

Report on potential research projects on pig genetic resource use in Vietnam, as ILRI – ISU joint initiatives under the L&F CRP.

Karen Marshall & Max Rothschild, 21/04/15

Background

Supported by the L&F “Discovery to Delivery” funds for the Vietnam pork value chain, a scoping trip was performed to identify areas of L&F engagement on pig genetic resource use in Vietnam.

This scoping trip was performed by Karen Marshall (ILRI) and Max Rothschild (Iowa State University), with support from the ILRI Vietnam team and Huyen Le Thi from the Vietnamese National Institute of Animal Science (NIAS). The trip took place 17-22nd November 2014, and comprised meetings with key research organisations and other actors located in Northern Vietnam, as well as a field trip to the Nghe An province (a L&F target site) where a variety of stakeholders were visited. See Annex 1 for full details.

Brief on pig genetic resource use in Vietnam

Vietnam is a developing country in South East Asia which produces nearly 28 million pigs annually with most production (about 70%) coming from a variety of smallholder production systems.

There are numerous different actors that are heavily engaged in the supply of pig breeding material to smallholders in Vietnam including research institutes, government departments, and the private sector.

A key research institute in the north of Vietnam is the National Institute of Animal Science (NIAS). NIAS is involved in running pig breeding programs (they have 3 pig research farms), breed comparison studies (currently two large trials, one station based focused on exotic breed / cross-breeds, and one in-situ based focused on indigenous breeds), some meat quality research (attached to the breed comparison studies), and some candidate gene studies. Another key research institute in the north of Vietnam is the Vietnam National University of Agriculture (VNUA; formerly Hanoi University of Agriculture), however this institute has limited engagement in pig genetic resource use.

Key government departments are MARD (Ministry of Agriculture and Rural Development – policy setting), provincial level breeding centres (provide administrative support to breeding activities in the province, support some community based breed maintenance programs), and district level breeding centres (provide artificial insemination services and district level support to community based breed maintenance programs).

The private sector key actors include breeding companies (large-scale), multiplier units (medium and small scale), private AI providers (small scale, some with own boars, some acting as distributors without own boars), and village boar keepers.

Vietnam has multiple breeds / cross-breeds of pigs including about 15 local breeds, numerous exotic breeds (predominantly Landrace, Large White, Pietran and Duroc), and various crosses between these. In the north, Mong Cai or Mong Cai crosses are commonly used as a maternal line – by all reports Mong Cai appears to be a well-adapted and highly reproductive improved local breed. NIAS was also experimenting with the use of Meishan pigs from China as a maternal line, however this work is still in early stages.

Identified areas of R4D

Given the number of actors already involved in the supply of pig genetic material, and the breadth of research and development activities on pig genetic resource use - either previously undertaken or currently being undertaken - an area of R4D engagement producing wide-spread impact in the short-term (such as the introduction of exotic pig breeds did) does not easily present itself. However, a number of interesting research areas with potential for more moderate levels of impact were identified, as summarised in Table 1 below.

It is anticipated that ILRI, ISU and NIAS will jointly develop the one or more of the ‘high interest’ research topics listed in the table below into a full proposal, as funding opportunities present themselves.

Table 1. Identified promising engagement areas on pig genetic resource use

Topic	Up-stream / applied	Potential impact	Funding level, USD, (best guess)	Overall interest-ISU	Interest ILRI	Interest NIAS – farming systems department	Interest NIAS – animal breeding department	Comments
HIGHEST INTEREST								
Interaction of breed x feed x animal health, where indicator of animal health is gut microbiome, and promotion of identified best feeding practice	In-between	Good, longer term	\$500,000 – but scaleable	High	High	High	High	ILRI / ISU: Novel yet applied, requires access to research station; NIAS FS: the ecological zone should also be considered
Improving the reproductive potential of the Mong Cai maternal breed-line, by increasing the frequency of the known candidate genes including (ESR, PRL, RBP4)	In-between	Difficult to access until allele frequencies are known	\$20,000 for initial test of allele frequency; \$500,000 for full project but scaleable	High	High	Medium	High	ILRI / ISU: the initial study could focus on allele frequencies NIAS breeding: some candidate genes related to reproduction traits such as ESR and PRLR etc.
Identification of resilience differences associated with selection signatures in the local	Upstream	Difficult to assess but potential	\$500,000 - but scaleable. More if bio-repository	High	High	Medium	high	ILRI / ISU: Can be coupled with a) creation national bio-

