Chapter 2

RESEARCH METHODS

This chapter discusses the topics on how the study area was selected, what kind of information was collected, how the samples were selected, how the data collection was carried out, as well as what kinds of method were used to process the data.

2.1 Site selection

According to the objectives of the study, the selection of the study site was based on the area where both local and crossbred cattle are being raised by farmers. The study was conducted during 2006 in Nam Dong district, Thua Thien Hue province of Vietnam (Figure 2.1). Nam Dong district is selected as the study area because it had the largest number of crossbred cattle.

2.2 Sampling technique

A two-stage sampling procedure was used to select farmers for the study. One district where both local cattle and crossbred cattle are being raised by farmers was selected purposively. Four communes within the district were again selected based on the number of raising cattle. Furthermore, two villages from each commune were selected purposively where cattle farming systems are being applied by farmers. A total of 80 farm households raising local and crossbred cattle were randomly selected and interviewed from the list of households raising cattle, forty households for local cattle and forty households for crossbred cattle. All households involved in mixed farming and had land, labor and kept cattle for more than four years.

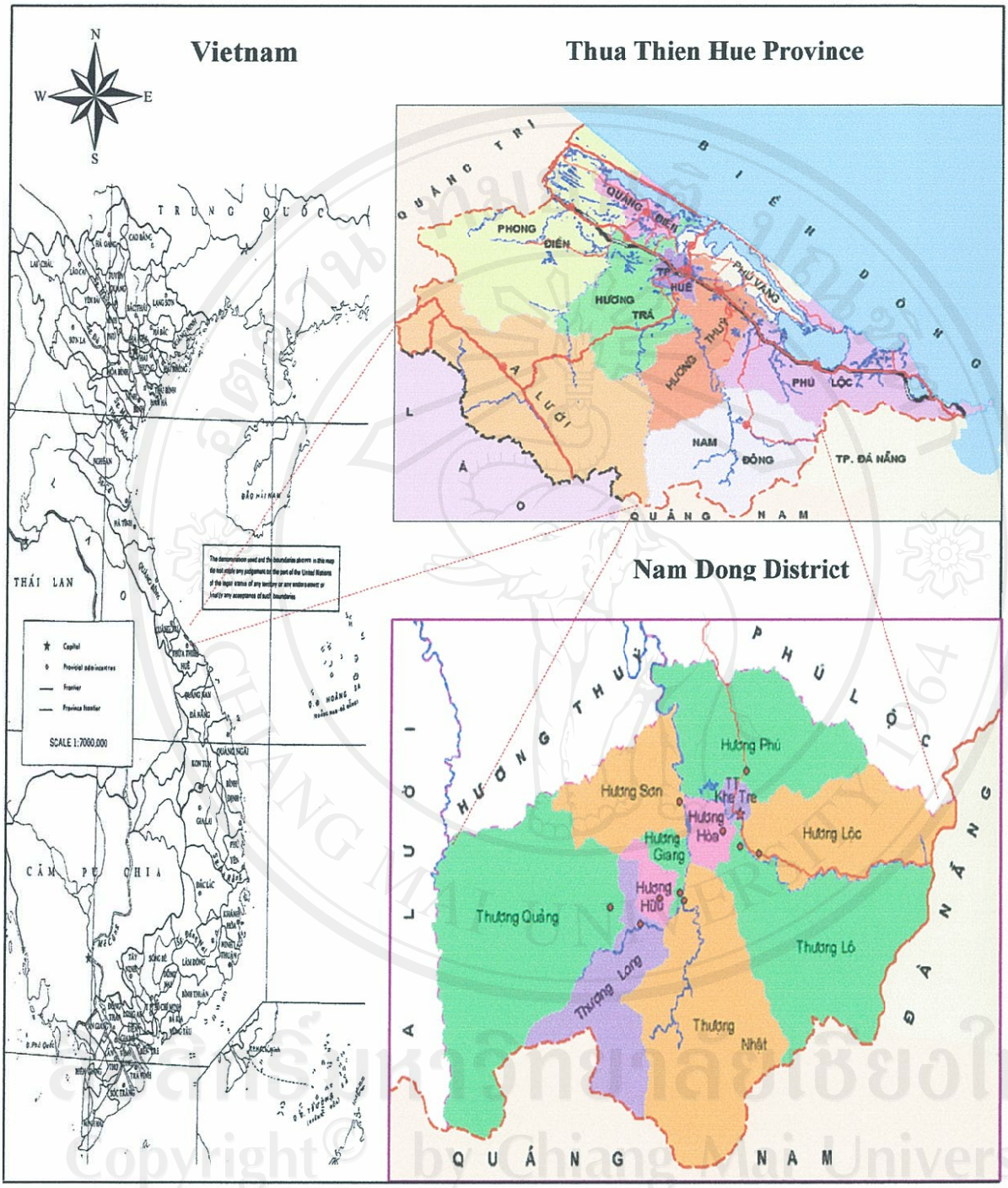

Figure 2.1 The map of Thua Thien Hue province and Nam Dong district

Source: (http://www.thuathienhue.gov.vn/Gioithieu/Bando)

2.3 Data collection

The information used in this study was collected from primary and secondary sources. Relevant information on cattle-based farming systems, farmers' use of cattle, cost and revenue of cattle production, and factors affecting adoption of crossbred cattle were gathered using methods as follows:

2.3.1 Secondary Data

The secondary data consisted of existing situation of cattle area, market information, veterinary service information and credit service information, which were obtained from relevant government offices and non-government agencies, district's office, commune's office and veterinary retailers.

