

# Beef Cattle Genetic and Breeding Projects in Vietnam and the Future Direction

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## Abstract

Vietnam's current and future human population estimates are presented. Present per capita ruminant and non-ruminant meat consumption is also reported. Based on this information, projected demand for meat from both ruminant and non-ruminant sources in 2010 will outstrip supply. It is estimated that Vietnam has the capacity to supply a high proportion of these projected shortfalls through improvement and development of its existing production systems. Specifically, this paper is focussed on describing the beef cattle breeds in Vietnam and their respective production characteristics. Further, factors that are preventing the development of coordinated beef cattle breeding strategies to improve productivity and profitability are identified and ACIAR and AusAID projects developed to improve the profitability of farmers' beef production systems are discussed. Finally, recommendations to ensure the future development of coordinated beef cattle breeding strategies that will assist in improving the profitability of farmers' beef enterprises are presented.

AT PRESENT, Vietnam's population is estimated to be about 78 million people. By the year 2010, the country's population is projected to exceed 100 million people (Anon. 1995). This increase in population and economic growth will increase the demand for animal protein of all types.

The UN Food and Agriculture Organisation (Anon. 1994) estimated that annual per capita meat consumption was 16.6 kg with around 2.5 kg derived from ruminants and 14.1 kg derived from non-ruminants. Between 1970 and 1994, the consumption of non-ruminant and ruminant meat increased by 2% and about 1.5%, respectively. Significantly, cattle numbers increased over the decade 1983–1993 by 5% annually to reach a population of 3.3 million head and buffalo by just under 2% to reach 3.0 million head.

In 2010, projected demand for meat from both ruminant and non-ruminant sources will outstrip supply. Production of ruminant meat (mainly beef) is anticipated to be 3 kg per capita with consumption estimated between 3.6 and 4.2 kg per capita. Equivalent estimates for non-ruminant meats are 18.9 kg and between 21.5 and 25.2 kg for production and consumption, respectively. It is estimated that Vietnam has the capacity to supply a high proportion

of these projected shortfalls through improvement and development of its existing production systems.

The small Yellow Cattle and the Laisind breeds are the most common breeds of cattle in Vietnam. Yellow Cattle have low average body weights, about 180–200 kg for mature females, around 300 kg for bulls and are extremely well adapted and fertile. The Laisind breed is a result of crossing the introduced Red Sindhi breed (1920 and more recent introductions) with the local Yellow Cattle breed. Mature Laisind animals usually average about 100 kg heavier in liveweight than Yellow Cattle and are often used by farmers as a first cross when attempting to increase the size of their animals. In general, cattle are managed on a low-intensity basis, utilising mixed feed resources of variable quality. Fertility rates in these cattle are good but growth rates and profit margins are typically low. These cattle are used as sources of animal power, income and a form of wealth.

Given this background, this paper discusses the present situation in Vietnam, aspects of current beef cattle genetic and breeding projects in Vietnam and the future direction. Specifically, discussions of Sub-Project 5, Genetics and Breeding, ACIAR Profitable Beef Cattle Development in Vietnam Project (AS2/97/18) and an AusAID Capacity-Building for Agriculture and Rural Development Program (CARD) Project are presented.

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## Present Situation

At present, there are a number of factors that are preventing the development of coordinated beef cattle breeding strategies. These include:

- no economic incentive for farmers to improve the performance and quality of their cattle;
- no integrated plan to develop a more efficient beef cattle industry through the identification of relevant performance trait measurements;
- no training in integrated supply chain and marketing systems;
- limited evaluation of the production performance of the local Yellow Cattle, Laisind cattle or 'Tropical Crossbred Cattle Types' on level terms in the local environment/regional beef production systems;
- no sound monitoring, recording or collection of 'standard' information on what is happening at the local level – opportunity to use information in genetic analysis at a later stage;
- no structured breeding programs with well defined 'breeding objectives'; and
- poor communication, coordination and collaboration between universities, research, development and extension (RD&E) and farmer groups to enhance the development of a National Beef Cattle Breeding Strategy.

## Beef Cattle Genetic and Breeding Projects in Vietnam

### ACIAR Profitable Beef Cattle Development in Vietnam Project (AS2/97/18)

As a result of the rapidly growing economy, the demand for beef, predicted to rise as incomes increase and forecasts indicating a widening gap in the supply of beef from national sources, a need was identified to raise the productivity of beef farming enterprises. Therefore, an ACIAR Project, Profitable Beef Cattle Development in Vietnam, was designed to assist in the profitable development of Vietnam's beef industry through conducting collaborative research in six key areas. These areas include:

- marketing systems;
- profitable calf management;
- forage production within intensive farming systems;
- evaluation of agro-industrial by-products as cattle feed;
- genetics and breeding;
- animal and human health.

