Chapter 6

Perspectives: in favor of sustainable livestock production pathways

G. Duteurtre, Nguyen Mai Huong, J.-D. Cesaro, B. Dorin, B. Hubert, Hoang Vu Quang

Mountain pigs in a H'Mong village

Crop-livestock integration in response to intensification

A fresh look at livestock system dynamics

The pathway of rapid intensification of livestock systems in Vietnam drove farmers to specialize their production units. The "decoupling" of livestock farming and crop farming took place gradually over recent years.

Before 2000

On farms, the cultivation of intensive crops like rice was closely integrated with the production of livestock such as pigs. In these integrated systems, livestock production played a key role in the transfer of fertility between natural areas (producers of biomass), cultivated fields (receivers of livestock effluents and suppliers of crop residues) and fishponds (also making use of the effluents). These recycling mechanisms also were promoted by the VAC model associating gardens (*vườn*), ponds (*ao*) and barns (chuồng) (see Chapter 4).

After 2000

The rapid increase in the number of commercial farms specialized in livestock and the intensification of more traditional livestock systems resulted in the decoupling of the different production units on farms. For economic reasons, the management of organic matter became a secondary concern for the "livestock farmers". These developments were facilitated by the use of chemical fertilizers and high-yielding crop varieties. However, the rapid growth of intensive landless pig and poultry farms ran up against the absence of facilities to process livestock effluents. Some farmers started to organize themselves to recover and dispose of the effluents free of charge or at low cost, but the abundance of fertilizer put some territories at an increased risk of pollution.

The institutional response

Government services have responded by promoting spatial segregation policies for livestock farms. MARD's strategy of creating "livestock concentration zones" (khu chăn nuôi tập trung), which was launched in 2008, recommended that areas be set aside in each district for the establishment of commercial farms. These livestock concentration zones were a powerful tool to encourage the relocation of production. However, instead of solving the problem of effluent management, these livestock zones have amplified the concentration of animals.

A biogas plant on a pig farm

© J.-D. Cesaro - CIRAD (2014)

In a context of climate change and the industrialization of agricultural production, it would be worth considering the development of a livestock model that is more local and resilient to coming changes. Several solutions are recommended:

At the farm level

Build a biogas production unit:

With the methanization of effluents, farmers can produce a gas useful for cooking and heating. Biogas systems are often undersized due to limited land. The tanks fill rapidly and the system releases the surplus into the environment. Many produce more gas than needed. Few produce electricity with it. The burned energy of gas is lost.

Develop fish ponds

The creation of fish ponds where effluents are used to feed fish is a technical solution that is fairly easy to implement but requires space and, preferably, impervious soil. The regions with hydromorphic soil are favored. Ponds can easily accept 300 kg of organic nitrogen per hectare. However, if the livestock systems produce more than this quantity, the agro-biological functions can no longer be maintained.

At the territory level

Phytopurification:

Ponds and pools around farms recover surplus effluent. These areas also are used to cultivate crops for animal feed. Aquatic and aquaphile plants may be found in them that reactivate using in particular the nitrogen contained in organic matter. This type of treatment is a good way to manage biogeochemical flows but cannot deal well with increased loads. Furthermore, this technique only works in hydrophilic environments.

