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Strategies to increase beef cattle production and retain farmer participation in beef cattle farming in the Solomon Islands.

Willie Anihehero Waroka

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A thesis presented in partial fulfilment of the requirements for the degree of Master of Applied Science in Agricultural Systems and Management

Massey University

ABSTRACT

Beef cattle farming in the Solomon Islands is important, it provides meat for domestic consumption, creates, employment for farmers, and is an alternative weed control method for coconut plantations.

Back in 1978, beef cattle numbers were at their highest level (around 25,184 head) and have declined to an estimate of 6,600 in 1996. An annual decline of 7-8% since 1990 led to a shortage in beef cattle production for the local market. This caused concern and led the Solomon Islands' government to consider revitalisation of the beef cattle industry.

This study provides insight into the declining cattle situation, and recommends strategies to improve the beef and to retain farmers participation.

In 1996, a survey was carried out amongst extension workers and beef cattle farmers, and semi-structured interviews of ten key informants from the Malaita and Guadalcanal provinces were conducted. The aim of this research was to obtain an insight in the constraints and problems with the revitalisation of the beef cattle industry.

Common themes were derived from the semi-structured interviews and a data analysis of the two survey questionnaires was carried out using the "SAS" statistical programme at Massey University. The statistical analysis method were descriptive, which included; frequency distributions, cross tabulations and calculations of correlation coefficients.

The study shows that lack of extension support for the cattle industry during the 1980s-1990s contributed to the decline of beef cattle numbers and less farmer participation in the cattle industry.

The Livestock Development Authority's reduction of marketing and production services also contributed towards the decline of the Solomon Islands' cattle industry. Furthermore, the lucrative prices from cashcrops encouraged farmers to go into crop farming and out of beef cattle farming during the 1990s.

Also, the study shows that farmers are still interested in cattle farming and they would like to see that institutional support services are set up to revitalise the cattle industry. Furthermore, farmers and extension workers require adequate training in farm management and animal husbandry to gain a better knowledge of beef cattle farming practices. Also any institutional support for beef cattle development in the future should be more focused on improving the medium and large commercial cattle farming sectors, in order to create sufficient good breeding stock.

In conclusion, this study recommends that improvement of the both smallholder and large commercial sectors is necessary for increase of cattle numbers and farmer participation. The Solomon Islands' cattle industry requires consistent support during its development stages in order to sustain production and consolidate.

Key Words: Solomon Islands, extension, beef cattle, agriculture.

Title: Strategies to increase beef cattle production and retain farmer participation in cattle farming in the Solomon Islands.

Author: Willie Anihehero Waroka

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DEDICATION

In loving memory of my sister Ann Iaipuro who ceased in 1976, while at Su'u Secondary School. For she did not stay on to see the results of her years in school, but today she is enjoying the fellowship with her God in Heaven.

To my wife Josephine and our four children: Willie, Jane, Lazarus and Burns. For their support and comfort while with me in New Zealand.

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COMMON ABBREVIATIONS USED

BGM - Black Gold Management Limited

CDC - Common Wealth Corporation

DBSI - Development Bank of the Solomon Islands

LCL - Livestock Co-orporation Limited

LDA - Livestock Development Authority

LPPL - Levers Pacific Plantation Limited

MAF - Ministry of Agriculture & Fisheries

MET - Ministry of Education & Training

SICHE - Solomon Islands College of Higher Education

SIPL - Solomon Islands Plantation Limited

Std Dev - Standard Deviations

WW II - World War

UNITS OF MEASUREMENT USED

Ac - Acre

(AU) $ - Australian dollar

°C - Degree Celsius

Ha - Hectare

hd - head of cattle

kg - Kilogram

km^2 - Square kilometre

m - Metre

mm - Millimetre

(n =) - Number of Respondents

S.I $ - Solomon Islands dollar

% - Percentage

CHAPTER ONE: INTRODUCTION

1.0 Chapter Overview

This chapter presents an introduction to the Solomon Islands, its resources, and its cattle industry. It also provides an overview of the study. Section 1.1 describes the general background of the Solomon Islands. It discusses the government system, the geography, vegetation and climatic conditions. Sections 1.2-1.3 describe the primary industry, major economic activities, and the study areas, which are in the West Kwa'arae and West Kwaio districts of Malaita and the on Plains of the Guadalcanal province. Section 1.4 gives the problem statement of the research. In Section 1.5 an outline of the study's objectives, scope and limitations is given, and the organisation of the chapters in this thesis is outlined.

1.1 A Short Introduction to the Solomon Islands

The Solomon Islands were discovered in 1568 by a Spanish expedition, captained by Avaro de Mendana (Hinton, 1969). The aim of the expedition was to establish new colonies for Spain, hunt for treasures, and to convert people from paganism to Christianity (Hinton, 1969). Despite the discovery, the Solomon Islands were not colonised and no treasures such as gold were found. After the 1568 discovery, the Solomon Islands lost regular contact with other countries for another period of two hundred years. Contacts were resumed by whalers and traders from Europe (Hinton, 1969). Whale hunting was a major activity during the 1800's in the Solomon Islands' waters, which resulted in a high exploitation of its natural resources. Traders settled in various parts of the Solomon Islands; they also established coconut plantations, such as the Levers Pacific Plantation Limited (LPPL) on the Russells islands of the Central Islands province and the Three Sisters islands of the Makira-Ulawa province.

1.1.1 Geographical Location

The Solomon Islands are situated between the latitudes of 5° and 12° South of the equator, and between the longitudes of 154° and 162° East (Hansell and Walls, 1974). It is a group of scattered islands in the South Pacific, that stretch across the Bismarck archipelago, about 1,000 km from Bougainville of Papua New Guinea. The closest neighbouring countries are Vanuatu and Papua New Guinea. There are six main islands: Guadalcanal, Malaita, Santa Ysabel, San Cristobal, New Georgia and Choiseul, with many hundreds of smaller islands (Figure 1). The total land area of the Solomon Islands is about 30,000 km^2, and around one third is used for agriculture (Hansell and Walls, 1974).

1.1.2 People

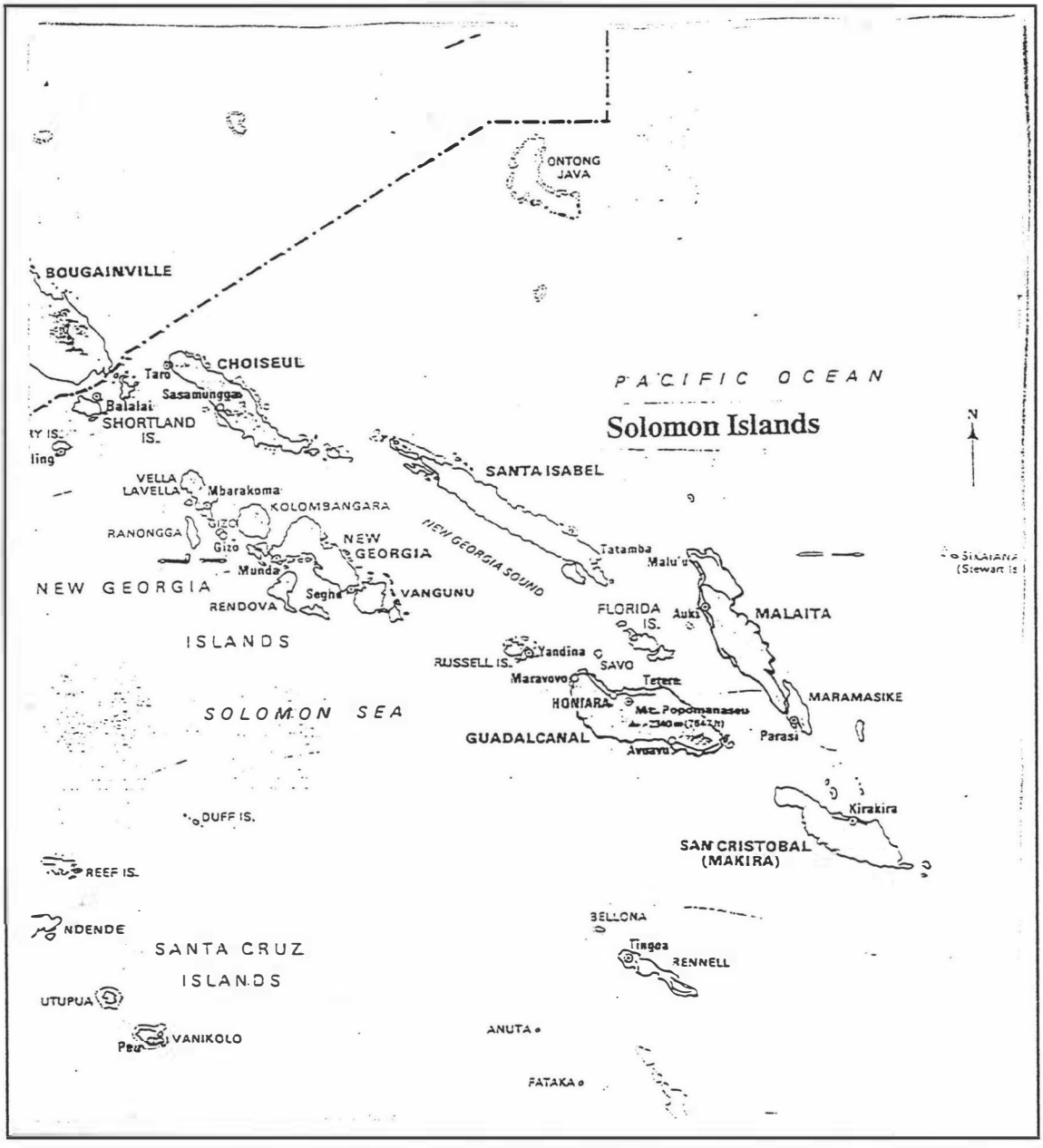
The national Census of 1986 estimated the population of the Solomon Islands at 340,000 people, with a 3.4% annual growth rate (Solomon Islands Statistical Bulletin No.22/95, 1995). The majority of the people lives in the rural areas. The Melanesians are the major ethnic group, comprising 90%. Six percent of the population is Polynesian, 3% is Micronesian, and 1% is described as others (Solomon Islands Statistics, 1986).

There are several micro-ethnic groups and about fifty to hundred different cultures within the Solomon Islands (Crocombe, 1989). Communication amongst these cultural groups is a major problem. Therefore, English and Pidgin English (a mixture of English and local languages) are the official languages (Crocombe, 1989).

About 85% of the Solomon Islanders rely on subsistence agriculture for their own food production, with the remaining 15% being employed by other industries (Osborne, 1979). Four-fifths of the farming population works the land under the customary ownership system where land is under the control of a tribe or clan and not an individual. Customary land can not be sold without the tribal members' consent, and customary land ownership is

transferred from one generation to the next (Osborne, 1979). Despite this, and due to the increasing demand for land for commercial activities, the customary land ownership system has constantly been under threat from land developers.

Figure 1: The Map of the Solomon Islands.



Source: Hansell and Walls, 1974.

Key: ---------- Solomon Islands' boundary with Papua New Guinea.

1.1.3 Government

The Solomon Islands have been a British protectorate from the 1890s, until it gained independence in 1978. The Westminster system of government was adopted under British rule, and still provides the framework for the national government system. Through national elections, members of parliament are elected for four years (Crocombe, 1989). After each general election a government is formed, either by the party with the majority of the 47 seats in the parliament, or by coalition between several parties. The Prime Minister is elected by the members of parliament, and is often a member of the party which has the majority in parliament.

1.1.4 Agro-ecology

1.1.4.1 Soil

The soil types in the Solomon Islands vary from coral atolls to rugged volcanic mountains and coastal plains. The majority of the soils is formed from basaltic rock, andesitic lavas clastic, limestone sediment and coral (Hansell and Walls, 1974). The weathering process of rain, wind, water and volcanic activity contributes to the soil formation patterns of the Solomon Islands (Chase, 1976). This weathering process has contributed to the leaching of soil nutrients and a general low soil fertility, especially in the high rainfall regions of the Solomon Islands (Bakers, 1984). Soil nutrient depletion is worsened by the continuous cultivation on the same area of land. The major soil nutrients which are easily depleted are nitrogen, phosphorus and potassium (N-P-K).

1.1.4.2 Vegetation

The vegetation of most of the Solomon Islands consists of tropical rain forest, with the exception of the Guadalcanal Plains which are dominated by natural grassland. Fosberg's (1979) study of the tropical Pacific grassland and savannahs concluded that the grassland

on the Guadalcanal plains have resulted from man's action of cutting and burning down the forest. Vegetative growth patterns are stipulated by the changing wet and dry conditions throughout the year.

1.1.4.3 Climate

The climate is mainly determined by the equatorial conditions, modified by the surrounding ocean, with high humidity and high rainfall all year round. It is one of the wettest regions of the world. Average annual rainfall is around 2,500 to 3,000 mm, and can occasionally be as high as 9,000 mm on the larger islands (Hansell and Walls, 1974). Heavier seasonal rains are normally experienced from November to March.

1.1.4.4 Humidity and Temperature

The temperature has little variation, and is between 27-30°C throughout the day and between 20-25°C at night. The lower night temperatures are caused by the land and sea breezes. The South-eastly winds can modify the weather conditions during the dry months from June to October. In December to May tropical cyclones occasionally occur, often causing extensive damage.

1.2 Primary Industry

The most important part of the primary industry in the Solomon Islands is agricultural production, which includes the minor and major farming activities of crop and livestock production. Besides agricultural production, fisheries and forestry also play an important role in the economy. The Solomon Islands' economy is dominated by the primary industries and 75% of the export earnings is derived from agriculture, fisheries and forestry activities (Solomon Islands Statistical Bulletin No.22/95, 1995). In addition, the primary industry provide the daily requirements for the majority of the people in the Solomon Islands in terms of shelter, cash income, food consumption and employment.

A large proportion of the population is involved in the primary industries, which also contribute towards the export of such products as copra, palm oil, cocoa, fish and timber (Solomon Islands' Statistical Bulletin No.22/95, 1995). Eighty percent of the export earnings comes from the agricultural sector (including timbers and fisheries) (Solomon Islands Statistics, 1986).

1.2.1 Agriculture

There are three different farming systems in the Solomon Islands: subsistence, semi-intensive and commercial farming. The agricultural production sectors occupy around 10,000 km^2 (Hansell and Walls, 1976). Minor cashcrops are those which are produced for own consumption, with the surplus being sold at local markets. Minor cashcrops are chillie, ginger, pineapples and peanuts, which are cultivated by farmers on a semi-intensive level.

Most minor cashcrops are sold to the urban centres to meet the consumption needs of its working population. On average, half of a farmer's time is spent on foodcrops and vegetables production (Varuia, 1993). Major foodcrops which are grown for the local markets include; yams *(Discorea alata)*, pana *(Dioscorea esculenta)*, potato *(Ipomoea batatas)*, taro *(Colocasia esculenta)* and cassava *(Manihot esculenta)* (Solomon Islands Statistical Bulletin No.22/95, 1995). The self-reliance of foodcrops and vegetable production has substituted the import of other foodcrops for domestic consumption needs. Agricultural exports are very important for the Solomon Islands economy. The major cashcrops are produced by commercial and semi-commercial farmers.

The main commercial cashcrops are palm oil, copra and cocoa (Solomon Islands Statistical Bulletin No. 22/95, 1995). Other export products in 1994 were beche-de-mer, marine shells, gold, art and crafts, and sharkfins (Solomon Islands Statistical Bulletin No.22/95, 1995). About 75% of the coconut and cocoa production for exports is

produced by the smallholders, and 25% by commercial companies. Oil palm growing and processing is carried out by the Solomon Islands Plantation Limited (SIPL), a company jointly owned by the Commonwealth Development Corporation (CDC), the government of the Solomon Islands, and local land owners on the Guadalcanal Plains. Palm oil plantations are also being identified for development in the Ysabel and Western provinces.

1.2.2 Livestock Industry

Livestock production for meat consumption is concentrated on poultry, pig and beef cattle. In 1993, the national cattle population was estimated at 8,400 heads (Wahananui et al., 1994). There is no large scale milk production in the Solomon Islands. The beef cattle industry has reduced its level of operation over the years, a trend which has contributed to the increase of imported livestock products from Australia, New Zealand and Vanuatu (Solomon Islands Statistical Bulletin No. 22/95, 1995).

About 80% of the population raises pigs and poultry, either by traditional or commercial methods. The Solomon Islands are therefore self-sufficient in pig and poultry production. The poultry industry has developed rapidly over the past ten years, resulting in increased research carried out in the Solomon Islands for further improvements. Also there has been increased imports of poultry layers and broilers in the past five years from Australia and New Zealand. This increase in poultry production has established a large scale base of stock available for local consumption.

1.2.3 Tuna Fishing Industry

Tuna fishing is a major foreign exchange earner for the Solomon Islands. In 1994, fish products was the second most important export industry, behind timber, with earnings of around 21% of the total export (Solomon Islands Statistical No.22/95, 1995). It is also one of the leading industries when it comes to providing job opportunities for Solomon Islanders.

The tuna fishing industry uses a pole-and-line method of fishing inside the country's territorial waters. The Solomon Islands' ocean covers about 1.3 million km^2. It is the seventh largest fishery zone in the South Pacific Region (Argue and Kearney, 1982).

The main tuna species caught for procession and export are skip jack *(Katsuwonus pelamis)* and small yellowfin *(Thunnus albacares)*. Foreign-based tuna fisheries companies have operated in the Solomon Islands for a number of years (Argue and Kearney, 1982). The main fishing company is Solomon Taiyo Limited, based at Noro in the Western province. It operates distant-water pole-and-line vessels, and longline vessels. Solomon Taiyo Limited is a private company owned by Japan and had joint-ventured with the Solomon Islands' government (Argue and Kearney, 1982).

1.2.4 Forestry Industry

The Solomon Islands have around 2.4 million hectares of forest, which covers about 85% of the total land area (Duncan, 1994). About 87% of the total land area is held under customary ownership, which means that a tribe has control over land-use. Less than 20% of the natural forest is suitable for commercial log harvesting (Duncan, 1994).

Forestry has recently become the largest foreign exchange earner in the Solomon Islands' economy (Duncan, 1994). The export of round logs and sawn timbers earned around S.I. $619 million between 1992 to 1994, which was more than all the other export commodities combined (Solomon Islands Statistical Bulletin No.22/95, 1995). In 1993, the government's revenue from the forestry sector was S.I. $61 million, which makes up one-fifth of the government's total revenue (Duncan, 1994).

Because the forestry industry is a leading contributor to the national economy, the government has increased its involvement in the monitoring of logging activities and has increased the number of logging licences (Duncan, 1994).

