</td>
</tr>
<tr>
<td></td>
<td>Weanlings-nursery (50 days)</td>
<td>0.100</td>
</tr>
<tr>
<td></td>
<td>Grower/Finisher (100 days)</td>
<td>1.000</td>
</tr>
</tbody>
</table>
SOLID/LIQUID SEPARATION (CENTRIFUGE)

Solid fraction

Liquid fraction
### SOLID/LIQUID SEPARATION (CENTRIFUGE)

<table>
<thead>
<tr>
<th>NUTRIENT</th>
<th>REMOVAL EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Between 12 et 15 %</td>
</tr>
<tr>
<td>P</td>
<td>~ 70% (~TS content)</td>
</tr>
<tr>
<td>K</td>
<td>Between 5 et 7 %</td>
</tr>
<tr>
<td>TS</td>
<td>Between 25 et 60 %</td>
</tr>
</tbody>
</table>
LIQUID/SOLID SEPARATION (CENTRIFUGE)
SOLID FRACTION (CENTRIFUGE)
MANURE TREATMENT SYSTEMS: BIOSOR
MANURE TREATMENT SYSTEMS: BIOSOR
MANURE TREATMENT SYSTEMS: BIODIGESTERS
MANURE TREATMENT SYSTEMS: BIODIGESTERS
SUSTAINABLE DEVELOPMENT
SUSTAINABLE DEVELOPMENT AND PIG OPERATION

Sustainable development is defined as development that meets “the needs of the present without compromising the ability of future generations to meet their own needs”.
SUSTAINABLE DEVELOPMENT - REPORTS

Embracing a Sustainable Future
being locally, thinking globally

Manitoba Pork
Canada’s Pork Industry

L’inscription de la production porcine dans le développement durable

Bureau d’audiences publiques sur l’environnement
Rapport 179

Consultation publique sur le développement durable de la production porcine au Québec
— Rapport principal
INDICATORS OF SUSTAINABLE DEVELOPMENT FOR THE PORK INDUSTRY IN QUEBEC
SUSTAINABLE DEVELOPMENT – COMMUNITY RELATIONSHIPS
GREENHOUSE GASES
PIG PRODUCTION AND GREENHOUSE GASES (GHG)

Barn and Feeding Management

Manure Storage Management

Manure Application Management

*NH₃ – Indirect GHG contribution
GREENHOUSE GASES IN CANADA

Source: Environnement Canada (2009)

Émissions de GES (Mt CO₂e)

- Canada: 747 Mt CO₂e (100 %)
- Québec: 85,7 Mt CO₂e (11,5 %)
- Secteur agricole au Québec: 7,3 Mt CO₂e (1,0 %)
- Production porcine au Québec: 1,3 Mt CO₂e (0,2 %)

Source: Environnement Canada (2009)
SOURCES OF GHG ON PIG FARM

- Énergie - 15 % (CH₄, N₂O et CO₂)
- Bâtiment - 10 % (CH₄)
- Entreposage - 25 % (CH₄)
- Champ - 50 % (N₂O)

Pig operation with liquid manure management.
NH3 EMISSIONS IN CANADA

Source: Environnement Canada (2010)

- Canada: 503 Kt NH₃ (100 %)
- Québec: 78 Kt NH₃ (16 %)
- Secteur agricole au Québec: 71 Kt NH₃ (14 %)
- Production porcine au Québec: 18 Kt NH₃ (4 %)

Source: Environnement Canada (2010)
PIG PRODUCTION AND GREENHOUSE GASES (GHG)

CAP-AND-TRADE SYSTEM IN QUEBEC

- Carbon market (December 2011)
  Western Climate Initiative (WCI)
  (www.westernclimateinitiative.org/)

- Quantification protocol for the pig industry (July 2012)
  - Cover on manure storage structure + burning of CH$_4$ (July 2012)
  - Feeding strategies (eventually...)
  - Liquid/solid separation & manure spreading (eventually...)
CARBON MARKET SYSTEMS IN NORTH AMERICA

- Western Climate Initiative – WCI
- Regional Greenhouse Gas Initiative – RGGI
- Midwestern Greenhouse Gas Reduction Accord – MGGRA
- Provincial market
CAP-AND-TRADE SYSTEM IN QUEBEC

Reference level by regulation

Regulated Market

Voluntary market

Reference level
(Historic Benchmark or Performance Standard)

Enterprise A needs carbon credit

Enterprise B sells carbon credit

Carbon credit

Pig Operation

Enterprise A

Enterprise B

Carbon credit
CAP-AND-TRADE SYSTEM IN QUEBEC
LIFE CYCLE ANALYSIS (LCA)
LYFE CYCLE ANALYSIS (LCA) IN QUEBEC

Carbon - Water – Socio-economic LCA of pig

Feeding
- Crop production
- Feed Production

Livestock facilities
- Sow barn
- Nursery
- Grower/Finisher barn

Processing
- Facilities
- 1 kg carcass

Energy, infrastructure and transportation

Functional Unit
CARBON FOOTPRINT OF THE PIG INDUSTRY IN QUEBEC

4,16 kg CO₂ e/kg carcass

- Grain Production: 49%
- Manure Management: 37%
- Operations on farm: 6%
- Processing: 8%
WATER FOOTPRINT \( L/\text{kg carcass} \)