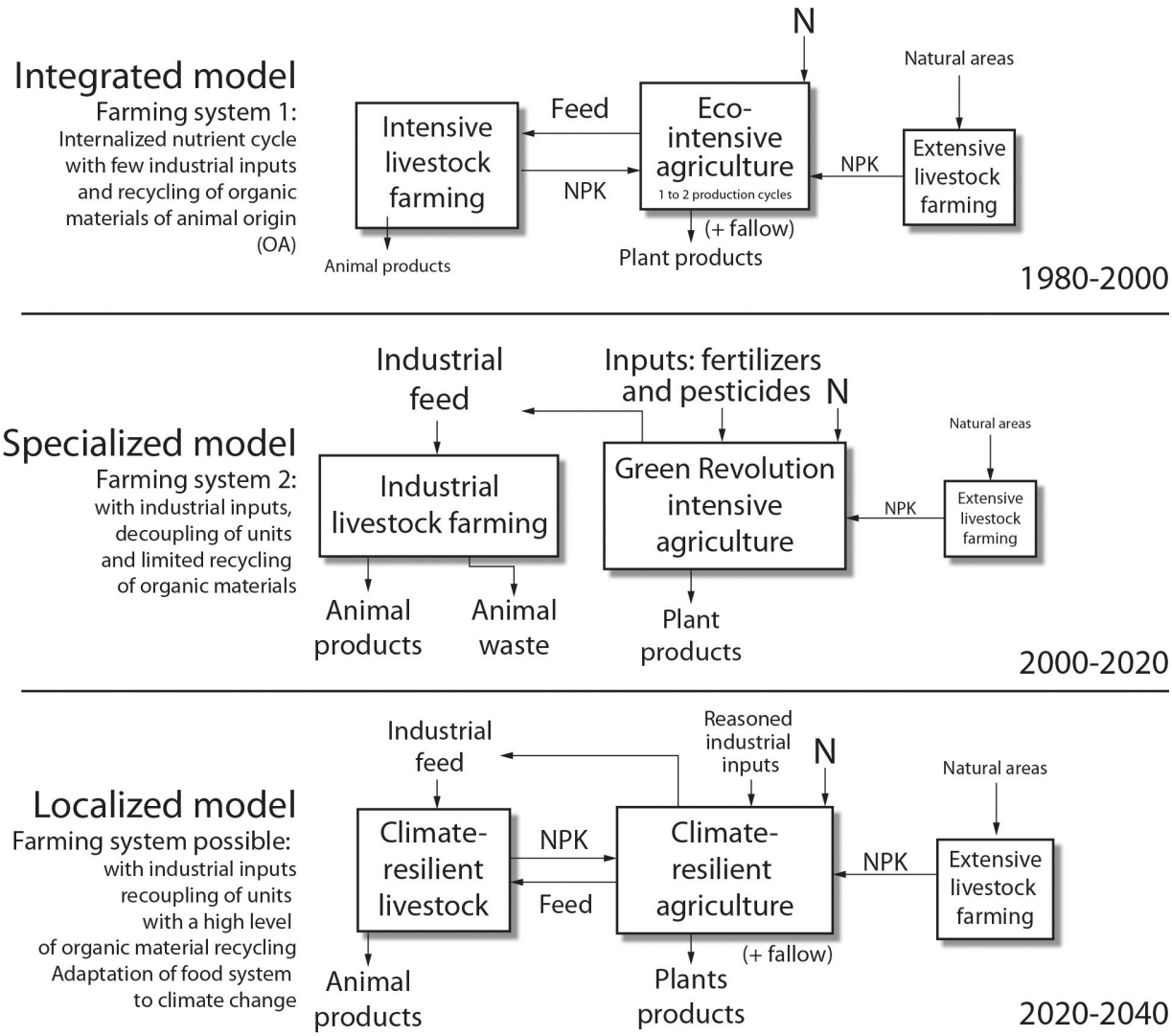
The reuse of effluents in agriculture:

This traditional practice remains completely relevant today, but it must be considered at the scale of the territory and not only at the level of individual farms. Full-fledged markets must be established to enhance the complementarities between livestock farms and crop farms. At the same time, the price of chemical fertilizers needs to be raised and support services should encourage farmers to market effluents. Numerous crops such as fruit trees and horticultural crops respond well to organic nutrients of animal origin.

At the transregional level

Regional effluent market:

In certain intensive livestock production regions, some actors are specializing in the collection, transport and resale of animal effluents. Farmers are unable to manage surpluses and government authorities are offering farm-level solutions. These actors therefore are starting to buy the effluents at a relatively attractive price and gather the materials along the main roads. Larger carriers transport these materials to other regions. Composting is fairly undeveloped and there is a lack of treatment plants at the territory level. Some regions are beginning to take an interest but face a lack of funding.



Some recommendations can be made based on current field observations:

- Target the first 100 communes at risk (1% of communes);
- Invest in biogas equipment;
- Invest in producing electricity with energy generated by biogas equipment;
- Plan the location of processing facilities in relation to the livestock production restructuring law;
- Create development permits for commercial farms. All projects with a turnover of over 1 billion VND (US$40,000) should be subject to authorization in relation to land and production;
- Establish links between commercial farms and companies to treat effluents;
- Encourage and organize export value chains;
- Model the environmental impact of intensive livestock production.