1.2.5 Minerals

The Solomon Islands are situated on the 'rim of fire', where the Pacific Plate is forced under the Australian Plate (Crocombe, 1989). This 'rim of fire' is well known for its belt of mineral deposits, which runs through Indonesia, the Pacific, to Australia. The search for mineral deposits in the 1980s-1990s resulted in the discovery of phosphate, gold, copper, oil and other minor minerals in the Solomon Islands.

Gold exports in the past have come from alluvial gold deposits found by local people. In 1996, the first open gold mining operation in the Solomon Islands started at Gold Ridge in the Guadalcanal province. With this recent gold mining activity, the government's foreign exchange earnings is expected to increase.

1.3 The Study Areas

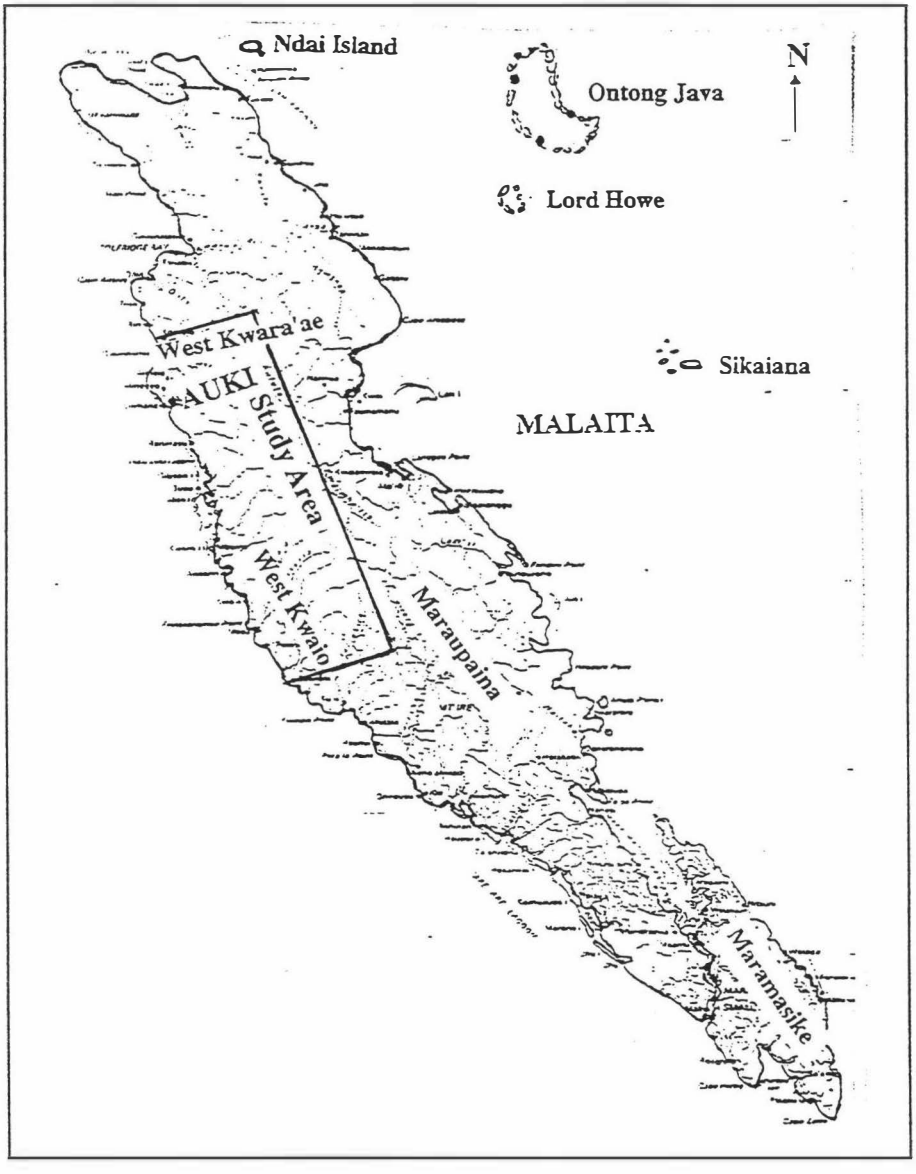
This study was conducted in the Malaita and Guadalcanal provinces. These two provinces were selected because of their easy access by road and sea, and because they have high numbers of farmers and extension workers which could be surveyed. The study was conducted in the West Kwa'arae (North-west) to the West Kwaio (South-west) districts of the Malaita province (Figure 2). For the Guadalcanal province, the Plains in the Bolomona district was selected as the study area.

1.3.1 Malaita Province

The Malaita province is located at the southern end of the northern group of Solomon Islands, and has a total land area of 4,200 km^2 (Hansell and Walls, 1974). It consists of three islands; Maraupaina, Maramasike and Sikaiana. The Sikaiana islands are made up of coralline atolls, which include Lord Howe and Ontong Java atolls (Figure 2). To the northern part of the main island of Malaita (Maraupaina) is Ndai island. It is about 40 km

of north of the Malaita's main islands, with an area of 17 km². In the southern part of the Malaita province is the Ulawa, of the Makira-Ulawa province (Hansell and Walls, 1974).

Figure 2: The Map of the Malaita Province.



Source: Hansell and Walls, 1976.

1.3.2 Land and Soil Formation

The Malaita province has coastal shore-lines that were formed by volcanic activities and consist of coral reefs. The indented coastal shores provide good sea port inlets for boats during bad weather. There are sea water lagoons which were formed from these coralline inlets along the shores of the Malaita province, e.g. along the North-east is the Lau lagoon, in the South-west is the Are'Are lagoon, and the Langa'Langa lagoon is in the mid-west of the Malaita province (Hansell and Walls, 1976).

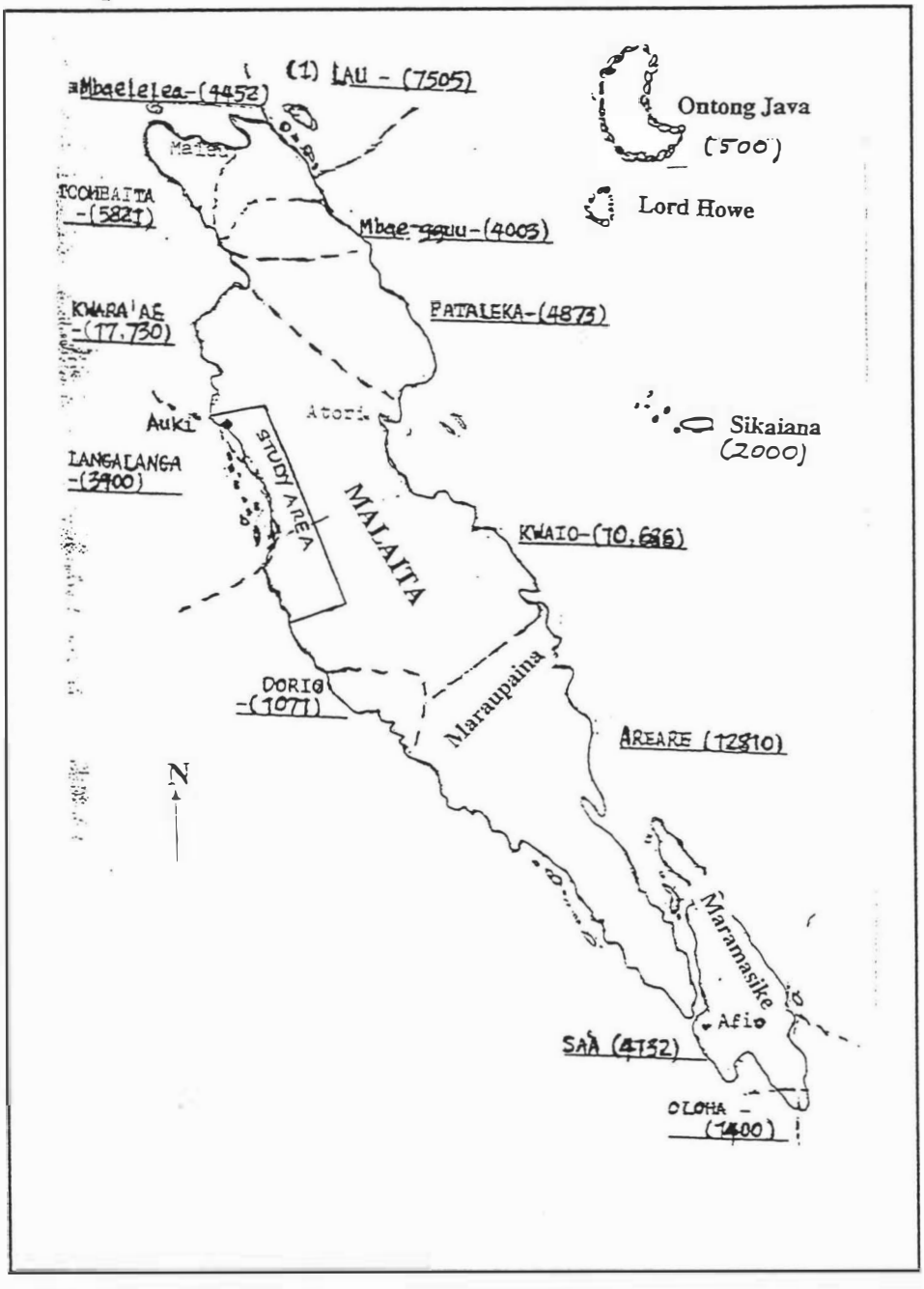
Some of the parts of the Malaita province's land formation were formed from low flat coral and calcareous soils. The central and mountainous areas are made up of red clay and brown soils which are derived from volcanic activities (Hansell and Walls, 1976).

1.3.3 People

In 1993, it was estimated that around 80,183 people lived in the Malaita province (Varuia, 1993). By 1996, the population of the Malaita province was expected to have increased by 20%. This because of high birth rates and improvements in the health and social services in the province. Ninety-seven percent of the population is Melanesian and Polynesian make up the other 3%. The Melanesians live on the main islands while the Polynesians live on the outlying atolls of the Sikaiana, Lord Howe and the Ontong Java islands (Varuia, 1993).

There are around twelve cultural groups in the Malaita province, with thirteen different languages (Figure 3). The majority of the population are subsistence farmers living in small villages. Ninety-nine percent of the population (Table 1.1) live on the two main islands, two-thirds are in the northern part (Varuia, 1993).

Figure 3: Population distribution and location on Malaita Province in 1993.



Source: Varuia, 1993.

Table 1.1: Malaita's Population Composition by Ethnic Groups in 1993.

Ethnic Groups	Estimated Population	Ethnic Groups	Estimated Population
Lau	7,505	Langa'Langa	3,900
Mbaelelea	4,452	Dorio	1,071
Mbaenggu'u	4,003	Kwaio	10,686
Toobaita	5,821	Are'Are	12,810
Fataleka	4,873	Sa'a	4,132
Kwara'ae	17,730	Outer Islands	1,800
Total			**80,183**

Source: Varuia, 1993.

1.3.4 Guadalcanal Province

The Guadalcanal province is one of the main islands of the Solomon Islands. It has a total area of 5,310 km^2 and is situated in the Central Southern part of the Solomon Islands (Figure 4) (Hansell and Walls, 1976).

The North-West and South-East of the Guadalcanal province consist of rugged mountains. The North-West also has coastal plains known as the "Guadalcanal Plains" which have great agricultural potential. The Guadalcanal province has the two highest mountains in the Solomon Islands: Popomanaseu and Makaranakomburu at 2,330 and 2,450 metres, respectively (Hansell and Walls, 1974).

Figure 4: The Map of the Guadalcanal Province.

Source: Hansell and Walls, 1976.

1.3.5 Land and Soil Formation

The soils of the Guadalcanal province originate from volcanic activity and are the result of the weathering process of the high mountainous areas which contributes to the deposits of the sedimentary rocks in the river basins. The soils on the Guadalcanal plains are described by Hansell and Walls (1974) as freely draining brownish loam and clay soils.

The Guadalcanal plains have a typical grassland soil; drier, deep-dark, carbon-rich and is less subjected to floods. Hansell and Walls (1976) reported that there are six land systems on the Guadalcanal plains (Table 1.2). It was estimated that 337 km^2 of the plains are available for agricultural production (Hansell and Walls, 1976). The Guadalcanal plains

are located between the Nggurambusu and Kombito rivers, and extends for about 11 km in-land to the Metapona river.

Table 1.2: Major Land Systems on the Guadalcanal Plains.

Land Systems	Area (ha)	Agricultural Land (%)
Metapona	19,575	58
Lungga	5,000	15
Kongga	3,900	12
Tenaru	1,825	5
Pusuraghi	1,860	5
Kumotu	1,555	5
Total	**33,715**	**100%**

Source: Watson, 1982.

1.3.6 People

The national Census of 1986 estimated that 60,000 people were living in the Guadalcanal province (Solomon Islands Statistics, 1986). There are four area councils in the Guadalcanal Provincial Assembly: Tasimauri, Tasimate, Gheana and Bolomona. Area councils are established in accordance with the government's Provincial Government Act, passed in 1984. This is a representative body of the people which governs their affairs through the provincial assembly. The provincial assembly members are elected through a voting system for four year terms.

1.4 Problem Statement

The Solomon Islands' beef cattle industry has declined at a rate of 7 to 8% over the last ten years (Cattle 2000, 1994). The highest cattle number ever recorded in the Solomon Islands was 25,184 heads in 1978 (Table 2.1). By 1993, the national herd had fallen to

8,400, and in 1996 it was estimated at around 6,600 heads (Wahananiu, et al., 1994). Over the same period the country has increased its imports of beef meat and small livestock products (Solomon Islands Statistical Bulletin No.22/95, 1995).

The livestock industry of the Solomon Islands is vulnerable to the import of livestock products. This vulnerability is caused by the relatively low livestock productivity in the country. Imports of livestock products originate mainly from New Zealand and Australia (Solomon Islands Statistics, 1994). The Solomon Islands is only self-sufficient in pig production, while for other livestock products imports are important to meet domestic consumption.

During 1993 the Solomon Islands imported around 84,545 kg of poultry products from New Zealand. In the same year, 25,934 kg of beef and dairy products were imported from Australia, United Kingdom and Vanuatu, for which the Solomon Islands paid around S.I. $246,720 (Solomon Islands Statistics, 1994). This trend of continuous high imports are putting economical constraints on the Solomon Islands' foreign exchange.

Therefore, the decline of the cattle industry discourages farmers from participating in its production. As a result farmers have shifted their interests into other farming activities which provides them with comparative benefits.

1.5 Overall Research Study Hypotheses, Objectives and Organisation

This study focused on the extension support services that exist for the cattle industry and its farmers, with identification of the problems and constraints that limited farmers realising the benefits from cattle production. This research is a first attempt to develop strategies that should retain farmers' interest in participating in beef cattle production. The study's specific hypotheses are:

(i) Technology transfer systems in beef cattle production are not effective;

(ii) There are few alternative uses that exist for beef cattle other than meat production; and
(iii) Farmers' adoption of new technology was not effective.

1.5.1 Overall Objectives

The study aimed to explore the perceptions of agricultural extension workers, farmers and key informants from the selected study areas on the issues relating to the beef cattle industry. Generally, the aim of this study was to develop strategies for increased farmer participation in beef cattle farming and ultimately increase cattle numbers.

1.5.2 Specific Objectives

The following have been identified as the specific objectives of this research study:

(i) to determine reasons why Solomon Islands farmers are not participating in beef cattle farming;
(ii) to identify problems and constraints, associated with technology transfer from the extension support services to farmers;
(iii) to suggest ways to strengthen technology transfer and to increase beef cattle numbers.

1.5.3 Scope and Limitations

The scope of this study has aimed to present farmers' perceptions and highlight the situation of extension support services delivery to farmers. The study was timely as it is at a stage where the cattle industry requires re-development in order to achieve the government's goals and objectives of self-reliance in its livestock production. The outcomes of this research will provide insight, knowledge and better understanding for future planning for improvement in the cattle industry. The limitations during the field study were transportation problems of travelling to survey cattle farms and interviewing farmers according to plan. Also some farmers and extension workers were not available

during the time of the surveys. The study was carried out at one point in time and thus provides a cross-sectional rather than longitudinal perspective.

1.5.4 Organisation of the Thesis

This Thesis has five chapters. Chapter One has provided a short introduction to the Solomon Islands, the study areas, and the research objectives. Chapter Two describes the review of the literature on beef cattle production and farmer participation. Research methods and results are described in Chapters Three and Four. Conclusions and recommendations are outlined in Chapter Five.

CHAPTER TWO: LITERATURE REVIEW

2.0 Chapter Overview

The literature review is focused on extension support services which have been provided for beef cattle production and farmer participation during the past ten years. The discussion concentrates on the beef cattle issues rather than the dairy cattle within the Solomon Islands' cattle industry. Section 2.1 outlines alternative small livestock production and importance to the Solomon Islands' agricultural farming systems. Section 2.2 describes beef cattle farming systems used by farmers in relation to cattle farming. This consists of the subsistence, semi-commercial and large scale commercial sectors. Discussion on the animal health situation of beef cattle is presented in Section 2.3. Section 2.4 gives a short introduction to the development of beef cattle in the Solomon Islands, since 1900s-1990s. Section 2.5 describes the institutional support services, established to provide support for the development of the cattle industry of the Solomon Islands. This includes the Agricultural Extension Services, credit facilities for farmers by the Development Bank of the Solomon Islands (DBSI), production and marketing services provided by the Livestock Development Authority (LDA). Section 2.6 outlines the conclusions for this Chapter.

2.1 Livestock Production

The main types of small livestock farm animals raised in the Solomon Islands are goats, pigs and chickens. Small livestock production in the Solomon Islands plays an important role in providing cash income, employment and meeting domestic food consumption. Around 75% of the smallholder farmers are involved in small livestock production, primarily raising pigs or chickens.

2.1.1 Milk Production

During 1960-1970s, small units of dairy cows were established for the fresh liquid milk consumption needs of missionaries and plantation owners. Herd size was small with only three to five heads of cattle per farm, and despite opportunities to increase income farmers did not take up dairy farming.

There is a small dairy unit at Betikama School which operates on an irregular basis. The present number of dairy cows is estimated to be around 20 heads (Wahananiu, et al., 1994). No further programmes have been identified for increasing dairy production due to lack of facilities and farmer know-how.

2.1.2 Pig Production

The traditional ways of raising pigs plays an important role in the cultural and the social values of many Solomon Islands' communities. Frederick (1969) estimated that there were around 17,120 pigs in the Solomon Islands (Freeman, 1977). In 1976, the pig population was estimated around 40,389 heads which was expected to increase to 60,000 in 1996 (Cattle 2000, 1994). The main constraints in the traditional systems, of raising pigs are poor housing, poor nutrition and feeding systems, and animal health and disease problems (Wisidagama, 1979).

