Pig Production Development
Animal-Waste Management
and Environment Protection:
a Case Study in Thai Binh Province, Northern Vietnam

Edited by

Vincent Porphyre
CIRAD
TA30/A – Campus International de Baillarguet
34398 Montpellier cedex 5 (France)

Nguyen Que Coi
NATIONAL INSTITUTE OF ANIMAL HUSBANDRY (Vietnam)
Thuy Phuong, Tu Liêm district
Hanoi (Vietnam)

With 25 authoritative contributors selected for their recognized leadership in this field
About the Editors

Vincent Porphyre, DVM, MSc, is researcher in CIRAD-UPR 18 Livestock production & Product Quality, F-34398, Montpellier, France; and member of the PRISE research consortium in Vietnam.

Nguyen Que Coi, DVM, is head of Small Livestock Research Department, National Institute of Animal Husbandry, Hanoi, Vietnam; and also member of the PRISE research consortium in Vietnam.

© 2006 - CIRAD
All rights reserved

How to cite this book:

Giấy phép xuất bản số 159/GP-CXB cấp ngày 07/06/2006

Design & layout by
TNT Design

tntdesignvn@yahoo.com

This document has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of the authors and can under no circumstances be regarded as reflecting the position of the European Union.
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Asia Pro Eco Programme</td>
<td>4</td>
</tr>
<tr>
<td>Prise Consortium</td>
<td>5</td>
</tr>
<tr>
<td>Contributors</td>
<td>6</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>7</td>
</tr>
<tr>
<td>E3P partners</td>
<td>8</td>
</tr>
<tr>
<td>The E3P Diagnostic Project: An introduction about Sustainable Pig Production in Vietnam</td>
<td>9</td>
</tr>
<tr>
<td>General Context of a Dynamic Agricultural Sector in the Red River Delta</td>
<td>15</td>
</tr>
<tr>
<td>Using Multi-temporal Satellite Images to Evaluate the Changes of Vegetation Index of Land Cover in Thai Binh Province</td>
<td>37</td>
</tr>
<tr>
<td>Stakeholders’ Perception of Pig Effluent Management in Thai Binh Province</td>
<td>55</td>
</tr>
<tr>
<td>Classification of Pig Farms Regarding Environmental Riski and Internal Use of Pig Manure</td>
<td>83</td>
</tr>
<tr>
<td>Local Fish Farming Practices and a Typology of Farms Based on Organic Matter Intake Management</td>
<td>107</td>
</tr>
<tr>
<td>Composition of Animal Manure and Co-products</td>
<td>127</td>
</tr>
<tr>
<td>Farmers Practices in Organic and Inorganic Fertilization on Crops, Trees and Vegetables</td>
<td>145</td>
</tr>
<tr>
<td>Economic Appraisal of Animal Manure Considered as a Commodity</td>
<td>163</td>
</tr>
<tr>
<td>Adequacy between the Production of Farm Fertilizers and their Potential Use to Fertilize Crops and Fish Farm Ponds</td>
<td>181</td>
</tr>
<tr>
<td>Outlook for an Intergrated Sustainable Development of Pig Production in Red River Delta</td>
<td>205</td>
</tr>
</tbody>
</table>
The Asia Pro Eco Programme is a five-year European Union initiative, launched in 2002, based on the experience and the inputs provided by the Asia Eco Best Programme. With a budget of €31.5 million, the main target is to adopt policies, technologies and practices that promote cleaner, more resource efficient, sustainable solutions to environmental problems in Asia. The Programme provides support through grants to policy reinforcement, operational & practical dialogue, diagnostic studies, technology partnerships and demonstration projects in the field of the environment. The implementation will concentrate on specific projects under the Call for Proposals mechanism accessible to public or non profit organisations in Asia and the EU.

**Contact:**
European Commission
EuropeAid Co-operation Office, Directorate D - Asia
Office: L-41, 02/57
B-1049 Brussels
Belgium
Tel: +32-2-298 67 42
Fax: +32-2-298 48 63
E-mail: europeaid-asia-pro-eco@cec.eu.int
Website: http://europa.eu.int/comm/europeaid/projects/asia-pro-eco/index_en.htm
PRISE Consortium

PRISE Consortium is a multidisciplinary research platform to meet the challenges of livestock development and its externalities in South East Asia. This co-operation initiative gathers French CIRAD scientists and Vietnamese researchers of the National Institute of Animal Husbandry, the National Institute of Veterinary Research, the Vietnam Agriculture Sciences Institute, Hanoi Agriculture University n°1 and other research organizations in Asia to analyse the intensification dynamics of husbandry systems, especially in dairy and pig production, to propose sustainable and innovative technical itineraries, and to promote the local animal biodiversity.