All of these proposals aim to better target government investments in a context where the livestock sector is rapidly transforming, and to promote greater sustainability of intensive systems.

Truck transporting slurry towards Lâm Đồng

© J.-D. Cesaro - CIRAD (2014)

Towards more inclusive and sustainable value chains

The issue of health safety

In 2017, a survey of 1000 urban dwellers living in Hanoi and Ho Chi Minh City found that food safety was a leading concern (49% of respondents), well in front of the environment (18%) or corruption (10%). The same survey should be conducted among rural dwellers, who compose two-thirds of the Vietnamese population, before declaring that health safety is the top issue for the Vietnamese. However, it is clear that the urban population is extremely sensitive to this problem. This situation is the result of multiple factors such as cross-border trade with China, the overuse of chemicals in agriculture and livestock, and the massive contamination of consumers. Consumers' concerns do not necessarily translate into radical changes in practice, but they are negatively affecting the government's perception of family farming.

Traditional *versus* modern value chains

Competition between traditional and modern value chains encourages agribusiness actors to advertise the quality control measures in the modern sectors. This is the case in the dairy sector, where mega-farms and major processing companies hold a significant share of the milk market, alongside small producers and processors. In the meat and egg sector, sources of supply are also diversified and there are millions of farms involved. The commercial farms are often integrated into agribusinesses. The latter invest in large-scale modern slaughterhouses. This is the case of Vissan, a company that sells meat notably on the markets of Ho Chi Minh City. In the poultry sector, the CP company has basically integrated production with the sale of finished products. The company sells controlled products directly under a registered trademark. However, this way of systematically setting tradition against modernity within production chains and sectors is hiding a more political objective of transforming food systems with industrial players assuming greater control. Particular attention should be paid to the potential emergence of monopolies justifying their concentration strategy solely on the basis of health safety arguments.

Transporting a pig to Hanoï

© J.-D. Cesaro - CIRAD (2013)

Monopoly or competition, diverse situations

The livestock sectors in the north and south of the country are very different. Around Ho Chi Minh City, the value chains are concentrated around slaughterhouses. Small informal slaughterhouses still exist, but the vast majority of meat consumed in the city comes from the industrial sector. By contrast, around Hanoi, thousands of small and medium-sized country slaughterhouses continue to operate and prosper. Slaughtering is so entrenched in village economies that the transformation of value chains is taking place much more slowly. In the dairy sector, the opposite situation holds. In the north, industries hold strong territorial monopolies. There is usually one industrial dairy per district, while in the south, dairies compete to collect milk.

VIETGAP standards

Quality standards are established to reassure consumers about the origin of a product. This is notably the case with the Vietnamese Good Agricultural Practices (VIETGAP) standard. VIETGAP is a certification of agricultural practices linked to official regulations. This standard was introduced as part of the agreements with WTO and ASEAN between 2006 and 2008. It is applied to products that have undergone inspection from the farm up to the consumer. However, the certifying bodies only monitor formal channels and ignore 90% of livestock production. Work is being done on voluntary certifications but this requires strong producer and processor organizations.

Livestock farmer organizations to better integrate largely unknown products

Producer organizations have a long history in Vietnam. For many years, agriculture was collectivized and managed by cooperatives in close collaboration with government authorities. Rather than being an advantage, this recent history has led to the intertwining of private interests and public management in the Vietnamese agricultural sector. Government representatives often have a say, even in the new generation of cooperatives and mass associations. This situation limits private initiative and the development of producer organizations. Yet for the diffusion of good practices, it is essential that private actors be able to organize themselves. Alonside the new generation of cooperatives, informal interest groups sometimes offer themselves as solutions to be promoted.

Promoting local transformation and the sustainability of sectors

On the one hand, Vietnamese consumers are concerned about health issues, on the other, they are fond of distinctive flavors. Many value chains exist in the country that provide quality foods with specific origins. Black pig meat, smoked mountain sausage, dried beef, artisanal yogurts, mountain cheeses... these are all products with distinctive characteristics that are part of a territorialized approach. It would be wrong to consider the Vietnamese food market as a homogenous whole made of raw products. A taste for originality and authenticity is extremely developed in what remains a rural society. In addition, urban consumers are also demanding quality products but are not always sure of their origin. Culinary tourism is an interesting niche sector even for livestock products, especially in highland regions.