A survey conducted in 1986 by agricultural workers in the Solomon Islands recorded that 57% of the Solomon Islands' farmers raised pigs for the purpose of cash income, meat consumption and social obligations (Solomon Islands Statistics, 1986). The demand for pigs for social obligations is usually very high. For example, Frederick (1969) reported that on one social occasion, 800 pigs were slaughtered for a marriage feast (Freeman,

1977). This highlights the importance of pig for socio-economic benefits within the Solomon Islands.

2.1.3 Poultry Production

Poultry birds are raised in the villages in a free range system, where they are housed at night and scavenge during the day. Commercial production of poultry birds for meat and egg consumption has increased in the 1990s. The major increase involves smallholder farmers who operate at large scale commercial levels, supported by extension services and available credit facilities from financial institutions within the Solomon Islands. Farmers interest in poultry farming has been consistent as income earnings are good and supply of stocks always available. Also the frequent commercial imports of day-old chicks from New Zealand and Australia has encouraged more farmers to enter into poultry farming.

Poultry farming is a growing industry in the Solomon Islands and the present population of poultry birds is around 100,000 (Cattle 2000, 1994). Farmers who are involved in poultry farming are widely distributed across the country, which helps to satisfy the needs of the population. Around 85% of farmers are involved in poultry farming, which makes it the second most important small livestock industry after pig production (Freeman, 1977).

2.1.4 Goat Production

Although the government had been encouraging more farmers to take up goat production, few herds have been established. Goats are raised on a subsistence system mainly for meat consumption (Wisidagama, 1979). There are no large scale farms and breeding herd developments by individual farmers, although there was the LDA's small livestock improvement programme from 1982-84. This involved nucleus and multiplication centres in the provinces to improve supply of livestock and feeds. Smallholders were encouraged

to raise goats during the 1980s, but not all projects were successful because of lack of stock and interest from farmers.

2.2 Beef Cattle Farming Systems

Beef cattle farming is an important sub-sector of the Solomon Islands' agriculture. It involves around 75% of the subsistence and commercial farmers (Cattle 2000, 1994). Beef cattle farming in the Solomon Islands provides meat for consumption, creates job opportunities in the rural areas and generates cash income. Furthermore, it has enabled farmers to learn new skills and knowledge in animal husbandry and management, provides alternatives for weed control in coconut plantations, and has potential for export to neighbouring countries (Cattle 2000, 1994). Solomon Islands' beef cattle farming system consists of subsistence, semi-commercial and large commercial sectors.

2.2.1 Subsistence Beef Cattle Farming System

Subsistence herd producers are often described as non-commercial producers. Subsistence cattle farming systems usually have 10-50 animals and less farmer involvement (Osborne, 1975). Due to the nature of subsistence farming, input and capital involved in development are low (Cattle 2000, 1994). Farmers tend to practise a tethering system with steers fattened on grazing small strips of pastoral land. Cattle also graze along roads and in the coconut plantations.

The subsistence system is based on individual and family group ownership of cattle farms and using family labour (Osborne, 1975). Subsistence farms range from 5 to 50 hectares on customary land (Wahananiu, et al., 1994).

2.2.2 Semi-Commercial Beef Cattle Farming System

Around 75% of the Solomon Islands' cattle farmers are involved in semi-commercial beef cattle production (Osborne, 1975). The semi-commercial sector consists of joint-block farms owned by individual smallholders and groups of farmers. The semi-commercial producers are farmers supported through credit schemes such as the Development Bank of Solomon Islands (DBSI) and the Livestock Development Authority's (LDA) credit facilities. The size of semi-commercial farms ranges from 50-240 hectares. They are owned by groups, such as ranches and co-operatives (Cattle 2000, 1994).

A semi-commercial farm may have around 100-500 heads of cattle and have access to sell to buyers from outside the area at higher prices (Wahananiu, et al., 1994). Farm ownership of the semi-commercial system is either by individual families or on a communal group. In the communal based projects labour is provided by the community itself (Wahananiu, et al., 1994).

2.2.3 Large Scale Commercial Beef Cattle Farming System

The large scale commercial beef cattle sector in the Solomon Islands ranges from 250-2,000 hectares and raises about 300-2,500 heads of cattle (Cattle 2000, 1994). Large scale commercial cattle farming system is practised by the commercial agricultural sectors, such as the Levers Pacific Plantation Limited (LPPL), large individual farmers, groups and state owned agricultural properties (Cattle 2000, 1994).

The large scale commercial sector plays an important role in the Solomon Islands' cattle industry, because it can maintain high beef cattle production and is more reliable, even when the industry was in decline. The industry depends on increase in cattle population

and distribution to other new areas in order to maintain high level of cattle numbers in the Solomon Islands (Cattle 2000, 1994).

High capital investment is required in large scale farming system together with the high inputs of extension services. Management of large commercial cattle farms was often done with employment of skilled labour and the aim was to make profits (Osborne, 1975). The large scale commercial farmers were also engaged in taking up development loans from the credit institutions such as the Development Bank of the Solomon Islands (Wahananiu, et al., 1994).

2.3 Animal Health Status

The Solomon Islands' livestock industry is fortunate not to have any major exotic diseases, such as "foot and mouth disease". This is a result of strict quarantine measures and the control of animal movement from one province to another, together with the geographical isolation of the islands by the oceans.

Therefore, contagious diseases were not of major concern in the beef cattle industry during the 1980's (McGowan, 1982). But, with today's increase in transportation services between the islands there is risk of animal diseases spreading from one province to another. Outlined in the following Section are some of the major diseases and parasites present in cattle herds in the Solomon Islands.

2.3.1 *Bovine tuberculosis*

Bovine tuberculosis (T.B.) is a disease which affects various internal organs of the animals, by bacterial infections. It is a disease which affects the animal's organs, such as the lungs, heart and brains and the bones. The infection of animals occurs through feed

and drinking water contamination. Infected animals with tuberculosis can have poor body growth and loss of body weight.

The first incident of *Bovine tuberculosis* (T.B.) in Solomon Islands was recorded in 1927 in the Levers Pacific Plantation Limited's (LPPL) herds. American soldiers (1945) reported that *Bovine tuberculosis* was present in 10% of the slaughtered beef animals. By 1960, Osborne confirmed T.B. incidence in 50% in the LPPL cattle herds on the Russell Islands (Freeman, 1977).

In 1967 an eradication programme for *Bovine tuberculosis* was started out by Frederick, who was the country's first appointed veterinary officer from the United Kingdom. The programme was implemented by the Ministry of Agriculture and Lands. By 1978, through programme and strict quarantine measures the disease was eradicated from most of the herds in the Solomon Islands (Reece, 1977).

2.3.2 *Brucellosis abortus*

Brucellosis abortus bacteria attack the foetus causing pregnant cows to calf prematurely resulting in the deaths of young calves. The *Brucella abortus* bacteria can be transmitted by contamination of pasture and drinking water in the fields.

A test for presence of *Brucella abortus* involves collecting blood samples from the jugular vein, using the Rose Bengal method. From 1972-1976, an eradication programme was carried out by the government's veterinary and livestock services on the Levers Pacific Plantation Limited, Government and smallholders' herds (Freeman, 1977).

Mass slaughtering of infected animals through the Livestock Development Authority's abattoir was one of the methods used in the above programme. Despite this, not all herds

throughout Solomon Islands were tested because of lack of handling and clinical facilities (Freeman, 1977).

2.3.3 Cattle Ticks *(Boophilus decoloratus)*

Cattle ticks *(Boophilus decoloratus)* are external parasites which survive on animals' blood (Hill, 1988). The parasites live on the animals' body, sucking up blood which can result in sores on the skin. The infected animals encounter loss of body weight and poor growth.

Cattle ticks *(Boophilus decoloratus)* were imported with a shipment of beef cattle in the 1920s from Rockhampton into the Solomon Islands. In 1943-1945 high incidences of cattle ticks were recorded in the Western province of the Solomon Islands. In order to eradicate this problem, the infected areas were placed under quarantine restriction. There was subsequently no transportation of cattle from those areas to other parts of the country.

Infested herds were authorised by the government to be slaughtered by officers of the Ministry of Agriculture and Lands. By 1970s, the cattle tick parasites were eradicated from most of the herds in the Solomon Islands (Freeman, 1977).

2.3.4 Buffalo Fly *(Lyperosia spp)*

Buffalo flies *(Lyperosia spp)* suck blood and cause sores on the skin of cattle resulting in cattle with poor health (Hill, 1988). The first buffalo flies *(Lyperosia spp.)* in a cattle herd was recorded in 1923 (Reece, 1977). Buffalo flies *(Lyperosia spp.)* spread from one farm to another by the transportation of cattle for marketing purposes. Buffalo flies were difficult for farmers to eradicate due to limited resources.

Most of the animal health problems in the beef cattle industry were caused by internal and external parasites. However many farmers did not have access to the facilities to carry out control measures. Good farm management practices were essential for control of animal parasites and also required farmers' participation.

2.4 A Short History of Solomon Islands' Beef Cattle Industry

Cattle is not a native animal to the Solomon Islands farming environment. Integration of cattle farming into Solomon Islands' agricultural systems started in the 1900s. Although this process was slow, cattle farming was important to the Solomon Islands' livestock development (Cattle 2000, 1994). The discussion below on the history of the cattle development in the Solomon Islands is divided in four sections: (i) cattle introduction before World War II; (ii) cattle development from 1940-1950; (iii) cattle development from 1950-1986; and (iv) cattle development from 1986-1996.

2.4.1 Cattle Introduction Before World War II

The introduction of beef cattle to the Solomon Islands started in the nineteenth century by expatriates who came as missionaries, government administrators and planters. The animals were raised to supply milk and meat products for the missionaries and plantation owners (Freeman, 1977).

As the number of Europeans increased, so did the beef cattle numbers. Beside milk and meat production, cattle were used to control weeds in the coconut plantations owned by the expatriates (Newham, 1994). The favourable climatic environment and the presence of quality pasture with few disease problems supported this increase in cattle numbers.

The first major imports of beef cattle to the Solomon Islands were from 1905 to 1913 by the Levers Pacific Plantation Limited (LPPL) (Osborne, 1979). It was during this early period that the LPPL developed large coconut plantations in the Solomon Islands, and the animals were used for weed control. By 1913, the LPPL owned around 1,500 beef cattle heads, mainly on the Russell Islands and Lungga in the Guadalcanal province. In the early 1930s, the national herd of beef cattle were estimated to be around 16,000 head. The majority of the animals were owned by large commercial companies, such as the LPPL (Freeman, 1977).

2.4.2 Cattle Development 1940-1950

By 1948 the total beef cattle numbers in the Solomon Islands had reduced to 1,500 head. Cattle numbers declined during the second world war due to the mass slaughtering of beef cattle carried out by armies for food consumption. In addition to this, plantation owners, who were mainly European, had left the country due to fear of war and they had little interest in keeping their plantations and herds (Freeman, 1977). Furthermore, an increased number of cattle had gone wild due to poor management during the second world war.

2.4.3 Cattle Development From 1950-1986

Within the period of 1950-1986, the Levers Pacific Plantation Limited, a privately owned commercial company, and the Solomon Islands' government had undertaken certain steps to re-develop the beef cattle industry through importation of cattle (Freeman, 1977). Therefore in 1960, the Solomon Islands' government imported 380 heifers from New Zealand (Freeman, 1977). Also some temperate breeds of cattle were imported from Australia with the intention of starting commercial dairy farming. Farmers did not pursue dairy farming because of lack of knowledge, skills and facilities. Later during the 1960s,

the Zebu breed was imported from Papua New Guinea, Vanuatu and New Caledonia (Baker, 1979).

The national herd of beef cattle is composed of *Bos taurus* and *Bos indicus* breeds. Freeman (1977), reported that the genetic composition of beef cattle in the Solomon Islands was 25% *Bos taurus* and 75% *Bos indicus* (Baker, 1979).

Table 2.1: Distribution of Cattle by Ownership in the Solomon Islands (1970-1979).

	Plantations		Missions		Solomon Islanders		Government		Total	
Year	**Herds**	**Cattle**	**Herds**	**Cattle**	**Herds**	**Cattle**	**Herds**	**Cattle**	**Herds**	**Cattle**
1970	31	9,687	31	1,024	212	1,222	6	156	280	12,099
1971	23	10,538	32	1,236	246	1,574	7	306	302	13,654
1972	21	11,933	31	1,328	278	1,846	8	691	338	15,798
1973	20	12,549	32	1,560	338	2,564	7	519	397	17,192
1974	24	13,144	35	1,529	502	4,618	13	1,937	574	21,228
1975	26	12,023	36	1,751	577	6,859	11	2,035	650	22,668
1976	27	11,875	39	1,902	688	8,723	14	1,610	768	24,110
1977	30	11,556	36	1,634	712	9,786	12	1,803	790	24,775
1978	31	12,006	36	1,331	747	9,441	16	2,407	828	25,184
1979	36	10,390	33	1,217	738	9,059	17	1,918	823	22,584

Source: Freeman, 1977; Schottler, 1984.

Table 2.1 shows a period of growth in the national herd, particularly from the smallholder sectors owned by Solomon Islanders. One of the contributing factors to this increase and growth was the government's interest in assisting cattle farmers. The government had

encouraged cattle development programmes in 1970s by establishing extension schemes with subsidies, farm grants and agricultural loans for smallholders (Schottler, 1984).

Freeman (1977) reported that from 1950s to 1960s, no Solomon Islander was trained by the government to manage beef cattle farms nor was given the opportunity to develop and own a beef cattle farm through the government support systems. The credit facilities such as agricultural loans were only becoming available to the Solomon Islanders during the 1970s. The Solomon Islands' beef cattle numbers reduced by 3.4% annually from 1979/1980. In 1985, the beef cattle numbers were round 19,750 head. The highest recorded number were 25,184 head of cattle in 1978 but numbers have subsequently declined (Solomon Islands Statistics, 1986).

Table 2.2: National Cattle Herd by Districts in the Solomon Islands (1980-1985).

	Central *		Eastern +		Malaita		Western		Total	
Year	**Herds**	**Cattle**	**Herds**	**Cattle**	**Herds**	**Cattle**	**Herds**	**Cattle**	**Herds**	**Cattle**
1980	218	13,389	110	1,745	360	4,606	135	3,255	823	22,995
1981	207	13,173	107	1,955	367	4,915	106	3,293	787	23,336
1982	205	12,267	121	1,904	349	5,331	124	4,169	799	23,671
1983	187	12,152	120	1,858	317	4,637	115	4,259	739	22,906
1984	198	12,844	125	1,850	239	3,429	102	4,600	664	22,722
1985	186	9,420	126	1,679	255	3,810	99	4,841	666	19,750

Source: Solomon Islands Statistics, 1986.

Notes: * Central district includes of Santa Ysabel, Central and Guadalcanal.

+ Eastern district includes Makira and Temotu provinces.

2.4.4 Government Involvement in Beef Cattle Production

In the 1970s, the Solomon Islands government increased its participation in beef cattle development. In 1972 the Government requested the Asian Development Bank (ADB) to study the livestock industry for further financial assistance (Osborne, 1979). The study recommended increased financial assistance and extended institutional support for cattle farmers and encouraging smallholders to increase beef production (McGowan, 1982). The project was approved and administered by the agricultural extension services, the Development Bank of the Solomon Islands (DBSI) and the Livestock Development Authority (LDA). Large herds and group ranches of about 1,000 hectares were encouraged by the government through the use of the farm grants and subsidy schemes. The DBSI provided development loans for beef cattle farmers (McGowan, 1982).

The initial instalment of AU$50,000 from the subsidy schemes for cattle development was provided by the government in 1970 to import 20 breeding head of cattle from Australia for the Tenavatu farm (Osborne, 1977). The Sixth Government Development Plan of 1975-1979 further strengthened the Solomon Islanders' participation by providing support services. Smallholder projects were assisted by subsidy and cattle farm grant schemes for cattle development on customary lands (Osborne, 1977).

Since the introduction of the government subsidy and farm grants in 1973, there were 6,432 hectares established as a result of farmer participation (Solomon Islands' National Development Plan, 1980). This included the communal farms and individual cattle projects (Osborne, 1979).

Further improvement in pasture management and animal husbandry were made through the institutional support services, for example, agricultural extension services and the Cattle Development Authority (CDA) in 1973 (Osborne, 1979). The subsidy scheme was

used for the projects' initial establishment. A rapid increase of beef cattle projects was experienced in the Malaita province, because of the interests from the smallholder sectors. Through further requests from the Solomon Islands' government in 1980, additional financial assistance was provided by the Asian Development Bank, United Kingdom, Australia, and New Zealand for the beef cattle and livestock industry (Osborne, 1979). In 1974, 2,401 heifers and 56 bulls were imported from Australia and distributed to smallholders (Osborne, 1979). A total of around 40,000 head of beef cattle was imported during the period 1970-1986. More than half of the imported cattle were distributed to the smallholders (Freeman, 1977).

2.4.5 Government Subsidy Scheme

The government subsidy schemes were supported with foreign assistance from Australia in 1973 (Wisidagama, 1979). The aim of the scheme was to encourage farmers to develop their land to sustain more beef cattle farms. The scheme ran from 1973-1986 and included pasture establishment, fencing materials and stockyard construction.

Farmers were encouraged to develop good pastoral areas for beef cattle by using pasture development grants. Pasture grants were administered by the Ministry of Agriculture and Lands. The aim of the pasture grant was to encourage cattle farmers to plant quality pasture species and maintain their growth to achieve better animal weight gains. The cattle projects were inspected by field workers prior to the payment of S.I. $25/ha; payment was made to farmers who satisfactory fulfilled certain requirements (Wisidagama, 1979).

Fencing grants included 75% of the fencing materials such as barbed wires, required for a beef cattle project. This provided for enclosing a pastoral area after fence posts were erected along the fence-lines. The farmer only provided for the remaining top strand of wire on the fence. Cattle projects that qualified for pasture and fencing grant were either

existing or new projects. The scheme aimed to encourage farmers who were interested in beef cattle farming.

The stockyard establishment grant was a part of the farm grant scheme. Farms from 20 hectares and up could qualify for the stockyard grant of S.I. $100 (Wisidagama, 1979). Half of the requirements were paid in advance following inspection and approval by the extension workers. It was estimated that around S.I. $363,820 was allocated for farm subsidies in 1977 (McGowan, 1982).

2.4.6 Cattle Development From 1986-1996

Since 1986, there has been no cattle census to determine the trend of the cattle population in the Solomon Islands. In 1991, the cattle number was estimated at around 9,700 and by 1993 it was expected to have declined to 8,400 heads (Cattle 2000, 1994). From 1993, the cattle number was estimated to decline at an annual rate of 7-8% and by 1996, it was estimated to have decreased to 6,600 heads of cattle (Wahananiu, et al., 1994).