PRISE publications series present the final results of specific projects implemented through this partnership. The following documents are also available from PRISE publications:

2010 trends of animal production in Vietnam
NIAH and CIRAD Workshop proceedings, in Hanoi (Vietnam), October 24-25, 2002

Animal production in Vietnam
Prospective 2010

PRISE Consortium
c/° NIAH-Vien Chan Nuoi
Thuy Phuong, Tu Liêm
Hanoi (Vietnam)
Tel: (84) 4.757.05.21
Fax: (84) 4.757.21.77
Email: ciradprise@hn.vnn.vn
Contributors

Frédéric Borne
CIRAD, dpt AMIS - France

Jean Pierre Boutonnet
CIRAD, dpt EMVT - France

Chu Xuan Huy
VTGEO - Vietnam

Mrs Charlotte Colson
Ecole Supérieure d’Agriculture, Angers - France

Dang Hoang Bien
National Institute of Animal Husbandry - Vietnam

Mrs Virginie Emonet-Denand
Institut National Agronomique, Paris Grignon - France

Jean Luc Farinet
CIRAD, dpt CA - France

Mrs Gaëlle Guérin
Institut National Agronomique, Paris Grignon - France

François Guerrin
CIRAD, dpt TERA - France

Benoît Hillion
Institut National Agronomique, Paris Grignon - France

Jean François Le Coq
CIRAD, dpt TERA - France

Mrs A. Lopez
AIDA, Saragossa - Spain

Jean Michel Médoc
CIRAD, dpt TERA - France

Olivier Mikolasek
CIRAD, dpt EMVT - France

Nguyen Que Coi
National Institute of Animal Husbandry - Vietnam

Mrs Nguyen Thi Hoa Ly
National Institute of Animal Husbandry - Vietnam

Jean Marie Paillat
CIRAD, dpt TERA - France

Pham Van Cu
VTGEO - Vietnam

Mrs Dominique Pillot
Ecole Supérieure d’Agriculture, Beauvais - France

Nguyen Duy Phuong
National Institute of Soils & Fertilizers - Vietnam

Vincent Porphyre
CIRAD, dpt EMVT - France

Rajesh Bahadur Thapa
Asian Institute of Technology - Thailand

Tran Duc Toan
National Institute of Soils & Fertilizers - Vietnam

Trinh Dinh Khuyen
Hanoi Agriculture University n°1 - Vietnam

Vu Dinh Tuan
National Institute of Soils & Fertilizers - Vietnam
This publication is dedicated to the people of Thai Binh province, facing a rapid development of the livestock and agricultural sectors that now threaten their water resources.

This book is the main result of a multidisciplinary initiative funded by the AsiaProEco programme of the European Commission. During 16 months, five Vietnamese and Thai research institutes and two European partners joined forces to study environmental pollution due to pig production in Northern Vietnam, through the example of Thai Binh province located in the Red River Delta. Its coverage of the outstanding livestock development issues and environmental externalities ranges from details of on-farm management practices to the balance of nutrients at regional level and the perceptions of society to suggest alternative strategies. It brings together satellite images, background issues and findings to guide researchers and policymakers in their domestic policies on agriculture and livestock with regard to environmental protection. These unique references aim to support the decision makers to balance economy and environment through innovative organizations, technologies and management options.

On the behalf of all seven partners, we would like to express our warm thanks to the European Delegation in Hanoi and the AsiaProEco programme for their substantial financial support. We want also to stress the strong support received from the Representatives of the People’s Committees in Thai Binh province, and also from those in the numerous districts and communes with whom we have worked in close collaboration. We gratefully thank Dr Đào Trọng Thuận, Head of the Department of Agriculture, and Dr Trần Duy Khánh, Director of the Thái Bình Livestock Breeding & Production Company for their constant and efficient help during the field activities.

Our work would not have been possible without the commitment of the thousands of motivated farmers, veterinarians and agricultural technicians who patiently described their practices, personal constraints and opinions about pollution. Finally these pages have benefited from the most valuable work of Mrs Phạm Thị Thu Huyền, Mrs Nguyễn Thị Hạnh, Mr Nicholas Stedman for the translation, and Mrs Jacqueline Porphyre for the meticulous proofreading.

We hope that the people of Thai Binh may find within these pages some answers, be they only partial ones, to the questions that they themselves are beginning to ask ever more urgently.

Dr Nguyễn Quê Coi, NIAH
Dr Vincent Porphyre, CIRAD
E3P Partners

From Europe

Delegation of the European Commission to Vietnam
Metropole Centre, 56 Ly Thai To, Hanoi City, VIETNAM
Tel: (84-4) 934 13 00 (Ext. 8263) - Fax: (84-4) 934 13 61
AsiaProEco Website : http://ec.europa.eu/comm/europeaid/projects/asia-pro-eco2/index_en.htm

CIRAD - Centre de Coopération International en Recherche Agronomique pour le Développement
Campus International de Baillarguet, TA30/A - 34398 Montpellier
FRANCE - Website: http://www.cirad.fr

Asociación AIDA - Ayuda, Intercambio y Desarrollo de Asia
calle de Guadarrama 28, 40006 Segovia
SPAIN
Website: http://www.lacajasolidaria.com/aida-segovia

From Asia

NIAH - National Institute of Animal Husbandry
Small Livestock Research Department
Thuy Phuong Commune - Tu Liêm District - Ha Noi City - VIETNAM
Website: http://www.vcn.vnn.vn

NISF - National Institute of Soils and Fertilizers
Dong Ngac Commune - Tu Liêm District - Ha Noi City - VIETNAM
Website: http://www.fadinap.org/vietnam/index.html

VTGeo - Institute of Geomatic and Remote Sensing
340 Bach Dang Street - Hanoi City - VIETNAM
Website: http://vtgeo.hn.org

HAU1 - Hanoi Agricultural University n°1
Faculty of Livestock production and veterinary medecine
Trau Quy - Gia Lam - Ha Noi - VIETNAM
Website: http://www.hau1.edu.vn

AIT - Asian Institute of Technology
P.O. Box 4, Klong Luang, Pathumthani 12120 - THAILAND
Website: http://www.ait.ac.th