Đồng Nai livestock and food security project

Based on current field observations, some recommendations can be made:

- Promote the organization of actors: associations, farmers' cooperatives, interest groups;
- Promote contracts between industries and local governments: prepare local development plans by sector, but also plans for investments in infrastructure and human development (PPP);
- Establish more transparent price and profit monitoring mechanisms at observatories directed by the statistical services in coordination with producer organizations and industries;
- Promote quality local products: identify products of animal origin recognized by consumers as having specific qualities and promote product specifications to enable their defence and improvement;
- Facilitate links between companies and producers: create a long-term partnership between livestock producers and industry based on support for agricultural production (credit, training, extension, techniques).

A milk collection center in Ba Vì

© J.-D. Cesaro - CIRAD (2015)

What are the foresight scenarios for the dairy sector in 2030?

Developing scenarios of the dairy sector's future

Under the framework of the Revalter project (information on the project is presented in the introduction of this atlas), a multi-disciplinary research team led participatory foresight workshops to explore feasible options for developing dairy production in Vietnam. The approach was based on considering different levels of analysis (farm, sector, districts, country). In the context of local and national workshops with industry stakeholders, the research team presented three possible but contrasting scenarios. These scenarios were described qualitatively (as storylines) and quantitatively using FAO projections to 2030.

Starting point of the scenarios

Strong population growth and increasing urbanization is putting food markets under heavy pressure. Rising per capita incomes are strengthening demand for diets high in protein and animal products, including dairy products. The country is becoming more and more deeply integrated into global economies and is facing fierce competition from imported animal products.

"Mega-farm – maximum concentration" scenario

Vietnamese milk production is shouldered entirely by a small number of very large, integrated, industrial farms. To establish large-scale farms, local authorities facilitate the transfer of land held by smallholders to private investors. This policy is clearly guided by the desire to promote modern technologies and large, capital-intensive farms where production costs are reduced through economies of scale. This mass production orientation generates environmental impacts related to high local concentrations of liquid waste and to increased imports of raw materials (maize, soybeans, etc.) produced abroad. The social impacts are also very problematic in this scenario, with thousands of agricultural workers removed from their land and deprived of their agricultural livelihoods.

"For a social and inclusive sector" scenario

Milk is produced only by family farms. The government supports small dairy producers to become competitive professional farms under the framework of long-term development programs. These national policies are adapted to each local situation. Small farmers engage in milk production through contracts with milk processing industries. Government support services encourage each farm to achieve forage autonomy and develop the capacity to treat effluents. Farmers get good economic returns from their integrated livestock-crop farming activities. The local environment is green and healthy, and many locations develop their own geographical indication for dairy products. This scenario estimates the number of jobs created in production at 116,000, which is 7.1 times higher than the "mega-farms" scenario.

"Dual system" scenario

Vietnam engages in a rapid transformation towards a modern, green and inclusive economy. A dual agriculture production system develops. Small and medium-sized farms play an important role in local ecosystems; and large intensive farms are strongly integrated into global supply chains.

Foresight meeting on the dairy sector in Hanoï

© G. Duteurtre - CIRAD (2015)