<table>
<thead>
<tr>
<th></th>
<th>Water extracted</th>
<th>Water rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water</td>
<td>168 L/kg carcass</td>
<td>92 L/kg carcass</td>
</tr>
<tr>
<td>Sub-surface water</td>
<td>18 L/kg carcass</td>
<td>41 L/kg carcass</td>
</tr>
<tr>
<td>Cooling water (energy)</td>
<td>43 L/kg carcass</td>
<td>32 L/kg carcass</td>
</tr>
</tbody>
</table>

*with hydroelectricity

**BLEU WATER**
Water consumed = 56% of the extracted water *
WATER FOOTPRINT : AGRICULTURAL PRODUCTION

% production

Water extracted

Water rejected

BLEU WATER Water consumed

Litres / kg de porc carcasse

- Oat
- Lime
- Soybean
- Bran Shorts
- Oatmeal
- Corn
- Méthionine
- Barley
- Canola meal
- Soybean meal
- Others
WATER FOOTPRINT OF THE PIG INDUSTRY IN QUEBEC (L/kg carcass)

Water extracted
199 L

81 L - 41%

111 L - 56%

Water rejected
96 L

35 L - 37%

56 L - 58%

BLEU WATER
Water consumed
103 L

= 56% of the water extracted with Hydro (+8 L/kg carcass)
= 172 L/kg boneless (WFN)
LIFE CYCLE ANALYSIS (LCA)

IN PROGRESS:

1. Socio-Economic LCA of the pig industry in Quebec

2. Development of a calculator (www.leporcduquebec.com)

3. Social Responsibility Report (June 2013)
LIFE CYCLE ANALYSIS (LCA)
GHG CALCULATOR (FEED MODEL)
GHG CALCULATOR (GHG ESTIMATION)
# GHG CALCULATOR (ENERGY)

<table>
<thead>
<tr>
<th>BÂTIMENT</th>
<th>GESTION DES LISIERS</th>
<th>TOTAL (t CO2 e)</th>
<th>HH-HHCAHE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chauvage-Gaz naturel</td>
<td>Litière</td>
<td></td>
<td>$0.00</td>
</tr>
<tr>
<td>Chauvage Propane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(kg eq. CO2) Bâtiment</td>
<td>(kg eq. CO2) Litière</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(kg eq. CO2) Séparateur</td>
<td>(kg eq. CO2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricité</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(kg eq. CO2) Bâtiment</td>
<td>(kg eq. CO2) Litière</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(kg eq. CO2) Séparateur</td>
<td>(kg eq. CO2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL (t CO2 e)**

- **BÂTIMENT**: $0.00
- **GESTION DES LISIERS**: $0.00
- **TOTAL (t CO2 e)**: $0.00
- **HH-HHCAHE**: $0.00

**HH-HHCAHE**

- Dépenses sur aide à l'énergie (par naturel, pour forme, Electrique)
- Ratio intensité énergétique
BIOSECURITY PROGRAM
The Canadian Swine Health Board will work to develop and implement a long term strategy for control of diseases in the hog industry

1. Biosecurity and best management practices
2. Research on circovirus and emerging diseases
3. Long term disease risk management including surveillance
Canadian Swine Health Board and Biosecurity

The Canadian Swine Health Board's mandate is "to provide leadership and coordination in support of management of health of the Canadian swine herd". One pillar of improving swine health in Canada is to improve the biosecurity of the national pig herd. The definition of biosecurity for the User Guide's purpose is putting into practice rules and processes to reduce the risk of introducing and spreading disease agents (pathogens). The primary concern will be with external biosecurity, that is, keeping disease agents out and keeping them from getting out into other farms. Internal biosecurity, that is, containing the spread of disease within the farm or...
GLOBAL AGENDA OF ACTION IN SUPPORT OF SUSTAINABLE LIVESTOCK DEVELOPMENT

2-4 April 2012 - FAO HQ, ROME, ITALY

FURTHER INFORMATION
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Food and Agriculture Organization
of the United Nations
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CONSULTATION ON FOCUS AREA NUMBER 1:
CLOSING THE EFFICIENCY GAP IN NATURAL RESOURCE USE
The Global Agenda of Actions will focus on the improvement of resource-use efficiency in the livestock sector to support livelihoods, long-term food security and economic growth while safeguarding other environmental and public health outcomes.

1. Strategic analyses
2. Generation and sharing of local and global knowledge
3. Promotion of capacity building, investment, piloting and mainstream actions and policies
4. Support to piloting new approaches
5. Advocacy (promotion of sustainable livestock sector development)
ON BEHALF OF QUEBEC PORK COUNCIL (FPPQ)

THANK YOU