In 1994, plans were formulated to revitalise the cattle industry by the Solomon Islands government through the re-development of the Tenavatu farm as the national breeding herd and distribution centre of improved progeny to farmers in the provinces (Cattle 2000, 1994). Furthermore in 1996, the government had privatised LDA to the Livestock Corporation Limited (LCL) (Solomon Star June, 1996).

2.5 Support Services For Cattle Development

The extension support services for cattle development in the Solomon Islands was very efficient in the delivery of services to cattle farmers during the 1970s-1980s (McGowan, 1982). This was primarily due to financial assistance and personnel expertise received

from funding agencies, e.g. the Australian Development Bank (ADB), and the bilateral assistance from UK, Australia and New Zealand. Financial support was administered by the Ministry of Agriculture and Fisheries, the DBSI and the Provincial governments. Farmers were required to meet certain criteria when applying for financial assistance from DBSI. In terms of subsidies, cattle farmers were required to develop at least ten hectares of pasture before their application could be approved. Farmers not meeting these requirements were not assisted (Wisidagama, 1979). Institutional support services concentrated on smallholders, rather than the large commercial sectors, e.g. the Levers Pacific Plantation Limited (McGowan, 1982).

2.5.1 Agriculture Extension Services

The extension services of the Ministry of Agriculture and Fisheries have been responsible for carrying out the extension support services of cattle development with farmers. This is an important section that provided the necessary information and knowledge to farmers. In the Solomon Islands, each province has an extension division which works closely with farmers to improve their farming systems (Grossman, 1980). The provincial extension workers perform tasks such as loan appraisals for farmers, and provide training in crop and livestock production.

Because of lack of funds there were few courses offered at the farmers training centres in the Solomon Islands. Recent financial constraints in the Ministry of Agriculture and Fisheries has reduced training for farmers in cattle husbandry and management. If there were systems of users pay in the extension services, then support for the extension services would be more financially effective. The past progress of the beef cattle industry was a combined effort of the extension and the cattle farmers (Grossman, 1980).

Grossman (1980) reported that one of the main reasons that contributed towards a break down of community and smallholders' projects, was the appraisal stages of a project carried out by extension workers. Sometimes extension workers might not understand the socio-cultural settings in the villages while appraising a project (Grossman, 1980). For example, a community's land tenure system and the social structure are parts of the community, therefore extension workers should address them in a context suitable with the community needs and aspirations.

2.5.2 Development Bank of Solomon Islands (DBSI)

The establishment of the Development Bank of Solomon Islands in 1979, increased credit facilities available to farmers (Wisidagama, 1979). The Bank's services were extended to the provinces which encouraged farmer participation in the cattle industry. Farmers were able to get loans for stock fattening and breeding purposes.

The literature revealed that farmers did not understand the whole concept of loans because often farmers were not using the loans from the DBSI on the appraised projects. In the past, funds were diverted by some farmers for other activities rather than cattle farming requirements (Grossman, 1980). Also there was no consultation about a cattle projects' viability with extension workers who may have discouraged farmers when projects were not viable.

2.5.3 Livestock Development Authority (LDA)

In 1973, the Cattle Development Authority (CDA) was established to co-ordinate the development of the cattle industry. By 1983, CDA was changed by an act of parliament and became the Livestock Development Authority (LDA). The LDA has been responsible

for the livestock development in the Solomon Islands. LDA was established as one of the government statutory bodies to promote the following beef cattle objectives:

(a) promote, assist and develop the cattle industry;

(b) establish and ensure the maintenance of an efficient system for handling, distribution and marketing of cattle products;

(c) promote and training of farmers in animal husbandry; and

(d) increase the national herd (Wisidagama, 1979).

However, some of these objectives were not achievable as beef cattle number decreased by 7-8% annually and few farmers were participating in beef cattle farming (Cattle 2000, 1994). The establishment of LDA's livestock support services in the provinces was an important network for the industry in 1980s. The livestock services and facilities provided by the LDA were part of the extension and livestock development programmes aimed to improve the cattle industry (McGowan, 1982).

The services included government breeding farms, livestock nucleus centres, multiplication centres, district cattle holding grounds, slaughter houses, central abattoir, transport and marketing services, for example, trucks and tractor trailers for cattle loading in each province (McGowan, 1982).

By 1983, an in-kind lending policy was introduced by the LDA for livestock farmers. The policy's objective was to increase livestock numbers and increase farmer participation in smaller livestock projects. Steers and other small livestock were obtained from the LDA on credit basis. They were mainly used for tethering on the roadsides, coconut plantations and strips of pastoral lands (Wahananiu, et al., 1994).

The in-kind lending policy works on the basis of the LDA supplying weaner steers to farmers. Farmers raised the stocks to a marketable size and then sell the animal back to the

LDA. The LDA receives an amount equivalent to the weaners' live-weight and the difference was paid to farmers.

The in-kind lending policy worked only in areas within the reach of marketing and transportation. With limited resources from the LDA and Extension Services in the Provinces, this system required a lot of work. One of the limiting factors with the in-kind lending policy was that farmers, in remote areas were not able to sell back beef cattle to the LDA because of transport difficulties. LDA was unable to deliver the services of production and marketing to the farmers in these provinces, because of the LDA's financial constraints.

2.6 Conclusion

With the present trend of a 7-8% annual decline of beef cattle numbers, shortages were widely experienced throughout the Solomon Islands and this concerned both the government and cattle farmers. Little was known about farmers' perceptions on the integration of cattle with other agricultural sectors in the Solomon Islands. Farmers were seldomly consulted by extension workers on the aspects of cattle development and this often resulted in misunderstandings. Institutional inputs were used for increasing cattle herd size without understanding the impacts of this on rural communities. Farmers' interests were changing and this often changed their objectives.

The extension support services that farmers received have not been consolidated and farmers have taken up other farming activities. The comparative advantage of crop production over beef cattle farming in the past has contributed towards this shift of farmers' interest. The extension inputs for beef cattle production were not effective in increasing cattle numbers and thereby retaining farmer participation.

CHAPTER THREE: METHODS

3.0 Introduction

Past research has shown that cattle farming is suitable for the Solomon Islands (Osborne, 1979). From 1970s-1980s, the government of Solomon Islands took up initiatives to further develop the beef cattle industry. Institutional support services such as the Livestock Development Authority (LDA), Extension Services, and the Development Bank of the Solomon Islands (DBSI) were formed to improve the beef cattle production in the Solomon Islands in order to substitute imported livestock products. This support included schemes such as agricultural loans and government subsidies.

According to the Sixth National Development Plan, the beef cattle industry aimed to raise 80,000 head of cattle by 1981-1983. This was not achieved, because of several socio-economical factors that limited the development of beef cattle industry. Despite government support and other institutional inputs, the decline of beef cattle numbers continued throughout the 1980s.

Further analysis of the situation was necessary to determine the problems associated with the low socio-economic benefits for Solomon Islands farmers from beef cattle farming. This study has aimed to recommend strategies that should improve Solomon Islands' beef cattle industry.

3.1 Chapter Overview

Section 3.2 describes the research areas and respondents involved in this study. Section 3.3 describes the process of the semi-structured interviews. The survey questionnaires for

the farmers and extension workers is outlined in Section 3.4. The data analysis and the reporting method are described in Sections 3.5-3.6.

The methods chosen for the field study were semi-structured interviews (face to face) with key informants and survey questionnaires for farmers and extension workers, to provide a wider range of response. The research started with a literature review (see Chapter two). The research method therefore has four main parts: (a) literature review; (b) semi-structured interviews; (c) field survey; and (d) data analysis and the thesis writing.

3.2 Research Areas

The Malaita and Guadalcanal provinces provided an ideal setting for the study because they had more beef cattle farmers, although numbers have dropped in the past ten years. There were several cattle projects that existed within these provinces, and good access via road and sea.

The survey questionnaire for the extension workers of the Guadalcanal province were filled in during the staff's annual conference at the Dodo Creek training centre. The surveys for the extension workers and cattle farmers of Malaita province were done after the key informants' interviews.

Prior to the survey of the extension workers, 36 of them were pre-identified. Of those 36, 31 (86%) responded. Thirty-five percent was from the Malaita, and 65% from the Guadalcanal provinces. Also, 57% of the intended 72 farmers who were pre-identified for the cattle farmer's survey could not be interviewed because of limitation of resources, time and non-availability of the farmers (Malaita 80% and Guadalcanal 20%).

3.3 Semi-structured Interviews

The semi-structured interviewing method was chosen because it gives greater opportunity for interviewees to express themselves about the issues that were raised in this research study (Appendix 1). An in-depth insight could be obtained through the semi-structured interviews on the key informants' perceptions about the issues raised in this study, by asking further questions. The comments from the key informants' interviews were written down and summarised, which allowed the discovery of common themes that emerged as results of these interviews.

The key issues were developed prior to the key informants' interviews. The key issues were related to beef production, farmer participation, extension services inputs and the status of the cattle industry in the Solomon Islands (Appendix 1). The key informants were experts with experience, skills and knowledge about the cattle industry and its recent developments. Ten key informants were interviewed. The interviews with the key informants were arranged by letter correspondence and telephone calls. Each interview lasted about one and half hours.

Key informants were people from the Agricultural Extension Services, Livestock and Veterinary Section of Ministry of Agriculture and Fisheries, the Livestock Development Authority, and the Development Bank of Solomon Islands. Also the heads of the Agricultural Divisions for the Guadalcanal and Malaita provinces and three butchery managers in Honiara and Auki were interviewed.

3.4 Field Survey

Consent for a survey of the agricultural extension workers and farmers within the study areas was given by the Extension Services Division. The extension workers were surveyed after consultation with each Provincial head quarters. The names of cattle farmers from

the study areas were provided by the Provincial Extension Services of the Malaita and Guadalcanal provinces.

The survey questionnaires were filled in with cattle farmers during visits to their farms. Also a first hand observation was noted on these farms' situations during the visits.

3.4.1 Extension Worker Questionnaire

There were 31 extension workers who filled in the survey questionnaires; 20 from Guadalcanal and 11 from Malaita. The first section of the extension workers' survey questionnaire was about their educational background and the services provided to cattle farmers. The second section was about farm characteristics, production systems, animal health and diseases control. The third section included the support services, the extension workers' perceptions and opinions on the Solomon Islands' beef cattle industry (Appendix 2).

3.4.2 Cattle Farmer Questionnaire

A total of 41 cattle farmers responded by filling in the farmers' survey questionnaire. Thirty-three of the cattle farmers were from Malaita and 8 from Guadalcanal.

The survey questionnaire included sections on the physical characteristics of cattle farms (for example farm production, size of farm units, number of the livestock), farm income and problems faced by farmers. The final section had questions about the support services that farmers received from the Extension Services (Appendix 3).

3.5 Data Analysis

The survey questionnaires for both the extension workers and the cattle farmers were coded. The coding process involved putting in values for each variable derived from the

responses. The values and codes of the variables were recorded in the Microsoft Excel 5.0 for Windows 95 for further analysis.

There were two types of variables used in the process of coding. Variables were re-coded and grouped into relevant fields. The data were processed into specific groups of categorical and continuous variables. The data was analysed using the Statistical Analysis Systems (SAS 6.10) on the Massey University's Computer Network Services. Descriptive analysis were carried out on the data obtained from the two survey questionnaires. The results of the survey questionnaires were derived from the statistical analysis process as frequency distribution, the mean and standard deviations for the categorical and continuous variables. Also correlation coefficients were used for selected variables relating to the study's objectives. Two summaries of tables for both surveys were made from the results of the data analysis.

3.6 Reporting

This thesis reports the outcomes of the research study carried out on the cattle industry in the Solomon Islands. The writing of this thesis included several stages of editing until it was completed. The major part of this research study is reported in this thesis and presented to Massey University.

Chapter Four: Results

4.0 Chapter Overview

This chapter presents the results of the survey questionnaires administered to the agricultural extension workers and beef cattle farmers in the Guadalcanal and Malaita provinces, and the semi-structured interviews with ten key informants associated with the Solomon Islands' beef cattle industry. Discussion of the results in this chapter is presented into three parts: (i) key informant interviews; (ii) extension workers responses; and (iii) beef cattle farmers' responses.

Section 4.1 describes the key informant views on the issues raised in relation to the Solomon Islands' beef cattle industry. Sections 4.2-4.3 describe the results of the extension workers and cattle farmers' surveys in the research areas of the Malaita and Guadalcanal Provinces. The conclusions of these results are discussed in Section 4.4.

4.1 Key Informant Interviews

The key informant interviews have played an important role in this study. Their perceptions and opinions provided the background to issues which were later addressed in the surveys of farmers and extension workers.

4.1.1 Key Findings

The following key themes were established after analysis of the key informant interviews: (a) key informant views on extension services and technology transfer; (b) farmer views on government incentives; (c) potential land are under-utilised; (d) beef cattle revitalisation; (e) revitalisation of the Livestock Development Authority (LDA); (f) co-ordination in the cattle production; (g) shortage of beef cattle breeding stock; (h) the Development Bank of the Solomon Islands (DBSI) lending policy; (i) integration of

the beef cattle farming; (j) cattle marketing infrastructures; and (k) alternative use of cattle. These common themes are discussed in the following subsections.

4.1.2 Key Informants' views on the Extension Services and Technology Transfer

Most of the technology transfer that occurred in the cattle industry was the result of the government programmes of the 1970s and 1980s, which aimed at improving the cattle production sectors in the Solomon Islands. The new technology included improved breeds, new varieties of high quality pasture, and improved herd management practices. The organisations that facilitated the government livestock programmes in the 1970s and 1980s were the Ministry of Agriculture and Fisheries (MAF), the Solomon Islands Development Bank (DBSI) and the Livestock Development Authority (LDA). Farmers had to seek technological information and advice from these government bodies on various aspects of their cattle farming activities, such as production, credit, farm finance requirements, or marketing of beef cattle.

New methods and technology was introduced through the livestock improvement programmes in the 1970s and 1980s. But farmers did not prepare to take up most of the new ideas, such as steer tethering, the in-kind lending system from the LDA, and the DBSI loans.

As one of the respondents revealed: "Often farmers would work well at the initial stages of project establishment, but as time went by they tended to switch to other farming activities, e.g. cocoa or coconut, instead of concentrating on cattle farming. They would continue just enough to stock their cattle projects and allow their cattle to graze without further improvements on their farms".

The key informants felt that, as a result of this attitude, many beef cattle farmers were not thinking seriously about what was suitable on their farm and what would provide

maximum output for them, but instead focused on obtaining government financial support. The key informants also indicated that the present support services for extension workers were not adequate and this contributed towards the ineffective transfer of technologies to beef cattle and small livestock farmers.

Most of the key informants also indicated that they thought the programmes financed by the Asian Development Bank and foreign aid donors from 1975-86 were not well co-ordinated. For example, the group ranches were not developed into large units and adequate breeding stock was not available for farmers for stock replacement purposes on their farms.

4.1.3 Government Incentives

According to the key informants, farmers had mixed perceptions and views on the government incentives, such as the farm subsidies and cattle grants offered to the beef cattle industry in the 1970s-1980s. One of the ways that the government subsidies and grants impacted on farmers was that they created a relaxed attitude and dependence on government assistance. The government subsidies and grants were introduced to assist farmers with the initial establishment of beef cattle projects, but according to the key informants most cattle farms gradually abandoned their enterprise after the government incentives ceased in 1986.

Generally, many farmers felt that government subsidies were an easy way of earning money without much effort to consolidate projects. Some perceived that the government subsidies and grants were incentives for getting "free handouts" and felt not obliged to revitalise their cattle projects even when there was no government support. Looking back on the 1970s-1980s, it was obvious that farmers were depended on the Solomon Islands' government to provide the incentives, and only a few of them were really interested in beef cattle farming and its economic potential.

4.1.4 Under-Utilisation of Potential Beef Cattle Land Areas

The key informants stated that potential land designated for beef cattle production was under-utilised. Since the 1970s-1980s, much of the potential land area identified for large commercial cattle ranches in the provinces was not used. This was caused by a variety of reasons, e.g. land disputes, road accessibility, lack of capital for investment, and transportation problems from the farms to market outlets. In 1994, a re-development plan was put in place, and areas with the potential to increase beef production in the Solomon Islands were identified (Table 4.1).

Table 4.1: Identified Sectors for Beef Cattle Re-development in 1994.

Identified Sectors	Areas (ha)
Smallholder land	6,441
Land use development farms	3,943
Government pastoral land	2,550
LDA pastoral land	760
LDA cattle holding grounds	442
Total	**14,136**

Source: Cattle 2000, 1994.

It was revealed that this existing area of 14,136 hectares required financial assistance for rehabilitation and restocking, if further steps were to be taken by the government and the cattle industry to re-develop these areas. In addition, 50,000 ha of land is available for grazing, either in coconut plantations or in the logged areas in the provinces. However, due to the lack of breeding stock and finance, these areas would not yet be developed according to the 1994 Plan.

As one of the key informants said: ".....there is still room for beef cattle development in the provinces. For example, in the Ysabel province there is about 7,000

ha that exists in the Gaogha and Havulei ward, and the Aola area on the Guadalcanal province has about 4,000 ha of land which has the potential for beef cattle grazing".

4.1.5 Beef Cattle Revitalisation Plan

In 1994, the Ministry of Agriculture and Fisheries (MAF) started a revitalisation programme for the beef cattle industry. It was revealed during the interviews that the government had the following aims for its revitalisation plan: (a) to develop a total area of 16,775 ha for beef cattle production, both through expansion and the rehabilitation of 284 locations in the country; (b) to improve the national herd through imports of improved progeny from overseas, breeding with them, and re-distribution of offspring to farmers; (c) to provide development inputs and support for beef cattle development through the extension services; (d) to improve marketing and other support infrastructure by encouraging the private sectors; (e) to provide research, training and extension services to farmers who are participating in beef cattle production; and (f) to provide rural credit facilities for beef cattle farming activities.

This plan aims at the following production systems: (i) commercial farms (250-2,000 ha), owned by individuals, private and state-owned companies, to hold at least 300-2,500 heads; (ii) semi-commercial farms (50-240 ha) for breeding and fattening stock; and (iii) small holder farms (12-49 ha) for fattening stock.

The key informant interviews revealed that the re-development programme started in 1994 at the government breeding farm at Tenavatu, with fence reconstruction, pasture establishment and restocking with 65-70 weaners. By 1995, twelve Santa Gertrudis breeding bulls were imported from Australia, which bred with the local herd on the farm for improved progenies. The Tenavatu farm was then used as the multiplication and distributing centre for improved offsprings, to be provided to cattle farmers in the provinces. Imports of semen from Australia for an artificial insemination programme

started in 1995. Around 70 heifers received artificial insemination and were ready for calving by August 1996.