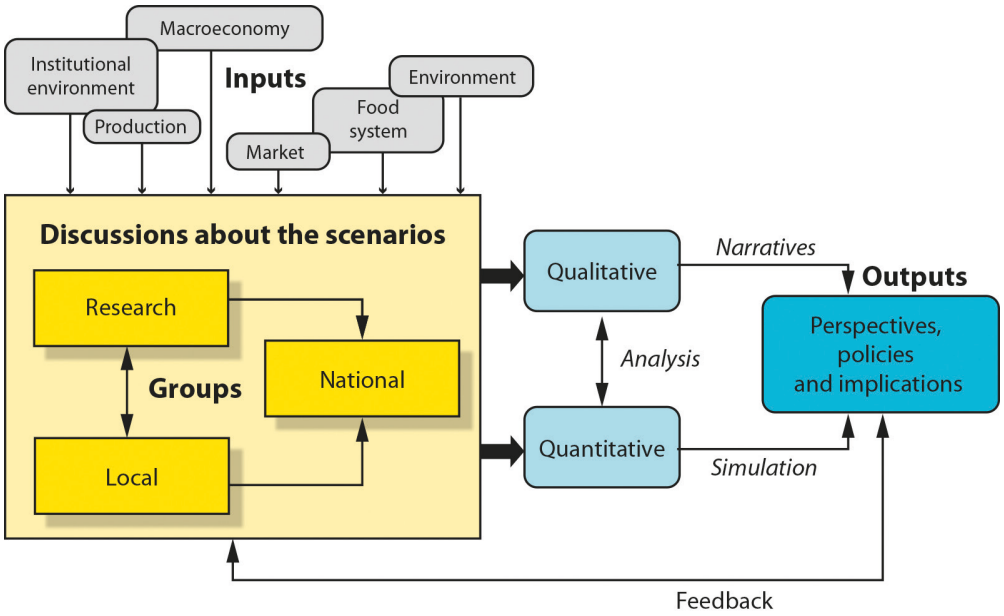
Foresight meeting on the pig sector in Sơn La

© G. Duteurtre - CIRAD (2015)

Foresight meeting on the pig sector in Đồng Nai

© G. Duteurtre - CIRAD (2015)

Method used by the Revalter team to build the foresight scenarios



Policy implications

These three scenarios are not predictions. They are meant to help anticipate what the future could hold, and to consider how to engage in different development pathways. The role of public policies is highlighted in particular.

Coexistence and cohabitation of agriculture models

The comparison of the three scenarios emphasizes the importance of promoting the coexistence of different agricultural models. As different types of farms have different impacts, their roles in sustainable development sectors seem to be complementary. The development of large farms renders it possible in the short term to balance supply and demand. However, this is accompanied by major social and environmental risks. In contrast, the growth of smallholder production makes it possible to adapt to local land constraints, provide work in rural areas and preserve the environment.

Support the transition towards a market economy

The dual system scenario is already emerging in Vietnam. The main role of family farming seems to be not only supporting rural livelihoods, but also producing local foods and cultural values, and maintaining rural ecosystems. However, small farms will have to diversify their activities, change their production practices and invest in economies of scale through new organizations (including group farming) and innovative technologies. For this, considerable investments in technological innovations will be necessary, with appropriate public credit systems and support. These investments will lead to more resource-intensive and labor-intensive farming systems.

Integrate economic, social, and environmental efforts in the development of livestock production

Policymakers need to consider not only economic dimensions but also labor, land ownership, food and environment indicators to promote a sustainable future for dairy production in Vietnam. Local and national governments must continue to support mega-farms and intermediary companies, but also family farming.

Scenario outputs in 2030

Scenario	S1. Mega-farms maximum concentration	S2. For a social and inclusive sector	S3. Dual system
National production	700 000 tons	700 000 tons	700 000 tons
Number of dairy farms	79 MF	23 330 EF	39 MF / 12 200 EF
Jobs created in the agriculture sector	15 500 jobs	116 000 jobs	67 000 jobs

National foresight meeting on the dairy sector

© G. Duteurtre - CIRAD (2016)

Conclusion

Major changes, past and future

Livestock production in Vietnam is being fundamentally reconfigured. Rarely in history has an agrarian transformation been so rapid. These developments are affecting the pig farming, poultry farming, dairy farming and cattle fattening sectors. We are witnessing the emergence of agro-industries up and down value chains, the transformation of family farms, and the emergence of new types of industrial farms. Among the factors favoring this "livestock revolution" are a quantitative increase in demand, the opening up of regional and international trade, and the emergence of standardized industrial technologies. These overall trends are fostering the belief that a "new" form of livestock production is emerging that is assuming a uniform shape across the country.

The diversity of development pathways

However, these changes are not uniform. To the contrary, the mapping of the transition of Vietnamese livestock production shows a tremendous diversity of development pathways. This diversity is the key lesson of this Atlas. Between the dynamics of pig farming observed in Thống Nhất district, the growth of smallholder dairy production in the Ba Vì basin, and the production of black pigs in the Northwestern mountains, the contrasts are striking. Highly intensive forms of livestock farming are emerging in peri-urban areas, while more extensive and integrated farming systems continue to prevail in more isolated rural areas. Similarly, while some regions are engaging in production specialization dynamics, other territories remain highly diversified. Local natural resource endowments, the organization of space, local social organizations, actors' networks, local industrial strategies, and local variations in public policies are the factors explaining the critical importance of "local" with regard to "global". Consequently, the transformation of livestock production must be grasped at the local level. One must understand the differentiated roles of livestock in the sustainable development of territories.