breeds, assessment of potential use of underlying genes in future breed development		for high impact if new genes for resilience identified, medium term	component is included					repository for local pig breeds b) breed mapping (geo-graphic) ILRI: needs to complement ongoing pig genomics research already being undertaken via the L&F genetics flagship around underlying genes for immune traits
Study on constraints to sow / boars expressing their full reproductive potential, as well as AI service provision effectiveness, followed by capacity building on the same.	Applied	High, short term	\$200,000	High	High	high	Medium	
MEDIUM INTEREST								
Comparison of maternal breed lines, and strengthening access to the most appropriate maternal breed line	Applied	Fair - high, medium term	\$1.5 -2,000,000	Medium	Medium	Medium	High	
Development and promotion of a synthetic maternal breed-line for the smallholder system	Applied	High, long term	\$2,500 000+	Low	Medium	high	high	ILRI / ISU: Very long term.
Breed focused market study – available markets, market requirements (collector / trader animal preferences, producers	Applied	?? Depends on outcomes,	\$50,000	Medium-low	High for new sites; low for sites	High	Medium	ILRI: Components of this already well covered for selected provinces by ACIAR

perceptions of these), fit of available animals to market, to inform future breeding interventions		feeds into other studies			where data is already available			smallholder pig competitiveness project, for selected provinces NIAS FS: should also include the linkage between state , private enterprise, and policy makers with the mentioned stakeholders
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Annex 1. Scoping trip details

Meetings 17/11/14 – 19/11/14, in conjunction with Max Rothschild and Fred Unger / Lucy Laper for certain meetings

- **Nguyen Thi Thanh An** - ACIAR acting country manager, Vietnam: an.nguyen@aciarc.gov.au
- **Dr Ngo Thi Kim Cuc** – Director, Animal Breeding and Genetics Department, National Institute of Animal Science (NIAS): cucngokim@yahoo.com
- **Dr Hai** – Deputy Head of Pig Research Centre, NIAS: hai1974vn@gmail.com
- **Dr Vu Dinh Ton** – Dean, Faculty of Animal Science & Aquaculture, Vietnam National University of Agriculture (formerly Hanoi University of Agriculture, HUA): vdton@vnua.edu.vn
- **Dr Do Duc Luc** - Head, Department of Animal Breeding and Genetics (within Faculty of Animal Science & Aquaculture) Vietnam National University of Agriculture (formerly Hanoi University of Agriculture, HUA): ddluc@vnua.edu.vn
- **Dr Kieu Dinh Thiep** – Assistant Vice President, C.P. Vietnam (CP is the largest commercial pig company in Vietnam): thiep@cp.com.vn

Field Trip 20/11/14-22/11/14, in conjunction with Max Rothschild, Fred Unger, Huyen Le Thi

Facilitator: Dr Thi Le Huyen – Deputy Director, Farming Systems and Economics, NIAS: lehuyen1973@yahoo.com

Day 1: Du Luong district

- Visit to provincial level breeding centre – courtesy visit with director
- Visit to Thai Dong pig breeding company – discussion with company head and technical staff
- Visit to large-scale pig multiplier unit – discussion with company head & tour
- Visit to members of Mong Cai breeders co-operative
- Visit to district level breeding centre

Day 2: Yen Thanh district

- Focus group discussion with men and women smallholder pig producers – facilitated by Huyen Le Thi
- Visit to small scale village boar keeper

- Visit to sire keeper also performing AI

Day 3: Nam Dam district

- Visit to smallhold pig producers of different scale, and operation type (piglet producers, piglet fatteners, full scale) – some involved in LIFSAP project, others not.