4.1.6 Revitalisation of the Livestock Development Authority (LDA)

The Livestock Development Authority (LDA) was a government statutory body responsible for overall livestock production, industry development, and marketing of beef cattle and small livestock. In 1996, the government privatised the LDA under the new name of Livestock Co-orporation Limited (LCL). The LCL is a locally owned company, a joint-venture with the Black Gold Management Limited (BGM Ltd), a specialist group of consultants in livestock production from Australia. The LCL is trying to address the livestock problems associated with the industry's development and the government revitalisation plans. The LCL company has planned to import pigs, chickens, goats, beef and dairy cattle from overseas in order to increase the cattle and small livestock numbers. Management and advisory services will be provided to the LCL by the Black Gold Management (BGM Ltd) Consultancy group.

4.1.7 Co-ordination in the Cattle Production

According to the key informants, the extension services provided for cattle farming in 1970s-1980s concentrated on smallholder farms rather than the large commercial private companies such as Levers Pacific Plantation Limited (LPPL). An example of this is the government subsidies and grant scheme, which was only given to the smallholder farmers and not to the LPPL. There were a few large commercial beef cattle farms, that operated without these government incentives. As a result of the government withdrawal of farm subsidies and grants, most of the smallholder farms were unable to maintain production during the declining periods of 1980s-1990s, and also the proposed large scale group ranches for cattle development did not eventuate.

As a result, the LDA and farmers were unable to have adequate beef cattle to supply abattoirs for beef meat, and to sustain stock for farms replacement. In the early 1990s, the LDA reduced its marketing services to farms around Honiara and therefore other farmers were left out and were confined to sell within their own local areas for low prices which affected their interest in cattle farming.

As one of the key informants said: ".....LDA's production and marketing services has changed in 1990s. Its effort concentrated on pig and chicken farming without much concern for the declining situation of the cattle industry. Probably there is more opportunity in pig and chicken than cattle farming".

4.1.8 Shortage of Beef Cattle Breeding Stock

Some key informants indicated that shortage of cattle breeding stock contributed towards the declining situation of Solomon Islands' national herd. The interviews revealed that the most affected were the cattle farms in the provinces, which did not have access to breeding herds for stock replacement. Farmers did not have many options in breeding when there were no new animals available, therefore, there was always the problem of inbreeding within the herds.

Furthermore, the key informants interviews revealed that, although the government had plans for the rehabilitation of its existing breeding farms such as the Tenavatu farm and others in the provinces, it may take long to materialise this, because such plans would require financial assistance to implement. Also the key informants felt that any government plan must encourage farmers to work independently rather than depend on government subsidies.

As one of the key informants said: ".....although the Tenavatu breeding farm is being revitalised for multiplication and distribution of beef cattle offsprings to farmers,

still many of the farmers' requirements for improved breeds are not yet met, because of financial difficulties and time constraints".

4.1.9 The Development Bank of Solomon Islands' Lending Policy

In 1979, the Development Bank of Solomon Islands (DBSI) was established to provide financial advice and to facilitate loans and credit assistance to the agricultural and industrial sectors in the Solomon Islands. It offered loans to farmers or groups of people with limited capital for investment in viable agricultural projects, which included beef cattle farming. Loans were first appraised by the extension workers and DBSI officers prior their approval, as loans were only given to farmers based on their project's viability. Loans which were offered to beef cattle farms were mainly for activities such as land clearing, fencing, pasture development, stock purchasing, labour, tools, equipment and materials.

The key informants felt that since the decline of the cattle industry, the Development Bank of the Solomon Islands was reluctant to give loans to cattle farmers. There was a change of the DBSI's lending policy on cattle farming in the past ten years, and as a result only few cattle projects received loans from DBSI. Prior to all loan approvals for farmers, they must be carefully assessed properly by the extension workers and DBSI's loans officers.

4.1.10 Integration of Beef Cattle Farming

The integration of beef cattle farming with other production systems was also raised as an important issue in the key informants' interviews. The key informants felt that beef cattle farming system was not integrated well with other farming systems in the past livestock programmes of the 1970s-1980s. It was revealed from the interviews that the development of the cattle industry during the 1970s-1980s was operating without

integrating with crops production, while ignoring the social-cultural settings that made up the whole farming community in the rural areas.

Cattle farming was not well integrated into the farming community because of the community's lack of knowledge and skills to raise the animals, and the rather relaxed work attitudes towards cattle farming. However, the key informants felt that cattle raised under coconut trees plays an important role by controlling weeds in smallholders' coconut plantations, which may be expensive if hired labour was used.

The key informants believed that farmers' adoption of new technology was important for further improvement of the beef cattle situation in the Solomon Islands. Farmers needed to seek information from the experts and extension workers to improve their own farming practices.

4.1.11 Beef Cattle Marketing Infrastructures

According to one of the key informants: ".....in the 1970s-1980s, the LDA established good infrastructural services for the production and marketing of beef cattle in the Solomon Islands. But in the early 1990s many of these infrastructures, e.g. the Mamara abattoir, the provincial slaughter houses and the inter-islands cattle shipping services, ceased operation. This was because of management and financial problems faced by the Livestock Development Authority to maintain all of its services to both beef cattle and small livestock farmers".

In terms, of beef products retailing, the interviews revealed that inadequate support was provided for beef retailers in the Solomon Islands. It was revealed that butcheries received little support from the extension services. For example, there were no government incentives, comparative to farm grants, given to butchery owners during the decline of cattle numbers. This was a concern amongst the butchery owners as shortage of beef cattle in the Solomon Islands led to higher retail prices.

4.1.12 Alternative Use of Cattle

The key informant interviews indicated that although alternative uses for beef cattle were possible they were not practised by farmers, except for grazing under coconuts to control weeds.

According to the key informants interviews, there was a potential for cattle to be used advantage for farm transports and as draught labour. In addition, there were possibilities to use cattle for dairy farming, which should be investigated.

4.2 Extension Workers Responses

This section provides an overview of the results from the extension workers' responses to the survey. Extension workers are the agricultural agents who work in the field to assist farmers with farm management.

The responses obtained from the extension workers reflect their opinions and views at the time of this survey, and on the issues addressed in the questionnaire. The results are discussed in the following subsections.

4.2.1 Background of the Extension Workers

The average age of the extension workers who responded to the survey was 37 years (Table 4.2). On average, an extension worker had worked with Extension Services for 11 years, after training in agriculture.

Table 4.2: Extension Workers Age (1996).

	Malaita		Guadalcanal		Overall	
Personal Details	***n***	**Mean**	***n***	**Mean**	***n***	**Mean**
Age (yrs)	11	37	20	37	31	37
		(4)		(7)		(6)
Years in Extension Services	11	11	20	11	31	11
(after training in agriculture)		(5)		(5)		(6)

Figures in parenthesis are standard deviations.

Table 4.3 shows that 10% of the Guadalcanal province respondents had only secondary education before starting a job in Extension Services. Ninety-one percent of the extension workers from the Malaita province and 37% of those from the Guadalcanal province had obtained a certificate in tropical agriculture. None of the extension workers from the Malaita province, and only 16% of those from the Guadalcanal province had a Bachelor Degree.

Table 4.3: Highest Education and In-service training (As a percentage of *n*).

	Malaita	Guadalcanal	Overall
Educational Levels	***n* = 11**	***n* = 19**	***n* = 30**
Secondary school	0	10	6
Certificate in tropical agriculture	91	37	57
Diploma in tropical agriculture	9	37	27
Bachelor degree in agriculture	0	16	10
In-service training	***n* = 8**	***n* = 14**	***n* = 22**
Animal health courses	25	36	32
Farm management courses	13	29	23
Others (public service courses)	62	35	45

In-service training was offered to the extension workers to upgrade their knowledge and skills. Nearly three-fourth of the extension workers received in-service training in animal health, farm management related courses, as well as courses in other subjects such as a public service.

One-fourth of the extension workers from the Malaita (n=8) and 36% of the extension workers from Guadalcanal (n=14) had attended courses on animal health (Table 4.3). Farm management courses were attended by fewer extension workers (23%). "Other courses", such as the public service course and the apiculture course, were considered most important in the Extension Service and were attended by nearly two-third of extension workers in Malaita and one-third of extension workers in Guadalcanal.

4.2.2 Extension Workers' Perceptions of the Beef Cattle Industry

The extension workers were asked about their perceptions of the current status of the beef cattle industry. No respondent from the Malaita province indicated any increase in the beef cattle numbers of their area, over the last five years but 11% of the extension workers from the Guadalcanal province did report an increase. Eighty-two percent of the respondents from the Malaita province (n=11) indicated that the status of beef cattle in their area was declining since 1991. For the Guadalcanal province, 67% of the respondents stated a similar trend for the cattle farms in their area during the past five years. One-fifth of the extension workers from both provinces indicated that the cattle numbers had remained fairly stable in the past five years (Table 4.4).

Table 4.4: Opinion on the Beef Cattle Numbers 1991-1996 (As percentage of *n*).

Beef Cattle Trend	Malaita *n* = 11	Guadalcanal *n* = 18	Overall *n* =29
Increasing	0	11	7
Constant	18	22	21
Decreasing	82	67	72
Total	**100**	**100**	**100**

4.2.3 Reasons For Farmers Interest in Beef Cattle Farming

Although most extension workers indicated that the beef cattle numbers were declining in their area, they were asked why some of their farmers remained interested in cattle farming (Table 4.5). The reasons which emerged from their responses were: high beef demand and therefore cash income, a good method of weed control in coconut plantations, land and market availability, and social security. Cattle is grazed in most coconut plantations as an alternative to hired labour to control weeds. Also some of the farmers were interested in beef cattle farming because the local markets were available to sell their animals, rather than depending on the Livestock Development Authority's marketing services.

Table 4.5 shows that four out of the nine respondents from the Malaita province indicated that high demand and cash income were the most important reasons for farmers' interest in beef cattle farming in their areas.

Similarly, 44% and 39% of those respondents from the Malaita and the Guadalcanal provinces indicated that because of land and markets for beef cattle were available, farmers from their area were interested in cattle farming. Furthermore, one of the nine extension workers of the Malaita province and two of the eighteen extension workers from the Guadalcanal province indicated that cattle was raised as an alternative method

to control weeds in their farmers coconut plantations. None of the Malaita province extension workers indicated that social security reasons, which included employment opportunities for farmers, were the main reasons for the interest in beef cattle farming, while 22% of the respondents from Guadalcanal province indicated that farmers in their area raised cattle for social security.

Table 4.5: Reasons Associated with Farmers Interest/No Interest in Beef Cattle (As percentage of *n*).

	Malaita	Guadalcanal	Overall
Main Reasons for Farmer Interest in Cattle Farming	***n* = 9**	***n* = 18**	***n* = 27**
Good beef demand and cash income	44	39	41
Available land and market	44	11	22
Effective for weed control	12	28	23
Social security	0	22	14
Main Reasons why Farmers are Not Interested in Beef Cattle Farming	***n* = 5**	***n* = 9**	***n* = 14**
Land limitation and disputes	20	0	7
Lack of management skills and interest	60	0	21
Low income and financial difficulties	20	23	22
Lack of government support	0	44	29
Lack of transport and market outlets	0	33	21

The extension workers thought that farmers in their area were not interested in cattle farming because: (i) the available land area was limited; (ii) farmer had land disputes; (iii) farmers lacked management skills; (iv) the return for beef cattle was not attractive; (v) lack of funds; (vi) inadequate government support; or (vii) lack of transport and marketing facilities. Table 4.5 indicates that one of the five extension workers from the Malaita province, who answered the question felt that land limitations and disputes

were the main reason why farmers were not interested in cattle farming. Land limitations and disputes are mainly caused by customary land problems, and the fact that individuals do not control over the use of this land. Three of five extension workers from the same province indicated that lack of management skills contributed towards lack of farmer interest in cattle farming. On the other hand, the extension workers from the Guadalcanal province listed low returns and finance, lack of government support and poor transport and marketing network as the main reasons for farmers' lack of interest in beef cattle farming.

4.2.4 Agricultural Extension Advice

The extension workers provided several services to farmers: advice on animal husbandry, project and pasture management, farmer training in raising cattle, and goal setting and farm objectives, and resource allocation (Table 4.6).

Table 4.6: Extension Worker's Advice to Beef Farmers (As percentage from *n*).

Types of Advice	Malaita $n = 11$	Guadalcanal $n = 20$	Overall $n = 31$
Animal husbandry	46	30	35
Project management	55	20	32
Beef cattle management training	18	35	29
Goals and objectives	18	10	12
Resource allocation	9	15	13

Note: The numbers do not add up to 100 because of multiple answers.

Less than half of the extension workers from Malaita, and 30% of the extension workers from the Guadalcanal province, advised farmers on animal husbandry. Advice about project management was the dominant area (55%) in Malaita, while similar advice was provided by only 20% of the extension workers from Guadalcanal. Beef

cattle management training was another aspect that extension workers provide their advice on. The extension workers provided training in beef cattle management also from the farmers' training centres in the provinces. This training included animal husbandry practices such as animal treatments or feeding and caring for young calves. Allocation of farm resources, such as capital, labour, tools, equipment and fencing materials, were discussion topics adopted by some of the extension workers in their contacts.

Sometimes the extension workers also conducted training courses for farmers. Selection of farmers to attend these training courses was based on farmer interest, types of courses (for example, crops or livestock), and a farmer's educational background. Attendance in the courses also depended on the individual farmer's financial situation, because in some occasions they were required to pay for the courses.

4.2.5 Extension Methods Used

The extension methods used by the extension workers were; contact farmers, farm visits, discussion groups, method demonstrations, radio messages, agricultural newspapers and bulletins. Extension workers use contact farmers as a method to pass on agricultural information to others farmers. A contact farmer could be a farmer who was interested in cattle farming, had a good reputation and regular contact with extension workers to obtain new information. Extension workers often combined contact farmers with discussion groups. Discussion group consisted of 10-20 farmers, all from one area, who meet at least once a month. All extension workers indicated that they use the discussion group method.

In comparison, farm visits were used by the extension worker as normal monthly visits to farmers and farms in their area. Farm visits were used mainly to keep extension

workers informed of the progress of work carried out by farmers and to assist them to plan for any problems that arise.

When asked which method was most effective, the respondents named contact farmer and discussion groups. Eight of ten extension workers from the Malaita province and nine out of ten extension workers from the Guadalcanal indicated that contact farmers was the most effective method used (Table 4.7). Discussion groups were reported to be the most effective by 20% of the Malaita province and 10% of the Guadalcanal extension workers.

Table 4.7: The Most Effective Extension Method (As percentage of n).

	Malaita	**Guadalcanal**	**Overall**
Extension Method	***n* = 10**	***n* = 20**	***n* = 30**
Contact farmer	80	90	87
Discussion groups	20	10	14

4.2.6 Extension Services for Animal Health

The majority (55%) of the extension workers indicated that no major diseases and parasites were experienced in the past. However, half of the respondents from the Malaita province were aware of infectious diseases in their areas, such as Bovine tuberculosis, Brucellosis abortus and pink-eye disease (Table 4.8). On the other hand, one third of the Guadalcanal province respondents had observed nutritional disorders in their area (Table 4.8). Nutritional disorders were reported to be associated with a lack of good quality pasture on most farms.

Furthermore, external and internal parasites were evident in the research areas of the Malaita and Guadalcanal provinces. The common external parasites were cattle and buffalo flies; internal parasites included intestinal worms which affected most farm

animals in the research areas. Eight of the 11 respondents from Guadalcanal indicated that external parasites were present in their areas. The majority of the respondents from the Malaita and Guadalcanal provinces revealed that diseases and parasites occurred on cattle all year around (Table 4.8).

Table 4.8: Animal Health Situation (As percentage of *n*).

Occurrence of diseases and parasites	Malaita	Guadalcanal	Overall
Disease	***n* = 11**	***n* = 20**	***n* = 31**
No record of disease	50	56	55
Infectious diseases	50	0	9
Nutritional disorders	0	33	27
Others	0	11	9
Parasites	***n* = 6**	***n* = 11**	***n* = 17**
No records of parasite	0	27	18
External parasite	67	73	70
Internal parasite	33	0	12
Disease occurrence seasons	***n* = 1**	***n* = 3**	***n* = 4**
All year round	100	67	75
Seasonal (wet & dry seasons)	0	33	25
Parasites occurrence seasons	***n* = 6**	***n* = 5**	***n* = 11**
All year round	50	20	36
Seasonal (wet & dry seasons)	50	80	64

Note: The numbers do not always add up to 100 because of multiple answers.

4.2.7 Types of Beef Cattle Breeds

The extension workers indicated that the main cross breeds of cattle in their areas included Solomon Islands Red, Brahmans, Herefords, Jersey and Santa Gertrudis. Originally these breeds were cross breeds of *Bos taurus* imported from Australia and

New Zealand. *Bos taurus* are European breeds, such as the Hereford, Shorthorn, or Jersey. *Bos indicus* is an Indian breed of cattle, e.g. Brahmans.

On the question of what percentage of cattle breeds existed in the survey areas, the results indicated that the Malaita province had around 73% of Solomon Islands Red x Brahmans and 27% of Brahmans x Santa Gertrudis. The Guadalcanal province had a herd with 60% Solomon Islands x Brahmans, 30% Brahmans x Santa Gertrudis, and 10% Solomon Islands Reds x Others (Table 4.9).

Table 4.9: Cattle Breeds in the Solomon Islands (As percentage of total herd numbers).

Types of Breeds	Malaita $n = 11$	Guadalcanal $n = 20$	Overall $n = 31$
Solomon Islands Red x Brahmans	73	60	65
Brahmans x Santa Gertrudis	27	30	29
Solomon Islands Red x Others	0	10	6

Table 4.10 indicates that natural breeding is the method commonly used, according to the extension workers. Natural breeding was common where bulls and cows were allowed to graze together without farmer supervision.

Table 4.10: Breeding Methods Adopted (As percentage of *n*).

Breeding Methods	Malaita	Guadalcanal	Overall
Natural breeding method	***n* = 11**	***n* = 18**	***n* = 29**
Yes	100	94	97
No	0	6	3
Inbreeding status	***n* = 11**	***n* = 18**	***n* = 29**
Yes	82	56	66
No	18	44	34
Artificial Insemination	***n* = 11**	***n* = 18**	***n* = 29**
Yes	0	17	9
No	100	83	91

All of the eleven extension workers from the Malaita province and 94% of those from the Guadalcanal indicated that natural breeding was commonly practised on most of the cattle farms (Table 4.10). Three extension workers from the Guadalcanal province, indicated that they performed artificial insemination on breeding cows. This was carried out at the Tenavatu farm in 1995 as part of the Government's breed improvement programme. Inbreeding was widespread on the farmers' farms. Around two-third of the extension workers of the Guadalcanal and Malaita provinces indicated that there exists inbreeding on most of the farms.