2.3.2 Primary Data

Primary data were collected from small-scale households raising cattle in 2005 to 2006 using questionnaire survey with topic to cover the study objective. PRA was used as another tool to collect primary information by way of having a meeting with 'key informants and leaders'. The data that were collected included family background, farm resources, production activities, socio-economic, biophysical and institutional characteristics, farmers' use of cattle, problems and potential of cattle production, inputs of cattle production applied (type, amount, cost), labor used in cattle production (hired, family, age, hours) for each operation. The constraints and potentials in raising cattle were also discussed. Besides, visiting the households was another method whereby the researcher could observe and find actual realities in the field.

2.4 Data Analysis

To achieve the first objective, the information regarding farming system and farmers' use of cattle was based on the formal survey using questionnaires and organizing the group of key farmers discussion. The key farmers were discussed to

get information regarding problems and potential of production in cattle-raising. The group discussions were held among 8 to 10 farmers per commune.

To fulfill the second objective, the data on cost of production and revenue were analyzed by using enterprise budgeting to find out the profitability of each group raising cattle (local and crossbred cattle). The values for revenue, cost and returns were estimated for raising local and crossbred cattle as per the existing market price. The calculation of revenue, cost and returns are explained in more detail as follows.

Revenue:

Revenue of each group was calculated based on cattle sold in the year and change in stock during the year.

Revenue = value of cattle sold + (value of stock at the end of the year – value of stock at the beginning of the year)

The stock of cattle was classified to be seven categories according to age and sex of cattle, as follows:

Calf with age under 6 months

Calf with age from 6 to 12 months

Bull with age from 1 to 1.5 years old

Bull with age more than 1.5 years old

Heifer with age from 1 to 1.5 years old

Heifer with age from 1.5 to 2 years old

Cow with age more than 2 years old

Cost:

Total cost is generally divided into operating expenses and ownership expenses.

Operating expenses are total costs over the year of study, such as veterinary service and health expense (drugs), breeding fees, feed, fertilizer for grass, interest, hired labor and repair of cattle-sheds.

Ownership expenses were computed for land rent or opportunity of land, annual depreciation of cattle-shed equipment and breeding cows by way of using straight line method. Annual depreciation was computed from the equation:

$$\text{Annual depreciation} = \frac{\text{cost} - \text{salvage value}}{\text{useful life}}$$

Returns:

Enterprise gross margin was defined here as the difference between gross income and operating cost.

Return to management (Profit) was computed by deducting total expense including opportunity cost of land and labor from revenue.

Return to family labor and management were computed by deducting operating cost from gross income and plus opportunity cost of family labor.

Return to family labor and management per day were computed by dividing return to family labor and management by number of family labor days using for cattle raising.

The profit were calculated based on farm level (profit/farm/year) and then were converted in standard unit per head of cattle by using Mature Stock Unit (MSU).

Mature Stock Unit (MSU): A means of computing the grazing load of a herd by comparing each age group, using a cow as unity (Barrett and Larkin, 1972). One European cow with 500 kg is equal 1.0 MSU. But in the Central of Vietnam, the live weight of a cow is about 350 kg only. In this case, the MSU needs to be adjusted to fit

with cattle in the region. The MSU of one cow in the region will be equal to 0.7 MSU. It is computed by way deducting 0.3 from the MSU of European adult bull or cow. But for growing cattle 1-2 years old and calves, their mature stock unit will be reduced to be a half of the growing cattle over 2 years old and a half of the growing cattle 1-2 years old, respectively, as following:

One adult bull	= 0.9 MSU	One growing cattle > 2 years old	= 0.7 MSU
One cow	= 0.7 MSU	One yearling 1-2 years old	= 0.35 MSU
Cow in milk	= 0.8 MSU	One weanling 6-12 months old	= 0.175 MSU
One calves < 6 months old	= 0.0875 MSU		

But in this study, all cattle were classified into 7 categories as mentioned above. Then the MSU were converted into the 7 categories with some adjustments because there is the difference of cattle classification. The adjusted MSU used for this study are as follows.

One calf under 6 months	= 0.0875 MSU	One calf 6 to 12 months	= 0.175 MSU
One bull 1 to 1.5 years old	= 0.6 MSU	One bull > 1.5 years old	= 0.9 MSU
One heifer 1 to 1.5 years old	= 0.35 MSU	One heifer 1.5 to 2 years old	= 0.525 MSU
One cow > 2 years old	= 0.7 MSU		

Finally, to explain the relationship between the cattle breeds, local and crossbred, and the profitability, the mean profit and cost of each group (local and crossbred cattle) will be calculated and compared. T-test will be used to compare the difference of the two means.