Outstanding policy issues

These transformations indeed have a significant impact on local communities. Consequently, this livestock revolution is a cause for concern. The emergence of increasingly industrialized production also challenges national development policies as well as local development pathways. In particular, this Atlas highlights the risks associated with land concentration policies and the emergence of corporate capitalism. More than ever, employment and rural populations must be placed at the heart of regional development policies, fostering win-win partnerships between companies and family farms and encouraging complementarity between livestock and crop activities for the sustainable management of ecosystems.

Coordinators

Jean-Daniel Cesaro

Geographer-cartographer with the joint research unit (UMR) SELMET/CIRAD
conducted his thesis, *Unlimited growth? Towards a new geography of livestock farming in Vietnam*, (French title: *Une croissance sans limite? Vers une nouvelle géographie de l'élevage au Vietnam*) under the framework of the Revalter project.

Nguyen Mai Huong

Economist, deputy director of RUDEC/IPSARD
conducted her thesis on scenarios of dairy sector development in Vietnam in 2017 under the Revalter project

Guillaume Duteurtre

Agro-economist with UMR SELMET/CIRAD, he coordinated the Revalter project from 2012 to 2016, and continues to work on livestock farming pathways in Vietnam with NIAS and IPSARD

Co-authors

Hoang Vu Quang (IPSARD)
Pham Duy Khanh (IPSARD)
N. Hostiou (INRA)
S. Cournut (VetAgroSup)
E. Pannier (IRD)
C. Culas (CNRS)
D. Sautier (CIRAD)
P. Bonnet (CIRAD)
B. Dorin (CIRAD)
B. Hubert (INRA)
A. Ickowicz (CIRAD)
Tran Doc Lap (NLU)
Nguyen Manh Cuong (IPSARD)
I. Baltenweck (ILRI)
Le Thi Thanh Huyen (NIAS)
M. Blanchard (CIRAD)

Acronyms

ANR: French National Research Agency
CASRAD: Center for Agrarian Systems Research and Development (Vietnam)
CIRAD: French Agricultural Research Centre for International Development
CNRS: French National Centre for Scientific Research
FAO: United Nations Food and Agriculture Organisation
GREASE (Platform in partnership): Management of Emerging Risks in Southeast Asia
IFPRI: International Food Policy Research Institute
INRA: French National Institute for Agricultural Research
ILRI: International Livestock Research Institute
IPSARD: Institute of Policy and Strategy for Agriculture and Rural Development
LIFSAP: Livestock Competitiveness and Food Safety Project
MALICA (Platform in partnership): Markets and agricultural linkages for cities in Asia
NIAS: National Institute of Animal Sciences (Vietnam)
NIVR: National Institute of Veterinary Research (Vietnam)
PRISE (ex-Platform in partnership): Intensification of Livestock Systems Research Cluster
RUDEC: Rural Development Centre (Vietnam)
VASI: Vietnamese Agricultural Sciences Institute
VNUA: Vietnam National University of Agriculture

Bibliography

Bergeret P. (2002) *Paysans, État et marchés au Vietnam: dix ans de coopération agricole dans le bassin du Fleuve Rouge*. KARTHALA Editions.

Castella, J.-C., Dang Dinh Quang (2002) *Doi Moi in the Mountains : Land Use Changes and Farmers' Livelihood Strategies in Bac Kan Province, Vietnam*. The Agricultural Publishing House. Hanoi.

Cesaro J.-D., Porphyre V., Duteurtre G. (2018) Influence de l'industrialisation de l'élevage porcin au Vietnam sur la diversification des systèmes en intégration agriculture-élevage, *Revue d'élevage et de médecine vétérinaire des pays tropicaux*, 71 (1-2)

Cesaro J.-D. (2016) « Une croissance sans limite?: vers une nouvelle géographie de l'élevage au Vietnam », thèse de doctorat en géographie, sous la direction de Frédéric Landy, Université Paris 10, 433 p.