4.2.8 Marketing of Beef Cattle

Table 4.11 suggests that the average live-weight of cattle at slaughter from the Malaita and Guadalcanal provinces is around 290 kg. An average price for slaughtered beef cattle could cost S.I. $830 and $900, respectively in Malaita and Guadalcanal provinces. With such high price, extension workers expressed that it was cost prohibitive for farmers as consumers could not possibly afford.

Table 4.11: Beef Cattle Sale on Farms (1996): Average Weight and Cost.

Live-Weight Sales (kg)	Malaita	Guadalcanal	Overall
Minimum	247	275	262
Average	296	288	292
Maximum	494	448	470
Average cost/beef animal S.I. $	**830**	**900**	**872**

The extension workers also reported that there are two butcheries in Malaita, one operated by the Livestock Development Authority (LDA) and the other one operated by Iro and Sons. In Honiara on the Guadalcanal province, there were four butchery shops: Boronia butchery, Island, Honiara and M.S. Other beef products market outlets included the super-markets and small retailers in Honiara and Auki.

4.2.9 Factors Affecting Extension Workers' Impact

Extension workers revealed that there were inadequate support services for cattle farming. The constraining factors impacted on extension workers' efforts to assist cattle farmers were: transportation problems, poor marketing infrastructure, fewer tools and materials, and inadequate staff training (Table 4.12).

Table 4.12: Extension Workers' Constraints (As percent of *n*).

	Malaita	Guadalcanal	Overall
Support Services Input	***n* = 11**	***n* = 20**	***n* = 31**
Transport facilities	82	70	74
Marketing infrastructure	73	70	71
Tools and materials	36	40	38
Staff training	18	40	32

Table 4.13: Factors Identified for Improvement (As percentage of *n*).

Characteristics	Malaita *n* = 11	Guadalcanal *n* = 20	Overall *n* = 30
Extension workers' training	100	45	65
Financial support & incentives	82	35	52
Improve working conditions	73	50	58
Increase breeding herds	64	30	42
Rehabilitate existing projects	55	35	42
Agricultural information	28	0	10
Supportive resources	9	20	16
Use of artificial insemination	0	20	13

The extension workers identified eight key factors that were potentially important to facilitate beef cattle production in the Solomon Islands. All extension workers from the Malaita province and 45% of the extension workers in Guadalcanal indicated that their training in beef cattle production should improve. Eight of the extension workers from the Malaita, and ten from Guadalcanal indicated that improvement of their working conditions was also important.

Other factors that extension workers from the Malaita and Guadalcanal provinces identified for further improvement in their area included: (i) increase in breeding herds; (ii) financial support and incentives; and (iii) rehabilitation of existing projects and agricultural information (Table 4.13).

4.3 Cattle Farmers' Responses

Sections 4.3.1-4.3.11 present the results from the data obtained from the survey of forty-one cattle farmers of the Malaita and Guadalcanal Provinces. The results reflect their cattle farming status and their perceptions and views with respect to beef cattle production in their own area.

4.3.1 Smallholder Farm Characteristics

The first part of section 4.3 describes some aspects of the average cattle farm, such as farm production, marketing, farm finance, income and expenses. The second part describes farmers' perceptions about the extension services that were provided to the cattle industry in the research areas.

The smallholder sector in the Solomon Islands comprised of subsistence and semi-commercial farming in crops and livestock production (Table 4.14). Cattle farmers were also involved in other types of farming activities to provide cash income and food for their own consumption. Table 4.14 indicates that cattle farmers surveyed produced cashcrops, for example cocoa, coconut and vegetables, to supplement their income from cattle farming.

All but one farmer cultivated cocoa and three-fourth of the farmers cultivated coconut (Table 4.14). However, only one-fifth of the farmers produced foodcrops and less than 10% produced vegetables. In general, productivity (yield/ha) of all crops was low.

Table 4.14: Major Crop Areas and their Production (1995-1996) *(n = 41).*

Crops	No. of farmers	Mean Area (ha)	Mean Production (kg)	Average yield (kg/ha)
Cocoa	40	5.4	1,232	228
		(6.6)	(1,357)	(206)
Coconut	31	5.0	1,166	233
		(6.6)	(1,434)	(217)
Foodcrops	7	1.7	311	183
		(0.5)	(27)	(54)
Vegetables	3	1.7	375	221
		(0.60)	(250)	(417)

Figures in parathenses are standard deviations.

4.3.2 Composition of Cattle Number on Farms

Table 4.15 gives the average cattle numbers on an individual farm. On average, there were more female calves than male calves (6 to 1). The ratios of number of heifers compared to steers and cows to bulls were 7 to 1 and 11 to 12, respectively. This indicates that there is a shortage of bulls on most farms in the study areas. An average farm had 35 head of cattle (Table 4.15).

Table 4.15: Average Beef Cattle Numbers on Farm *(n = 41).*

Beef Cattle Class	No. of Farms with Beef Cattle Class	Average	Std Dev
Male calves	41	1.0	0.2
Female calves	27	6.0	3.0
Steers	32	8.0	8.0
Heifers	35	7.0	6.0
Cows	34	11.0	11.0
Bulls	37	2.0	1.0
Total		**35.0**	

4.3.3 Small Livestock

The number of poultry birds and pigs on an average farm were 42 and 7, respectively (Table 4.16). Small livestock was another source of farmer income which supplemented the income derived from beef cattle farming. The respondents from the study areas indicated that these poultry birds and pigs were raised mainly for home consumption. However, recent interest in commercial poultry and piggery farming has encouraged farmers to expand their small livestock farming. One-third of the respondents raised poultry birds and half of the respondents reared pigs along with beef cattle production (Table 4.16).

Table 4.16: Average Small Livestock Number on Farm *(n = 41).*

Small Livestock	Number of farms	Mean	Std Dev
Poultry	15	42	86
Pigs	21	7	4

4.3.4 Factors of Concern for Cattle Farmers

Farmers faced several constraints in beef cattle production. These constraints included shortage of productive stock, inadequate pasture, limited land for grazing, poor community support for the enterprise, unavailability of farm labour, weed problems, and high cost of weaners (Table 4.17). Shortage of good stock and inadequate land for grazing were the two dominant factors affecting beef cattle production.

Table 4.17: Factors of Concern to Beef Cattle Farmers *(n = 41).*

Farm Factors	Percentage of Respondents
Stock shortage	78
Grazing land limitation	51
Inadequate pasture	44
Lack of community support	42
Lack of labour	37
Weed problems	34
Expensive weaners	12

4.3.5 Sources of Farm Finance

One of the major constraints indicated by respondents was the lack of continuous financial support due to the fact that subsidy scheme and DBSI loans were limited or sametimes even inaccessible to the respondents. The respondents reported getting sufficient that farm finance was a major problem for farmers and that it affected the recent developments of the beef cattle industry.

The respondents also revealed that the DBSI's agricultural loans were more focused towards providing loans for enterprises other than beef cattle farming. The results suggest that many farmers managed to obtain working capital for cattle projects

through their own savings, and that DBSI loans are for many farmers still an important source of finance (Table 4.18).

Table 4.18: Finance obtained by Beef Farmers (1996) *(n = 41).*

Types of Finance	No. of Respondents	Mean (S.I. $)	Std Dev
Farmers savings	33	4,887	3,994
Members' shares	5	1,312	1,592
Subsidy	19	602	1,074
Farm grant	11	555	540
DBSI loans	26	9,077	1,038

Twenty-six respondents received DBSI loans, which provided them with an average of (S.I. $9,077 for their cattle projects (Table 4.18). These loans were used mainly for materials, equipment, tools and to purchase livestock. The savings (S.I. $4,887 per household) from other income generating activities could be used as source of finance to assist farmers with a start of their cattle projects. The loans repayment performance was not investigated and could be a topic for future research.

4.3.6 Farmer Income and Expenses

The respondents, like in many other developing countries, did not keep formal records on income and expenses. An assessment of income and expenses suggests that the main sources of farmers' income are their agricultural activities, such as beef cattle, coconut, cocoa, vegetables, foodcrops, pigs and poultry farming. The average income from beef cattle farming in 1996 was estimated around S.I $6,492 (30% of total income). Coconut and cocoa (S.I. $2,233 and $1,636) were the second important sources of farmers' annual income, respectively.

Although many respondents produced vegetables, this only contributed S.I. $591 towards their annual household income. Five farmers had income from a job with a fixed salary (mean S.I. $5,020), while 26 of 41 respondents earned an income from skilled or unskilled labour employment (Table 4.19). The respondents' earnings from these skilled and unskilled labour included jobs such as, carpentry, furniture making and vehicles repairs.

Table 4.19: Sources of household income (1996) ***(n = 38).***

Source of Income	No. of Respondents	Mean (S.I. $)	Std Dev
Foodcrops	35	860	993
Vegetable	31	591	1,111
Coconut	25	2,233	2,338
Cocoa	31	1,636	1,622
Beef cattle	38	6,492	7,636
Pig	19	1,627	3,449
Poultry	20	409	668
Salary	5	5,020	3,078
Skill labour	9	2,067	2,057
Unskill labour	17	299	235
Others	8	519	545
Mean household income	**41**	**S.I. $1,095**	**S.I. $1,266**

The respondent household expenses included: (i) food consumption; (ii) social services (health and education); (iii) family expenses; (iv) farm inputs; and (v) durable assets (Table 4.20). Family expenses consisted of household goods, for example clothing or a contribution to social obligations. Durable assets were tools and equipment, such as a tractor, or a chainsaw, which were required on farm to carry out their farming activities. The survey results indicated that food consumption, social services, farm inputs and durable assets were leading expenditure items.

Table 4.20: Household Expenditure Incurred by the Beef Farmers *(n = 39).*

Expenses	No. of Respondents	Mean (S.I. $)	Std Dev
Food consumption	39	1,373	848
Social services	39	666	953
Family expenses	34	828	1,319
Farm inputs	36	1,546	2,436
Durable assets	13	6,274	11,475
Mean/household expenses	**41**	**S.I. $1,195**	**S.I. $1,717**

4.3.7 Farmer Perceptions of the Extension Services

Farmer perceptions on available agricultural extension services provided for the development of the beef cattle industry differed from those of the extension workers. The respondents felt that not enough support was given to the beef cattle industry since early 1980s for maintaining a high level of beef cattle production. This had encouraged farmers to abandon beef cattle farming to move into crop production. This scenario of not enough support provided by the extension services to the beef cattle farmers is illustrated by Table 4.21, which shows who farmers contact for advice on animal diseases. In 1996, farmers had an average of 13 contacts with nearby farmers, friends and others combined, compared to only 7 contacts made with the extension workers and veterinarians, respectively. Only one-fifth of the farmers used veterinarians in the study areas.

Table 4.21: Farmer Contacts for Technical Advice in 1996 *(n = 40).*

Contacts on Diseases	No. of Respondents	Mean	Std Dev
Farmers and friends	28	7.0	4.2
Extension workers	25	5.0	4.0
Veterinarians	8	2.4	1.0
Others	10	6.0	4.0

These contacts were important for farmers as they sought technical advice and information about improved methods of beef cattle production.

4.3.8 Extension Advisory Services

Table 4.22 outlines the main areas of advice that extension workers provided to the beef cattle farmers. Slightly more than half of the respondents indicated that the extension workers provided advice on project development and farm management, and 46% received some advice on herd and diseases management. Furthermore, 17 respondents indicated that they received advice from extension workers on pasture management, production and beef breeding. Only four of the 41 respondents reported that they received advice on credit and financial matters related to their beef cattle farming from the extension workers (Table 4.22).

Table 4.22: Advice from the Extension Workers (1996) *(n = 41).*

Main Areas of Advice	No. of Respondents	Percentage of Farmers
Project development and management	23	56
Herd and diseases management	19	46
Pasture management	17	42
Production and breeding	17	42
Credit and finance	4	10

4.3.9 Common Places for Farmers to Meet with Extension Workers

The study revealed that farmers met extension workers at different locations. However, meetings in the extension worker's office and on-farm visits by extension workers were common (Table 4.23).

An overwhelming majority of the respondents (90%) visited the Provincial Extension Services offices in towns, such as those in Auki and Honiara. It was interesting to find that one-fourth of the respondents met extension workers in local markets where farmers came to sell their foodcrops and vegetables. This avenue provided opportunities for them to meet with extension workers and discuss any problems associated with their farming activities. Other points of farmer-extension worker contact were demonstration farms (17%), training centres (17%) and shopping centres (5%).

Table 4.23: Farmer-Extension Worker Contacts *(n = 41)*.

Meeting Point	No. of Respondents	Percentage
Extension office	37	90
On-farm	33	81
Market places	10	24
Demonstration farms	7	17
Training centres	7	17
Shopping centres	2	5

4.3.10 Inadequate Institutional Support

The constraints outlined in Table 4.24 demonstrate of the lack of institutional support for beef cattle farming since the 1980s. Farmers were concerned about the effects of declining veterinary and animal health services, non-availability of agricultural loans,

lack of cattle transport, poor knowledge about improved methods of beef cattle farming, ineffective extension service, and lack of adequate beef cattle market outlets.

Table 4.24: Farmers Responses to the Lack of the Institutional Support *(n = 41).*

Institutional Attributes	Percentage of Respondents
Declining veterinary and animal health services	56
Non-availability of beef cattle loans	51
Lack of cattle transports	50
Poor knowledge about improved beef cattle farming methods	49
Ineffective extension service	46
Lack of adequate beef cattle market outlets	37

4.3.11 Correlation Coefficient Analysis

A correlation coefficient analysis was carried out to examine bivariate relationships amongst key variables associated with beef cattle farming. These included: (a) constraints faced by the respondents and farm attributes; (b) extension service and farm attributes; (c) production policy and improvement factors; and (d) marketing and production attributes.

Table 4.25 indicates that the good market price was positively associated with access to livestock (stock shortage) ($r = 0.51$, $P< 0.01$). This reflected market environment at the time of survey. However, the number of female calves were negatively associated with the shortage of livestock ($P< 0.05$). A modest positive association was found between herd size and grazing land available ($r = 0.32$, $P< 0.1$). On the other hand, farmers with limited grazing land also had less loan available ($r = 0.41$, $P< 0.01$), but farms with more number of female calves also had less loan available. Larger cattle area and loan for beef cattle farming were positively correlated ($r = 0.54$, $P< 0.05$).

A weak positive association was found between farmers interest in beef cattle farming and herd size (r = 0.32, P< 0.1).

Table 4.25: Relationships between Cattle Constraints in Beef Cattle Farming and Farm Attributes.

	Farming Attributes				
Constraint Factors	Good price	Herd size	Less loans	Female calves	Cattle area
Stock shortage	0.51 ***	-0.05 ns	0.32 **	-0.48 **	-0.19 ns
Limited land	0.12 ns	0.32 *	0.41 ***	-0.35 *	0.01 ns
Management	0.27 ns	0.08 ns	0.29 *	0.27 ns	0.49 *
Less loans	0.23 ns	0.33 *	1.00 ns	-0.40 **	0.08 ns
Beef loans	-0.01 ns	0.07 ns	0.21 ns	-0.09 ns	0.54 **
Farmer interest	0.15 ns	0.32 *	0.18 ns	0.35 ns	0.06 ns

Note: ***, ** and * denotes significant bivariate relationship at 1, 5 and 10%, respectively.

Table 4.26 indicates that market outlet was negatively associated with the lack of livestock programmes (r = -0.34, P< 0.05). A positive association was found between available labour for beef cattle farming and markets (r = 0.29, P< 0.1), which implies that farm labour was not a problem for farmers with access to markets. Lack of tangible livestock programmes was negatively correlated with labour availability (r = -0.33, P< 0.05), and positively associated between weed control on farming (r = 0.31, P< 0.05). A positive association was found between less loans available for beef cattle farming and weed control (r = 0. 37, P< 0.05), suggesting loans subsidised cost of production. The result implies that the respondents did not have employment opportunity in beef cattle farming in absence of long-term government programmes and farmers had to presumably incur higher costs for weed control on their farms (r = 0.32, P< 0.05).

Table 4.26: Bivariate Relationships amongst Selected Beef Cattle Farming.

Farm Attributes	No programme	Labour	Weed control
Market outlet	-0.34 **	0.29 *	0.07 ns
Govt support	-0.27 *	0.10 ns	0.32 **
No programme	1.00 ns	-0.33 **	0.31**
Less loans	-0.21 ns	0.19 ns	0.37 **
Overstock	0.11 ns	-0.05 ns	0.07 ns

A strong and positive association was found between beef cattle production and number of steers (r = 0.94, P< 0.01) (Table 4.27). Similarly, a moderate and positive correlation was found between overstocking and beef cattle production attributes (r = 0.48, P< 0.01), implying under-utilisation of land available for grazing. There was also a positive association between market outlet for beef cattle and production (r = 0.31, P< 0.05). The results suggests that market served as driving force behind production. Beef cattle farmers' interest and government support for beef cattle farming were also positively associated (r = 0.46, P< 0.01), suggesting a symbiotic relationship between the farmers and government programmes. Furthermore, a weak and positive association was found between farmers' interest in beef cattle farming and market outlet for beef cattle farming (r = 0.32, o.30, P< 0.1).

Table 4.27: Bivariate Association amongst Production Policy and Improvement.

Improvement Factors	Cattle production	Overstock	Farmer interest in beef cattle farming	Market availability
No.of Steer	0.94 ***	-0.20 ns	-0.18 ns	-0.28 ns
Production	-0.19 ns	0.48 ***	-0.15 ns	0.31 **
Gov't support	-0.22 ns	0.24 ns	0.46 ***	0.18 ns
No. of cow	-0.13 ns	0.13 ns	0.32 *	0.30 *

The results in Table 4.28 indicates that cattle area was positively associated with the management of grazing land. The results suggests that large grazing cattle area was relatively better managed (r = 0.50, P< 0.1). The management of grazing land tended to be weak when demand for beef cattle was higher (r = -0.40, P< 0.05). However, the management was better on farms closer to the market (r = 0.34, P< 0.05). A positive association was found between improvement of beef cattle production and market outlet for beef cattle (r = 0.40, P< 0.05). However, a weak but positive correlation was found between farmers interest in beef cattle and market outlet (r = 0.26, P< 0.1).