To achieve the third objective, this objective was to determine the factors to affect the adoption of crossbred cattle using the logistic regression model as follows (Hosmer and Lemeshow, 2000):

$$\pi(x) = \frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}}$$

$\Pi(x)$ is the probability that the farmers will adopt the crossbred cattle breed, the dependent variable equal 1 if the farmer adopted the crossbred cattle breed, 0 if do not adopt the crossbred it means the farmer adopted local cattle.

x is a vector of explanatory variables,

β_0 and β_1 are parameters of the model and e is base of natural logarithms.

e is base of natural logarithms and approximately equal to 2.718

A transformation of $\Pi(x)$ that is central to the study of logistic regression is the logic transformation. This transformation is defined, in terms of $\Pi(x)$, as:

$$G(x_i) = \ln\left[\frac{\pi(x_i)}{1 - \pi(x_i)}\right]$$

$$G(x_i) = \beta_0 + \sum_{i=1}^{n} \beta_i x_i$$

A farmer's decision either to adopt or reject crossbred cattle is influenced by the combined effect of a number of factors related to farmers' objectives and constraint.

In this study, several factors were considered and the hypotheses of each factors were defined as follows:

Age of household head (Age): It is hypothesized that with increasing age a household head will be less likely to be aware of new crossbred cattle breed. Younger household head may have greater access to information because they have greater

access to education, and thus will be more aware of technologies. Older household head might not have access to this information, not like to change and learn new technologies.

Education of household head (EduHh): A higher level of education increases a farmer's ability to obtain process and use adoption information of an improved local cattle breed. Education thus increases the probability of adoption improved cattle technology.

Access to technical training (AtTech): It is hypothesized that there is positive relation between adoption of crossbred cattle and access to technical training. Farmers who attend a technical training will understand and be able to apply technique to raise crossbred cattle. This is a dummy variable (1 = Yes, access to technical training, 0 = No, no access to technical advice).

Access to veterinary service (ViVeSe): Veterinary service is placed to provide the artificial insemination technology. It is hypothesized that there is positive relation between access to veterinary service and adoption of crossbred cattle. This is a dummy variable (1 = Yes, farmer access to veterinary service, 0 = No)

Credit (MoRaiCat): Access to credit increase the probability of adopting improved cattle technologies. This is a dummy variable (1 =Yes, use of credit, 0 = No, not use of credit).

Labor availability in the family (more than 15 years old) (LabMT): Labor availability in the family is the number of family member who are in the working age. It is hypothesized that there is a positive relationship between adoption of crossbred cattle breed and labor availability in the family.

Having vehicle (Moto): If farmers have motorbike, it will easier for them to go to the market and veterinary services. It is hypothesized that there is positive relation between adoption of crossbred cattle breed and having vehicle. This is a dummy variable (1=have motorbike, 0= not have motorbike)

Areas of own grass-land (AreLaPas): Farmers who have own grass-land is a better adopter of improved cattle technologies.

Household income (NetFaInco): Farmers who have higher income are likely to invest in improve cattle technology.

Having social position of household head (Sopo): Farmers who have a social position will properly have a better access to information on improved cattle technologies. This is a dummy variable (1= Yes, having social position, 0= No, not having social position)

Number of children in family (ChiYT): It is hypothesized that there is negative relation between adoption of crossbred cattle and number of children in family. By the traditional way of cattle raising, children are used to bring cattle to pasture.

Number of cattle in family (TotalCa06): It is hypothesized that farmers who have more cattle will have a higher possibility to have a good cow which can apply the artificial insemination technology and expected to be positively associated with the decision to adoption crossbred cattle.

The variables above affect farmers' decision to raise cattle. It is assumed that farmers will accept to raise crossbred cattle if they are younger, have a higher education, a higher income, access to veterinary service, access to credit, an access to technical training, have a motorbike, a social position, more children in the family, have land to grow grass and more cattle in family.

The vectors of explanatory variables (x) are as follows:

Table 2.1 Definition of variables for adoption study

Variable	Description	Codes/value
Age	Age of household head	Years
EduHh	Education of household head	Number of years studied in the school
NeFaInco	Household income (Net income)	VND
AtTech	Access to technical training	1=Yes, 0=No
ViVeSe	Access to veterinary services	1= Yes, 0=No
TiBuIn	Access to input market Two dummy variables are needed;	Length of time used from their house to market which will be classified into three categories. (*)
VeShor	Very short	1= very short, 0= otherwise
Shor	Short	1= short, 0= otherwise
Moto	Having vehicle	1= have motorbike, 0= Not have motorbike
MoRaiCat	Access to credit	1=Yes, 0=No
LabMT	Labor availability in the family(>15 years old)	Number of family labor
Sopo	Having social position of household head	1=Yes, 0=No
AreLaPas	Area of own grass land	Number of Sao (1 Sao=500m2)
TotalCa06	Number of cattle in family	Number of head of cattle
ChiYT	Number of children in family (7-15 years old)	Number of children (male + female)

(*): Very short: <30 minute; Short: 30 minute – 1 hour; Long: > 1 hour.

The logistic model will be analyzed by logistic regression test statistics. The test of significance for each variable can be achieved by using t-statistics.