The overall project objective has been to contribute to the profitable development of the beef industry in Vietnam through an integrated, multi-disciplinary and cooperative series of scientific activities conducted in

different regions of the country and targeted to the needs of specific production systems.

An important goal of this project has been to seek outcomes which increase the profitability of cattle-rearing by smallholder farmers, rather than assessing results only in terms of physical production or productivity measures. Extensive use has been made of on-farm research wherever possible and the whole program has been employing a diverse set of research and training methodologies.

A distinctive feature has been to structure the research through a series of independently-managed, integrated sub-projects as identified above. Inter-disciplinary teams have involved some common members from all of the main sub-projects to ensure that effective collaboration is maintained, both geographically and between disciplines.

In the past, institutional agencies, such as national research centres have tended to measure significant improvements in terms of more, better, larger and quicker. However, smallholder farmers have generally nominated profitability as their first concern, namely, economic performance: prices, profit and income. The measure of 'profitability' used in this project will be 'the predicted effect of an intervention on whole-farm profitability' (Perkins 1996).

Further, recommendations based on official policy or good research procedures have not been adopted by farmers. Generally, rejection has been based on economic grounds, that is, too little return for the extra inputs and effort; too great a risk for uncertain rewards and too great a lapse of time between investment and return.

A brief outline of Sub-Project 5, Genetics and Breeding is presented. A feature of this project has been the 'on-farm' research approach which has accepted the problems of measurement and replication across different farming production systems and where issues are tested by farmers with their land and resources.

## Sub-Project 5, Genetics and Breeding

### Objectives

The objectives of this project include:

- to undertake a critical review of the current breeding strategies of national and provincial authorities in Vietnam;
- to improve the level of understanding of modern genetic principles and reproduction and artificial breeding technologies; and
- to monitor the performance of progeny generated by crossing four tropically adapted performance-evaluated sire genotypes from Australia to Laisind dams at two experimental research sites.

## Results

The results to date include:

- The critical review of current breeding strategies in Vietnam highlighted the urgent need to overcome the misplaced emphasis on increased body size for cattle production and a long history of uncoordinated crossbreeding with exotic *Bos indicus* and *Bos taurus* breeds, much of which has yielded few lasting or useful results. Beef cattle production is a longer-term investment compared to the more intensively-fed/managed dairy industry, which yields farmers a daily income return. More thought and research is required on developing a breeding strategy for beef cattle, with clearly-stated objectives which combine farmers' preferences and official policy. As a result of this survey, this project has been focussed on developing a crossbreeding program to produce a mid-sized, 'easy care' animal with good growth and good fertility, while remaining well-adapted to the local environmental stresses.
- To improve the level of understanding of modern genetic principles and reproduction and artificial breeding technologies, two training workshops in *Genetics, Breeding Programs* and *Artificial Breeding Technologies* were organised at Ba Vi Research Station, Ba Vi, Ha Tay Province, north-west of Hanoi and at Buon Ma Thuot and M'Drak, Dak Lak Province in the Central Highlands of Vietnam.

Approximately 20 participants attended each workshop where an 'adult education' training strategy of 'learning by doing' was employed, as the workshops were attended by people with various levels of training in the disciplines of genetics and animal breeding. After brief presentations on theory, the participants were then asked to apply the principles that they had just learnt about through working examples or through actual training on cows organised by staff from the National Institute of Animal Husbandry. Further, the workshop focussed on both the similarities and differences that exist between

tropical northern Australia and tropical Vietnam, and then technologies/strategies that might be applied in Vietnam were discussed.

With the completion of the theory and practical components of the course, participants were encouraged to contribute to the planning of a successful artificial breeding program, that is Objective 3, at their respective locations, so that they had both ownership of the problems confronting the particular program in their region and of the solutions to these problems. This approach received overwhelming support, with the result that all participants wished to have some involvement in the proposed crossbreeding programs at the two sites.

On the final day of each workshop, potential collaborating farmers were invited along to the workshop to listen to and discuss the objectives of the proposed project, the proposed tropical breeds of beef cattle to be used in the project and any concerns that they might have with respect to the production and evaluation of these crossbred calves. Once again, this proved to be a very successful strategy. The farmers were comfortable with this approach and they openly discussed all issues with both the workshop participants and trainers.

Further, to ensure the success of this project, additional presentations were made to the provincial leaders of the Departments of Agriculture and Rural Development (DARDs) so that they were aware of the objectives of the project, had some ownership of the project in their province and also had the opportunity to explore the potential of integrating this project with already existing provincial projects. As a result of this strategy, the provincial leaders of the DARDs pledged their support to ensure a successful conclusion to the project.