Beef cattle improvement was positively associated with market outlet (r = 0.30, P< 0.05). In addition, the relationship between herd improvement advice and market outlet for beef cattle farming was found to be weak and negatively associated (r = -0.27, P< 0.1). Finally, a weak, but positive association was found between the management attributes of beef cattle farming and the Livestock Development Authority (LDA) (r = 0.27, P< 0.1). The result suggests that the LDA played important role in the overall management of beef cattle farms.

Table 4.28: Relationships between Marketing and Production Attributes.

Production Attributes	Farmer interest in beef cattle farming	Management of grazing land	Improvement of beef cattle production	Herd advice
Cattle area	0.06 ns	0.50 *	-0.07 ns	0.02 ns
Demand	0.05 ns	-0.40 **	0.11 ns	0.01 ns
Beef market	-0.11	0.34 **	0.40 **	0.21 ns
Market outlet	0.26 *	0.04 ns	0.30 **	-0.27 *
LDA	-0.06 ns	0.27 *	0.25 ns	-0.05 ns

4.4 Conclusion

The purpose of this research was to identify the under-lining factors associated with the decline of the beef cattle industry in the Solomon Islands, and to suggest ways to improve this situation. The research was carried out in three steps: (a) interviews with key informants; (b) interviews with extension workers; and (c) interviews with beef cattle farmers.

The outcomes obtained from the key informant interviews, and the extension workers and farmer surveys, suggest that during 1980-1996 beef cattle numbers and farmer participation in the cattle industry has been declining. The declining trend of cattle numbers on farms was confirmed by both extension workers and beef cattle farmers in the study areas of the Malaita and Guadalcanal provinces.

The results of this study suggested that the knowledge and technology available for beef cattle farming were not well transferred to the farmers. Inadequate farm management skills and lack of working capital were two major factors contributing to decline in cattle numbers during the 1990s.

A major attribute that contributed to the beef cattle decline in the past ten years was the withdrawal of government incentives for beef cattle farming. On the other hand, government support schemes, such as the cattle farm grants and subsidies, created dependence of farmers on government support. Also, farmers have switched their interest away from cattle farming to other enterprises because of good returns and government support for these enterprises.

This study also revealed that the cattle industry and farmers have lacked the support of the extension services, which included the LDA and DBSI, in the late 1980s -1990s. As a result, farmers changed from beef cattle farming to crop production.

On-farm constraints also contributed towards the loss of farmer interest and the decline of cattle numbers since 1980. These factors included: (a) low return from farmers cattle sales during the 1980s; (b) poor farm management skills; (c) grazing land limitations and disputes among farmers about land use; (d) poor pasture quality on most of the farms; and (e) inadequate farms access to market outlet. Furthermore, the results indicated that there was no development programme to direct extension workers' efforts after 1986 in strengthening beef cattle production system. Extension workers were not well equipped in order that further progress and assistance could be offered to farmers during these changes in the Government's priorities and policies. The research suggests that with proper diagnostic measures, the beef cattle industry in the Solomon Islands could possibly be revived.

CHAPTER FIVE: SUMMARY AND RECOMMENDATIONS

5.0 Introduction

Although the beef cattle industry has been declining over the past ten years, it still plays an important role for the total food production in the Solomon Islands. Other significant roles of beef cattle farming are: generating cash income and employment; controlling weeds in the coconut plantations; providing a cheap source of fertilisers; and having the potential to use beef cattle as draught animals. Livestock, including beef cattle, constitute an important component of the Solomon Islands' agricultural economy. The research suggests that there is room for improvement of the beef cattle industry in the Solomon Islands. The main objectives of the study were: (i) to identify the factors that caused the decline in beef cattle production in the Solomon Islands; (ii) to find ways to improve farmer participation in beef cattle production; and (iii) to recommend strategies that might revitalise beef cattle production in the Solomon Islands.

This chapter summarised the main findings of the study, draws conclusions and presents recommendations. First of all, this study focused on the constraints affecting the beef cattle industry and the possibilities to retain farmer participation. It examined the extension services provided to beef cattle development in the past ten years. This included determining the alternative potential use of cattle and its integration with other socio-economic activities in the Solomon Islands.

5.1 Chapter Overview

The summary of the outcomes of this study are discussed in Section 5.2. Section 5.3 describes the recommendations for the beef cattle industry and Section 5.4 identified areas for further study. Finally, Section 5.5 summarised the conclusions of this chapter.

5.2 Attributes of the Beef Cattle Sector's Decline

From the results obtained, the following main attributes that contributed to the decline of the beef cattle industry in the Solomon Islands have been identified: (a) a shift of farmer interest away from beef cattle; (b) fewer of the large commercial cattle farms; (c) limited farmer knowledge on new technology; (d) poor farm and herd management; (e) a lack of extension support services; (f) poor marketing infrastructures; (g) poor beef cattle transportation; (h) inefficient beef cattle pricing; (i) land ownership constraints; and (j) dependence on the government for subsidies/incentives. The following sections discuss these attributes.

5.2.1 A Shift of Farmer Interest away from Beef Cattle Farming

The lack of farmer interest in beef cattle farming over the last ten years contributed significantly to the declining situation in the cattle industry, as the surveys of the extension workers and farmers have shown. Factors such as low beef cattle prices compared to those of cocoa and spice crops, and land limitations and disputes over farm ownership of customary land, have contributed to this lack of farmer interest.

Also, the past livestock programmes which aimed to achieve 80,000 cattle heads in 1981-1983 and to establish a meat cannery, were not successful (Osborne, 1979). This was because farmers were not producing enough beef cattle to meet government's plan. Smallholders did not have the required resources and abilities to adopt the new ideas and technology of raising beef cattle as expected within that short time frame set up with foreign aid assistance. Planning was not based on farmers' needs.

Generally, the programmes on livestock development did not fully understand what farmers needed in order to implement policies which are conducive and lasting for farmers (Timon, 1993). The production from smallholders farms was unreliable and very sensitive to price changes. Therefore, as a result, farmers within the surveyed areas often shifted to crop production when beef cattle prices were unfavourable.

5.2.2 Fewer of the Large Commercial Cattle Farms

One of the common factors that emerged from the study was the lack of beef cattle breeding stock, bulls and cows, on smallholder and large scale farms. The low stock numbers on large scale farms in the 1980s contributed significantly to this. The study recognised that the large plantation sector is ideal for increasing the national herd, in order to make breeding stock available to the smaller farmers.

In past livestock programmes, the private commercial companies such as the Levers Pacific Plantation Limited, were not supported with government incentives to maintain high beef cattle production. Therefore, the government had little control on their own beef cattle operations. For example, from 1985 and onwards the Levers Pacific Plantation Limited (LPPL) diverted most of its beef cattle farm areas into cocoa and coconut plantations (Cattle 2000, 1994). The company's large cattle herd at the Lungga farm and areas on the Russell Islands were destocked in order to plant cocoa and coconut trees. This massive decrease in the LPPL cattle numbers has contributed towards the decline of the national herd.

In contrast, the large scale farms owned by Solomon Islanders had not been performing well, even though they were supported with the government incentives. For example, the cattle farm grants and subsidies were given to large community farms, such as the Eliote community cattle project and the Masupa cattle farm in the Malaita province. All of these large scale farms had been abandoned, because of poor leadership and lack of farm management skills.

5.2.3 Limited Farmer Knowledge on New Technology

Direct transfer of technology and knowledge, from developed countries to developing countries, to achieve self-sufficiency in livestock production, often has negative effects on the producers and the industry in the longer term (Qureshi, 1993). Planners did not

understand the traditional situation well, enough to assess if the technology imported was suitable for the local socio-economic settings.

Limited farmer knowledge of new technologies and methods of raising beef cattle, has frustrated further progress in the overall livestock development. For example, some of the beef cattle farmers did not adopt the steer tethering method and did not understand the LDA's in-kind lending policy. Farmers felt that they required more of the extension advisory services so that they could adopt new ideas and changes. New concepts and technologies had to be first put into farmers' context of understanding before they were adopted.

The study has recognised that it is fundamental for farmers to clarify their objectives for keeping livestock. In the commercial sectors objectives were often clear and constraints therefore relatively easy to identify and correct (Mack and Fernandez-Baca, 1993).

The role of extension workers in "translating" new information and technology into the farmers' context is very important for the development of the beef cattle industry (Blackburn, 1989). The reported 7 to 9 contacts of farmers with extension workers in a year is inadequate to bring about major changes on smallholder beef cattle farming.

5.2.4 Poor Farm and Herd Management

The main grazing methods used by farmers in the Solomon Islands are continuous and rotational grazing. Continuous grazing is characterised by allowing cattle to graze on large pastoral areas, without sub-dividing the paddocks. This system resulted in over-grazing of pasture and caused inbreeding amongst the herd. On contrast, the rotational grazing system is used by sub-dividing the paddocks, which gave much more control over grazing management. As revealed from the study, 34% of the farmers had weed problems on their farms. And, although 95% of the surveyed farmers used improved pasture, most areas were still occupied with shrubs and native grasses.

The results indicated that smallholders were not managing their farms as well as they could in the previous years. For example, many beef cattle projects were abandoned in the late 1980s and early 1990s. As a result of poor farm and herd management, cattle sometimes got out of farmers' control and caused problems on other people's properties. Also cattle from unattended projects had gone wild, which reflected farmers' lack of management skills in beef cattle farming.

5.2.5 Lack of the Extension Support Services

The study found that government extension services and support for maintaining the level of cattle production, after the financial support and foreign aid assistance were withdrawn at the end of the livestock programmes. This created a major problem for farmers who did not plan for this withdrawal, a factor contributed to the industry's decline. In fact, since 1986 the financial support from the extension services has concentrated on revitalising coconut and cocoa production (Cattle 2000, 1994).

The study also revealed that the decentralisation programme of the extension services into the provinces during the 1980s, without any central funding support system, contributed towards the decline of farmer interest in beef cattle compared to commercial crop production. There was no source of local funds to fill the gap left when the foreign aids' financial support was withdrawn. Also the results indicated that the transfer of new research findings on beef cattle development did not reach farmers (Mack and Fernandez-Baca, 1993). As a result, most farmers perceived beef cattle farming as an uneconomical farming activity.

5.2.6 Lack of Marketing Infrastructures

The Livestock Development Authority's (LDA) reduction of marketing services for farmers in distant provinces also affected farmers' interest in beef cattle farming. For example, the reduction of provincial cattle holding grounds for marketing and transportation of beef cattle, and fewer butchery retailers and no inter-islands cattle transport systems collectively contributed to the critical stage of the cattle industry.

The LDA's past services of beef cattle purchasing and transportation from the provinces to the central abattoir in Honiara had ceased, because of lack of financial and management problems.

Decreased farmers access to sell beef cattle through the LDA's services forced most of farmers to arrange their own markets within their own areas. For example, farmers around Auki sold locally to the LDA, and Iro and Sons butcheries on an individual basis, whenever they required money.

5.2.7 Poor Beef Cattle Transportation

The study made it clear that one of the serious problems faced by farmers was cattle transportation to and from farms to the market outlets in the research areas. Farmers' responses indicated that the LDA's reduction of transportation services for cattle from the provinces had its effects on the farms. Farmers were not able to sell cattle to LDA and found difficulty in replacing their stocks, which resulted in increased inbreeding on smallholder projects. Also, in order to utilise the potential land areas which were identified for large scale cattle farming in the provinces, a transportation system for market purposes is important.

5.2.8 Inefficient Beef Cattle Pricing

Beef prices at local markets were quite high compared to the LDA prices in the rural areas. Farmers could decide by themselves when they wanted to sell beef cattle in their areas.

It became clear from the key informant interviews that farmers were concerned over the poor pricing and payment system used by the Livestock Development Authority in the past. This system included collecting beef cattle on the farms and paying for them later from the head office in Honiara. This caused serious delays for farmers, which contributed towards the shift in farmers' interest, away from cattle farming to other sources of income. The study also showed that local prices for beef cattle were high

and there was no control over them by the Livestock Development Authority. These prices also affected other smallholder farmers who wanted to start beef cattle farming because they could not afford the higher prices for buying stock.

5.2.9 Land Ownership Constraints

There are two types of land tenure systems in the Solomon Islands; customary and leasehold. Leasehold land is mainly used by private companies, for example, the Levers Pacific Plantation limited (LPPL). However, the majority of the smallholder farms were established on customary land. One of the common characteristics of the customary land ownership is that no individual person or group owns the land. Customary land in the Solomon Islands was owned by tribes and rural communities. Each individual person in a tribe, however is entitled to use customary land to provide food for their own consumption.

However, extension workers were cautious about cash generated projects that were established on customary lands, because they required farmers to go through a long process of consultation with other tribal members to get their approval. This resulted in long delays for cash generated projects to eventuate. Therefore, extension workers reiterated that registered land had advantages over customary land for development projects, because registered land is more secure and is less likely to create land disputes.

5.2.10 Dependence on the Government for Subsidies/Incentives

An trend that emerged from the study was that farmers have developed an attitude of waiting for financed programmes. The attitude of depending on aided projects made farmers reliant on financed/subsidised programmes for most of the times, rather than doing things by themselves. This observation was obvious from the extension workers and farmers' responses to the surveys. The results indicated that beef cattle farmers were not prepared for the termination of the cattle farm grants and government subsidies during the 1980s. Many of the farmers were expecting similar project funds

to continue after the 1984 termination of cattle farm grants and subsidies for farmers. The dependence on foreign assistance for the agricultural sector remains an on-going problem.

Farmers seemed not understand the whole concept of foreign aid because many had thought of it as an input which was easy to acquire and that would continue. The idea of getting "easy money" from the government had lasting effects on farmers over the years. Instead of looking for economic viable options in the market place, farmers tended to look for the government for financial incentives.

5.3 Recommendations

As a result of this study the following strategies are recommended to increase beef cattle production and retain farmer participation in the cattle industry in the Solomon Islands: (a) strengthening of farmers training institutions; (b) strengthening of the extension services; (c) rehabilitation of the smallholder projects; (d) pasture improvement; (e) improvement of the national herd; (f) improvement of beef cattle marketing services; (g) improvement of the credit facilities to farmers; and (h) monitoring of the beef cattle revitalisation programmes.

5.3.1 Strengthening of the Training Institutions

Training of extension workers is an important facet of the whole extension system that is supposed to provide the necessary knowledge and up-to-date information for farmers who are involved in beef cattle farming. In the past years, the industry has experienced a lack of trained personnel to respond to farmers' demand for their service.

It is recommended that the Ministry of Agriculture and Fisheries (MAF) should increase the in-service training for the extension workers from the provincial extension services with specific courses, such as in farm management, animal health and diseases control.

As revealed throughout this study, in the past little attention was given to farmer training in beef cattle management. In order to increase farmers' understanding and interest in cattle production, training is necessary for farmers, which should enhance further opportunities for opening up new areas for cattle development.

One of the steps recommended for the Provincial Extension Services and the Ministry of Agriculture and Fisheries (MAF) is to improve the provincial training centres, which were established for farmers and extension workers training. These training centres are used for training farmers and to disseminate new research findings and information. Likewise the Solomon Islands government should increase training opportunity for extension workers at the Solomon Islands College of Higher Education (SICHE) and as well in overseas institutions.

5.3.2 Strengthening of the Extension Services

The extension services should be strengthened to effectively carry out the beef cattle and small livestock programmes, as identified in 1994. As this study indicated, due to lack of funds and resources such as transport facilities, extension workers could not carry out the required jobs to assist beef cattle farmers. Therefore, the government should provide further financial support, training and resources required for better functioning of the extension services.

5.3.3 Rehabilitation of the Smallholder Projects

Smallholder sectors played an important role in the past development of the cattle industry. Therefore, this study recommends to continue assisting smallholder farmers until they are more confident and can consolidate beef cattle production on their farms.

Any revitalisation programme should first recognise farmers' interests and needs because in many occasions in the past externally funded programmes have overlooked farmers interests. Programme designers should consult farmers first about any projects which requires them to participate. An appropriate size of cattle projects for

smallholders is within the range of 12-50 ha, which could be managed with their limited resources.

Along with revitalising the small scale beef cattle industry, new areas should be identified and developed to increase the present herd numbers. This study recommends that there should be more promotion to increase the awareness of farmers on the government plans for the cattle industry for the next years.

The government plans to develop group ranches for beef cattle farms on customary land should be studied in great detail, and land owners and farmers involved should be allowed to make their own decisions. This should help solving the problems that may arise within the groups.

5.3.4 Pasture Improvement

Low pasture quality and availability on most of the projects in the Solomon Islands are important factors that hinder higher beef cattle production. In order to retain farmers interest and reach higher production, it is recommended that farmers should use good quality and improved pastures. A mixture planting of legumes and improved grasses is important for the health and growth of the animals. It is recommended that the Ministry of Agriculture and Fisheries and the Provincial Agricultural Extension Services should organise further training for farmers on pasture management and animal husbandry. Farmer training in pasture management should provide an opportunity for them to manage their pasture on the farms and have a sufficient knowledge on farm animal husbandry.

5.3.5 Improvement of the National Herd

Further improvement of the national herd at Tenavatu farm on the Guadalcanal province should strengthen the breeding programme which has recently been implemented through the cattle industry's revitalisation plan of 1994. The national herd, which is being improved by importing breeds from Australia and through the use

of artificial insemination (A.I.), should served as the central point of distribution of improve progenies to smallholder farms.

Similar multiplication and distribution centres should be established in the major cattle production areas in the provinces. Farmers will use the new improved breeds of cattle that are produced from the provincial centres. Financially, the Solomon Islands government should continue to support such establishments for provincial farmers.

5.3.6 Improvement of the Beef Cattle Marketing Services

Further support services for the marketing of beef products is necessary, and they should be provided closer to the farms. The newly formed Livestock Corporation Limited, which has taken over the functions of LDA in 1996, should strengthen the marketing network at provinces and farm levels. Support for beef cattle marketing in the rural areas, such as local butcheries, holding grounds, slaughter places, abattoirs and cattle trucks, should be provided to the agencies that facilitate these services at the local level.

5.3 7 Improvement of the Credit Facilities to Farmers

As indicated earlier, lack of credit facilities for farmers is one of the constraints that inhibited low cattle production. The existing financing schemes, whether from the government or from private organisations such as the DBSI, should provide financial inputs to all cattle development sectors, whether subsistence and commercial. There exists a need for liaison and consultation between the Extension Services, LDA and DBSI for monitoring of the implementation of the beef cattle and small livestock programmes.

Similarly, the DBSI's lending policy on beef cattle development should be more flexible for cattle farmers to acquire adequate funds for their farms rehabilitation. The DBSI's lending policy has no favoured providing loans for beef cattle farming, because

of its declining situation. The DBSI should liaise with each Provincial Government to form a credit network system for rural farmers to loan money for farming.