Duteurtre G., Cesaro J.-D., Nguyen Mai Huong, Pham Duy Khanh, Nguyen Ngoc Luan (2015) TH dairy company (Vietnam): Is such a large-scale investment sustainable?, CIRAD report, 17 p.

Devendra C., and D. Thomas. 2002. "Crop–animal Interactions in Mixed Farming Systems in Asia." Agricultural Systems 71 (1–2): 27–40.

DLP. 2007. Atlas of Vietnam Animal Husbandry. Agriculture Publishing House. Hanoi: Department of Animal Production (DLP), Ministry of Agriculture and Rural Development (MARD)

Epprecht, M. (ed.) Robinson, T. (ed.) et al. (2007)Agricultural atlas of Vietnam: a depiction of the 2001 rural agriculture and fisheries census, General Statistical Office, Hanoi (Viet Nam). Dept. of Agriculture, Forestry and Fisheries Statistics

Epprecht M. (2005) Geographic Dimensions of Livestock Holdings in Vietnam - Spatial Relationships among Poverty, Infrastructure and the Environment." PPLPI Working Paper 23778. Food and Agriculture Organization of the United Nations, Pro-Poor Livestock Policy Initiative.

Gerber P., Chilonda P, Franceschini G, Menzi H. (2005) "Geographical Determinants and Environmental Implications of Livestock Production Intensification in Asia." Bioresource Technology, The 10th International Conrence on Recycling of Agricultural, Municipal and Industrial Residues in Agriculture, 96 (2): 263–76.

Minot N., Baulch B. (2005) "Spatial Patterns of Poverty in Vietnam and Their Implications for Policy." Food Policy 30 (5–6): 461–75.

Molénat M., Tran The Thong (1991) "La Production Porcine Au Viet Nam et Son Amélioration." 68. Animal Genetic Resources WORLD ANIMAL REVIEW. Rome. http://www.fao.org/docrep/u4900t/u4900T0a.htm.

Nguyen Mai Huong, Cesaro J.-D., Duteurtre G., Dorin B. (2018) Livestock farms' upscaling unlimited? Building scenarios for Vietnam's dairy sector by 2030. Policy Brief, dP MALICA, 4 p.

Ngueyn Mai Huong (2017) « Structural Transformation and the Livestock Revolution in Vietnam: current situation and future scenarios for the dairy sector », thèse de doctorat en économie, sous la direction de Paule Moustier, EDEG – SUPAGRO, 219 p.

Mai Huong Nguyen, Dorin B., Duteurtre G. (2017) Structural transformation, agriculture and livestock in Vietnam (1970-2015). A multi-scale political economy of an ongoing revolution. 11ème Journées de Recherche en Sciences Sociales INRA-SFER-CIRAD, Dec 2017, Lyon, France.

Nguyen Mai Huong, Duteurtre G., Moustier P. (2017) What shapes the governance of the dairy value chain in Vietnam? Insights from Ba-Vì milkshed (Hanoi). 2017. World Food Policy, 4 (1) : 57-81.

Nguyen Mai Huong, Cesaro J.-D., Pham Duy Khanh, Hoang Vu Quang, Duteurtre G. (2016) Which is a sustainable development of dairy sector in Vietnam: Dairy household farms or intensive and large scale farms, *Journal of Animal Science and Technology* (61) : 12-21.

Pham Duy Khanh (2016) « Vers des modèles durables de transformation des systèmes d'élevage en Asie du Sud-Est : Application au cas du secteur laitier au Vietnam » , thèse de doctorat en économie, sous la direction de Benoit Dedieu, ED435 ABIES, 225 p.

Pham Duy Khanh, Duteurtre G., Cournut S., Messad S., Dedieu B., Hostiou N. (2016), « Caractérisation de la diversité et de la durabilité des exploitations laitières familiales au Vietnam : étude de cas en zone périurbaine de Hanoï », *Revue d'Elevage et de Médecine Vétérinaire des Pays Tropicaux,* 69 (4) : 131-141.

Porphyre V., Nguyen Que Coi (2006) "Pig Production Development Animal-Waste Management and Environment Protection: A Case Study in Thai Binh Province, Northern Vietnam." PRISE/CIRAD.

Revalter project team at the final workshop