- To monitor the performance of progeny generated by crossing four tropically adapted performance-evaluated sire genotypes from Australia, by artificial insemination (AI), to Laisind dams at two experimental research sites has been the greatest challenge in this project.

In Vinh Phuc Province, North-West of Hanoi, the following breeding program was employed:

Red Brahman (100% tropically adapted <i>Bos indicus</i> ) (AI) sires	}	× Laisind dams
Droughtmaster (50% tropically adapted <i>Bos indicus</i> ) (AI) sires		
Red Brangus (50% tropically adapted <i>Bos indicus</i> ) (AI) sires		
Laisind sires (natural mated)		

At M'Drak, in Dak Lak Province, Central Highlands of Vietnam, the following breeding program was employed:

Red Brahman (100% tropically adapted <i>Bos indicus</i> ) (AI) sires	}	× Laisind dams
Droughtmaster (50% tropically adapted <i>Bos indicus</i> ) (AI) sires		
Belmont Red (tropically adapted <i>Bos taurus</i> ) (AI) sires		
Laisind sires (natural mated)		

During the second phase of this project, AI training courses were run to evaluate the skills of the Vietnamese Research and Extension (R&E) staff. In addition, Vietnamese R&E staff organised training days in heat detection for the cooperating farmers to ensure that cows could be successfully identified for AI.

Representative calf breed types have been produced and their growth performance will be evaluated towards the end of 2001 using a high molasses based diet in conjunction with a true protein and roughage.

### **AusAID CARD Project – ‘Enhancing Tropical Beef Cattle Genetics, Reproduction and Animal Breeding Skills as Applied to Beef Industry Supply Chain Systems’**

The focus of this project has been to enhance the local capacity for teaching, research and extension in agriculture and rural development in the key priority area of agriculture, and livestock improvement in Vietnam, and within these areas, to deliver activities in the disciplines of biotechnology and genetic improvement as highlighted as a priority area by the Government of Vietnam (GOV) in the Vietnam–Australia Development Cooperation Program, CARD Program Guidelines. Specifically, this project has focussed on specialised training, in Australia and Vietnam, and curriculum development in Vietnamese universities and associated agricultural institutions, in the disciplines of genetic improvement, reproduction and animal breeding.

#### **Objectives**

The objectives of this project include:

- short-term R&E staff placements in tropical central Queensland, Australia (‘train the trainer’ strategy);
- three strategically located workshops conducted throughout the northern, central highlands and central coastal regions of Vietnam (use of Australian specialists and Vietnamese R&E staff trained in Australia, as identified above); and
- curriculum development exercises in Vietnamese universities and associated agricultural institutions.

A final objective of this project has been to enhance the Sub-Project 5, Genetics and Breeding, ACIAR Profitable Beef Cattle Development in Vietnam Project (AS2/97/18). To date, this sub-project has been progressing well and has offered many active learning opportunities for project staff. However, this ACIAR project has a research focus and the project team has not been able to extend the successes of this project to the wider farming community.

#### **Results**

The results from this project include:

- Ten Vietnamese R&E staff visited the tropical beef cattle production region of central Queensland, Australia, and received specialist training in R&E techniques and strategies in tropical genetics, animal breeding and reproduction and visited all sectors of a tropical beef industry supply chain system.
- Three training workshops in ‘Tropical Genetics, Reproduction and Animal Breeding’ were developed, organised and conducted in the North, Central Coastal and the Central Highlands regions of Vietnam. These workshops:
  - included the production of course notes in English and translated into Vietnamese;
  - were centred on regional farmer groups/communities involved in the established ACIAR Genetics and Breeding Sub-Project sites in Vietnam; and
  - employed a ‘regional beef cattle production systems approach’ that:
    - ◆ used collaborative and consultative group strategies between Australian and Vietnamese R&E specialists working together with these farmer groups to identify their concerns/issues with respect to profitability and sustainability of their beef cattle enterprises,
    - ◆ resulted in more targeted R&E strategies that effectively addressed these issues, promoted local ownership of both problems and solutions by all members of farming families and communities and R&E specialists through this approach resulting in increased adoption of ‘best practice’ management strategies; and
    - ◆ assisted in the alleviation of poverty in the these local collaborating farming communities, as a direct result of implementation of this ‘regional beef cattle production systems approach’.

A feature of these workshops, as identified above, was activities centred on regional farmer groups at established ACIAR Genetics, Breeding and Reproduction Sub-Project sites throughout Vietnam employing Australian and Vietnamese extension specialists, working together with these farmer groups, to identify their concerns/issues with respect to profitability and sustainability and to ensure that future research would be based on identified ‘issues’ – ‘issues-based research’.

- A new curriculum in ‘Tropical Genetics, Reproduction and Animal Breeding’ will be developed in collaboration with Vietnamese universities and

associated agricultural institutions, and agreed to by these organisations.

These activities will result in the development of a strong framework for future growth forged through the delivery of modern genetic principles applied to the development of practical animal breeding strategies and delivered through the latest reproductive technologies.

### Recommendations for Future Direction

There are a number of recommendations that have been identified to ensure the development of coordinated beef cattle breeding strategies that will assist in improving the profitability of farmers' beef enterprises. These include:

- Universities, RD&E groups and farming communities/families
  - Encourage interactive and participatory approach between these groups in problem solving.
  - Develop a 'two way' flow of information between these groups.
  - Foster a collaborative and coordinated approach in the collection and management of 'standard' data.
  - Promote the development of a sound National Beef Cattle Recording Scheme.
- Foster a Regional/Whole of Commune Beef Cattle Production Systems Approach

- Define the 'Regional Beef Production System'.
- Define the environment.
- Ensure a sustainable production system
  - ◆ Resources available for future generations (soil and vegetation).
  - ◆ Cost of production/Maximise profit (factor in all costs and returns).
  - ◆ No one 'best regional/national system' with respect to replacement animals and sale animals.
  - ◆ Investigate the opportunity for integrated/ 'alliance' type systems, for example, seed-stock producers, commercial breeders and finishers.
- Market definition.
- Investigate and promote payment on final live-weight or slaughter weight.
- Develop management strategies
  - ◆ Finishing strategies
  - ◆ Weaning strategies
  - ◆ Disease management strategies
  - ◆ Breeding cow herd\Bull management.
- Genetic improvement program (bull selection)
- Develop a permanent and unique animal identification system.
- Develop customised 'Regional/Commune Breeding Objectives' and a National Breeding Strategy (Figure 1.)

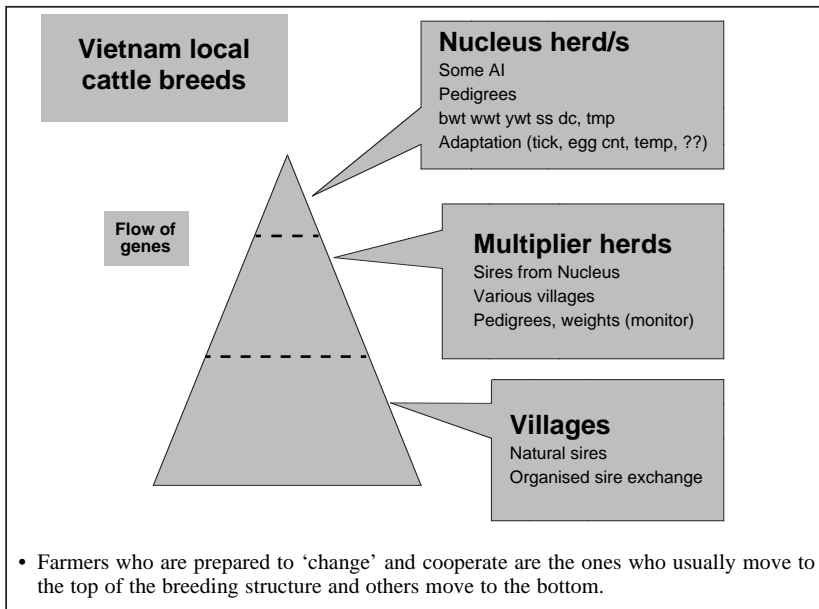


Figure 1. National breeding strategy.

- Criteria:
  - ◆ Well adapted;
  - ◆ Good fertility;
  - ◆ Mid-sized;
  - ◆ 'Easy care';
  - ◆ Good growth;
  - ◆ Combination of farmers' preferences and official policy.
- Develop an Economic Selection Index = \$w survival + \$x fertility +y rate of gain.
- Need to start with manageable sites. Need to work with farmer groups who are prepared to 'change' and improve their production system rather than trying to change the whole country.

## References

- Anon. 1994. FAO AGA. Viet Nam – Livestock Sub-Sector Research Priorities. Animal Production and Health Section, Informal Discussion Paper, 3 p.
- Anon. 1995, World Bank. Vietnam Population and Family Health Project, Vol. 1, para 1.4, page 9.
- Perkins, J. 1996. Action and Consequence: Sensible Economics for Rational Researchers, ACIAR Proceedings Exploring Approaches to Research in the Animal Sciences in Vietnam, Hue University of Agriculture and Forestry, Vietnam, No. 68, 31 July–3 August, 1995, 159–162.