5.3.8 Monitoring of the Beef Cattle Revitalisation Programmes

The study recommends that a management group should be established to monitor and evaluate the progress of the beef cattle revitalisation programmes which started in 1994. This management group should monitor the progress of the Livestock Corporation Limited (LCL) which is carrying out the responsibilities of the production and marketing of beef cattle industry. It should identify problems and adjust for a better implementation of the revitalisation programmes.

5.4 Further Research Areas

This study has identified an number of areas for future studies.

5.4.1 Government Subsidies

Research should be carried out on farmers involvement and commitment in the government funded livestock programmes, and their impact on the farming community. It should look into how farmers could best use subsidy schemes, and it should study farm planning and the management of farm finance.

5.4.2 Export of Frozen Beef Products

Further investigation of exporting frozen beef within the Pacific Region should be carried out. This study should look into the possible trade opportunities with neighbouring countries such as Fiji, Vanuatu and Papua New Guinea. This should establish baseline information for the future expansion of the beef cattle, and other small livestock industries.

5.4.3 Dairy Farming

The potential use of cattle for dairy farming should be investigated in areas which are close to towns where transport and local markets are available. Farmers who could venture into dairy farming should be identified and provided with the support and inputs which are required for initial and on-going establishment. Nucleus dairy units should be established by producers around Honiara and Auki, to supply liquid milk for the town population.

5.4.4 Cattle as Draught Animals

The use of cattle as draught animal could play an important role for the transportation needs of individual farmers. In the coconut plantations, draught animals could be an option for transporting heavy loads of copra. Also the use of draught animals in tilling the land could benefit farmers on flat lands such as the Guadalcanal Plains. Farmers could cultivate their land with the use of beef cattle as draught animals.

Further research should be carried out on the use of beef cattle, because of its potential for use as draught animals. Any research in such an area should investigate technologies which are suitable and adaptable to the Solomon Islands farming environment.

5.5 Conclusion

In conclusion, this study suggests that the Solomon Islands' livestock producers, including beef cattle farmers could achieve self-sufficiency and become more commercialised in the future, if all efforts are combined to revitalise the beef cattle industry. It is important to strengthen the Extension Services at both the National and Provincial levels. As recommended training extension workers is also important, because they provide new ideas and knowledge to farmers which could generate further interest for beef cattle farming.

Farmer training in pasture and herd management also plays an important role in order to revitalise the existing cattle projects or develop new areas. Other recommendations include, improving and increasing the national herd, support marketing services, loans to cattle farmers, and monitoring and evaluation of projects.

Finally, any consideration to undertake the recommended strategies in this study depends on the Solomon Islands Government's policies and priorities towards the beef cattle and small livestock industry in the future.

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APPENDICES

Appendix 1: Key Issues for Key Informants' Interviews

Extension Services Support

Extension Services goals and objectives

Existing extension services' programme for the cattle industry

Centralisation of the extension services

Perceptions on farmers' participation in cattle farming

Effects of agricultural extension services on cattle farming

Social factors

Social obligation and problems on farms

Land ownership - individuals and community

Land owners' consents

Individuals and family projects

Community and large scale commercial farms

Land disputes

Co-operative farms

Land use for cattle production

Economical factors

Perception on the viability of beef farming

Government schemes- subsidy benefits

Economical factors to the decline of beef cattle

Where farmers start, e.g. capital

Loan applications and conditions

Farmers' loans and repayments

Cattle prices - are they appropriate

Market outlets from local suppliers

Extension support services

Technology transfers

Improved breeds and artificial insemination

Support services from the Ministry (MAF)

Number of extension workers in proportion to farmers

Ways of reaching farmers/farmer knowledge

Research findings to farmers

Programme objectives

Revitalising of the cattle industry

Farmers' attitudes towards cattle farming

Cattle loan application and farmers' attitudes

Beef production number

Number of beef cattle on farms

Trend of cattle number and farmer participation - increasing/decreasing

Land areas for cattle production

Technology and Support Services

Overseas assistance - what are they?

Government policy on livestock development - what is it like?

Transfer of new findings - who does this?

Views on the LDA functions to meet the marketing of livestock

Problems associated with increase of cattle production

Farmers' training in animal husbandry

LDA's Services on production and marketing

Marketing facilities for cattle production

Farmers' participation and alternative ways to improve beef farming

Use of improve breeds in cattle farming

LDA's Support Services

Cattle payments systems - Farm gate prices

Transport facilities and arrangement of cattle sales

Existing improvement programmes to farmers

Extension services

Livestock division and co-ordination with LDA

Financial Supports

Perception on farmers attitudes to this issues

Major problems with cattle loan projects

DBSI lending policies and conditions on cattle projects

Economical viability of cattle projects

Farmers' problems with cattle loans

Strategies to resolve loan problems with farmers

Viability of cattle projects

Loan conditions and approvals

Loan follow-ups

Communal Approach

Farmers and community attitudes towards cattle farming
Land disputes on cattle projects
Social obligations to misuse loans
Extension support services to loan projects
Markets and transport services to farmers
Use of government subsidies

Perception on marketing facilities

Beef supplies to butchery shops
Demand for beef meat consumption
Problems experienced on retailing beef meat
Financial supports from financial institutions

Improvements for the Cattle Industry

Strategies for cattle improvements
Cattle farms and marketing facilities
Marketing and transportation systems
Extension services at provincial levels
Identify livestock revitalisation programme
Animal health problems in the provinces
Staff training

Cattle Farm Situation

Cattle numbers and herd size (increasing/declining/constant)
Causes of cattle declining situation in the Solomon Islands
Farmers interest and farm ownership

Farmers' management skills

Extension workers' visits

Systems of beef production

Provincial Government

Provincial government's policy on agriculture

Distribution of extension workers

Allocations of provincial resources on agricultural development

Breeding herds and benefits to beef farmers

Problems of the cattle farms in the provinces

Appendix 2: Extension Workers Survey Questionnaire

MASSEY UNIVERSITY

Department of Agricultural and Horticultural

Systems Management

A SURVEY OF AGRICULTURAL EXTENSION WORKERS IN THE SOLOMON ISLANDS (May - June 1996).

A. Background Information

1. **Province**: _____ 2. **Ward**:_____

3. Name: **Mr/ Mrs/Miss** *(Circle)* _____

4. Your relationship to the head of the household _____

5. How old were you on your last birthday ? ☐ **Years**

6. Please state your highest educational qualification _____

7. Please specify any other courses you have completed _____

8. What is your job title ?.....

9. How long have you been in your present occupation ☐ **Years**

B. Extension Work Load

Please indicate your responsibility as an extension worker with the following information.

1. Approximate number of farmer households you visit in a month ☐

2. Approximate number of beef cattle you examine or treat in a month ☐

3. Approximate number of other l ivestock you examine or treat in a month ☐

C. Beef Cattle Situation

1. Approximate number of beef cattle in your area ☐ **cattle**

2. The most distant beef cattle farmers you visit ☐ **km away**

3. Average number of beef cattle herd size per household ☐ **cattle**

4. Please indicate the trend in cattle population in your area in the last five years.

(please circle)

1	2	3
increasing	**constant**	**decreasing**

5. Are farmers still interested in beef cattle farming in your area ? ***(please tick)***

Yes ☐ **No** ☐

6. Please state reasons why farmers are interested/not interested in beef cattle farming?

.....

.....

7. What are the prominent beef cattle diseases prevalent in your area ? ***(please rank 1 (most prevalent) to 5 (least prevalent)***

Disease	**Prevalence** ***(rank 1 to 5)***	**season/month**
(a) _____	(a1) _____	(a2) _____
(b) _____	(b1) _____	(b2) _____
(c) _____	(c1) _____	(c2) _____
(d) _____	(d1) _____	(d2) _____

8. What are the prominent parasites in beef cattle in your area ?

(please rank 1 = most prevalence to 5 = least prevalence)

Parasite	**Prevalence** ***(rank 1 to 5)***	**season/month**
(a) _____	(a1) _____	(a2) _____
(b) _____	(b1) _____	(b2) _____
(c) _____	(c1) _____	(c2) _____
(d) _____	(d1) _____	(d2) _____

D. Extension Service

1. What extension methods do you use in your area ? ***(please tick)***

(a) Contact farmer	☐	(e) Radio	☐
(b) farm visit	☐	(f) Newspaper	☐
(c) Discussion group	☐	(g) Others	☐
(d)Bulletin	☐		

2. Which method(s) is/are most effective in disseminatinginformation ?

_____

_____

3. Please give examples of the most common "extension messages" you deliver ?

(a) .....

(b) .....

(c) .....

(d) .....

4. How far is the veterinary clinic from the most distant community in your area ?

☐ **km** ☐ **hours walk**

(a) Are medicines available at the vet. clinics ? **Yes** ☐ **No** ☐

(b) If medicines are not available at the vet clinics, how far do farmers have to travel ?

☐ **hrs/**☐ **km**

5. When you are visiting beef cattle farmers, do you provide medicines ?

(please tick) **Yes** ☐ **No** ☐

6. If medicines are available, are they free ? **Yes** ☐ **No** ☐

(a) How much do you ***charge per treatment*** of an animal ?

Types of treatment	**Charge (S.I. $)**
(a)	(a1) ☐
(b)	(b1) ☐
(c)	(c1) ☐

7. On average, how many farmers usually would attend your extension programme such as:

	No. of farmers
(a) Field days	☐
(b) Method demonstrations	☐
(c) Discussion groups	☐
(d) Training sessions	☐
(e) Other event	☐

8. Who prepares extension programme for beef cattle ?

(please tick)

(a) Provincial Extension Department ☐

(b) Livestock Department ☐

(c) Farmers groups ☐

(d) Other govt agencies ☐

9. Are you consulted for extension programme preparation ?

Yes ☐ **No** ☐

10. How often do you have to make a written report ?

every ☐ **months /wks** ***(please tick month /wk)***

11. How do you select farmers for training ? **please explain**

.....

.....

12. What percentage of beef cattle farmers have borrowed money from bank ? ☐ %

13. Is credit for beef cattle farming easily available ? ***(please tick)***

Yes ☐ **No** ☐

14. Do you have any new extension strategy for beef cattle production in your area ? **Yes** ☐ **No** ☐

15. If **yes**, please explain: _____

_____

_____

E. Breeds

1. Are bulls easily available ? **Yes** ☐ **No** ☐

2. What are the common breeding practices in your area ?

(***please tick***) (a) **Natural** ☐ (b) **Artificial insemination (A.I)** ☐

3. How many A. I. did you perform in beef cattle last year ? ☐ **cows**

4. What is the breed structure of beef cattle population in your area ?

Breed	Percentage
(a) _____ (a1)	☐
(b) _____ (b1)	☐
(c) _____ (c1)	☐
(d) _____ (d1)	☐

5. Is inbreeding common in your area ? **Yes** ☐ **No** ☐

6. Do government farms or programmes provide breeding services to farmers in your area ? **Yes** ☐ **No** ☐

F. Feed

1. Types of feeding that farmers **mostly** rely on for beef cattle ?

Feeding Methods *(please tick)*

(a) grazing on private paddocks ☐

(b) grazing on communal land ☐

(c) Hay or silage ☐

(d) Feed concentrates ☐

(e) Fallow land ☐

2. What percentage of farmers area buy feed from outside for cattle ? ☐ %

3. How many months of green pasture is available in your area ? ☐ months

4. What would be the average size of available pasture area *(**hectares**)* in your area ?

☐ **ha**

5. How many herds usually graze on a common pasture land ? ☐ **herds**

G. Marketing

1. What would be body weight of beef cattle at the time of sale in your area ?

(a) minimum _____ **kg**

(b) maximum_____ **kg**

(c) average wt_____ **kg**

2. Where do most of the farmers sell their beef cattle in your area ? _____

(a) Nearest market _____ *(please name)*

(b) Distance to the nearest market from an average farm ☐ **km**

3. Who do farmers sell their beef cattle to ? *(please tick)*

(a) Butchers *(please name)* (i) _____ (ii) _____

(b) LDA ☐

(c) Middle-men trader ☐

(d) Villagers ☐

(e) Others ☐

4. How are farmers paid for their beef cattle ? *(please tick)*

(a) by body weight (kg) ☐

(b) by carcass wt (kg) ☐

(c) other ..... ☐

5. When do most of the farmers sell their beef cattle ? ***(please specify average age)*** ..... months.

6. What would be an average price for a beef cattle of..... **kg** body weight **S.I. $**..... or ..... **S.I. $** ***per head.***

7. When is the best time to sale beef cattle for high price in your area ?

(please tick) **months.**

1	2	3	4	5	6	7	8	9	10	11	12

H. Perception

1. How important are following factors for **small holder** beef cattle farmers in your area ? ***(please rank 1 = most important to 5 = least important)***

Also, please give examples of some of the specifics related to these factors.

Factors		**Rank**	**Important Examples**
(a) Management	(a1)	☐	(a2) _____
(b) New initiatives	(b1)	☐	(b2) _____
(c) Pasture development	(c1)	☐	(c2) _____
(d) Labour availability	(d1)	☐	(d2 _____
(e) Market assurance	(e1)	☐	(e2) _____

I. Staff Development

1. Please rank the following factors for their roles in enhancing extension service to beef cattle ***(1 = very important to 5 = least important).***

Factors	**Rank**		**Improvement Required**
(a) Staff Training	(a1)	____	(a2).....
(b) Salary	(b1)	____	(b2).....
(c) Mobility	(c1)	____	(c2).....
(d) Incentives	(d1)	____	(d2).....
(e) Extension materials	(e1)	____	(e2).....

(f) Regular Supervision (f1) —— (f2) .....

(g) More of staff (g1) —— (g2) .....

2. How do you think to increase number of beef cattle in your area?

(a).....

(b) .....

(c).....

(d) .....

3. As an extension worker, what are the five major problems you have faced that might have limited your work performance ?

(a).....

(b).....

(c).....

(d).....

(e).....

Comment/Suggestions

If you would like to add any thing not covered in this survey, please feel free to do so. You may also write on a separate sheet of paper and attach to the questionnaire.

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Thank you for your participation in this survey.

Appendix 3: Beef Cattle Farmers Survey Questionnaire

MASSEY UNIVERSITY

Department of Agricultural and Horticultural Systems Management

A SURVEY OF BEEF CATTLE FARMERS IN THE SOLOMON ISLANDS (May - June 1996).

A. Background Information

(1) **Province :** _____ (2) **Ward:** _____ (3) **Village:** _____

(4) Farmer's Name: **Mr./Mrs./ Miss.** *(Circle)* _____

(5) Number of years schooling completed. ☐ **years.**

(6) Age on your last birthday ☐ **years.**

(7) Currently a cattle farmer **Yes** ☐ **No** ☐

(8) Number of household members:

(a) **adults** ☐ (b) **children** under 15 years ☐

(9) Number of years in beef cattle farming ☐ **years.**

B. Farm Characteristics

1. Area available for cultivation ☐ **acres/ha**
2. Area under irrigation ☐ **acres/ha**
3. No. of irrigated plots ☐ **plots**
4. Major crops grown and area sown (last season).

Crops	Area (acres/ha)	Production (kg)
(a).	(ab)	(ac) .....
(b).	(bb)	(bc).....
(c).	(cb)	(cc) .....
(d).	(db)	(dc) .....
(e).	(eb)	(ec) .....

5. Livestock ownership and trend over past three years.

(a) Type of livestock (b) Number (c) Trend in past three years.

(1= increasing, 2 = no change, 3 =decreasing)

a. Cattle

(i) Calves

(i) Male _____ ☐

(ii) Female _____ ☐

(ii) Heifers _____ ☐

(iii) Steers _____ ☐

(iv) Cows _____ ☐

(v) Bulls _____ ☐

b. Small Ruminants

(i) Goats _____ ☐

(ii) Other _____ ☐

c. Poultry _____ ☐

d. Piggery _____ ☐

e. Others

(i) ..... _____ ☐

(ii) ..... _____ ☐

6. Beef cattle herd type and number in the herd.

	(please tick)	*(No. of herd)*
a. Breeding	☐	☐
b. Fattening	☐	☐

7. Availability of materials and services for beef cattle farming in the past five years. Please use a scale of 1 to 5 to rank the availability.

(1= better, 2= no changes, 3= less, 4= not available, 5= do not know)

Items	**Rank**	**Observed impact on changes**
Pasture		
Land for grazing		
Stock replacement		
Extension advice		
Technology to improve productivity		
Veterinary medicines		
Labour to tender livestock		
Access to credit		
Community support for beef cattle farming		
Market for beef cattle		

C. Crop Production

1. Please indicate average ***hours/week*** you spend on tendering livestock and other farming activities:

Farming activities	***Hours/wk***
(a) Cattle	
(b) Pigs	
(c) Coconut	
(d) Cocoa	
(e) Gardening	
(f) Farm visits	
(g) Other crop production	

2. Crops produced on farm. ***(Please indicate % income from each crop in a year and area cultivated)***

Crops	**% income**	**Area (ha/ac)**
(a)		
(b)		
(c)		
(d)		
(e)		
	Total 100 %	**Total _____ ha**

D. Cattle Diseases

1. Please list major diseases you have encountered in the last three years and death of cattle you have experienced.

Local name of disease	***No. of deaths/ losses***
(a) _____	
(b) _____	
(c) _____	
(d) _____	

2. Contacts made to seek treatment for beef cattle diseases: ***(please indicate number of contacts sought and contacts in the past 12 months).***

	No. of contacts sought	**No. of contacts made**
(a) Neighbours		
(b) Livestock extension worker		
(c) Veterinarian		
(d) Other		

E. Parasites / Pests

1. Please list major parasites (local names) you have encountered in beef cattle farming in the last three years and deaths/losses you have experienced:

Local name of parasites	*No. of Losses*
(a) _____	
(b) _____	
(c) _____	
(d) _____	

2. Contacts made for parasites in beef cattle in the past 12 months. ***(please tick)***

	No. of contacts
(a) Neighbours	
(b) Livestock extension worker	
(c) Veterinarian	
(d) Others	

F. Pasture/Feed/Fodder

1. Place of grazing:

(a) Own private pasture land ☐

(b) Community grazing land ☐

(c) Govt grazing area ☐

(d) Others ☐

2. Feed deficit months are: ***(please tick 1 or more)***

1	2	3	4	5	6	7	8	9	10	11	12
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

3. Feed deficit is handled by: ***(please tick)***

(a) letting cattle starve ☐

(b) selling cattle ☐

(c) Using supplemental feed ☐

(d) Contracting grazing to others ☐

(e) Others _____ ☐

4. Types of pasture/feed/fodder available **(please fill in 1 or 2).**

Type of pasture (*local names*) **Availability** *(1 = year around, 2 = seasonal)*

(If seasonal, indicate no. of months available)

(a) _____ ☐

(b) _____ ☐

(c) _____ ☐

(d) _____ ☐

G. Extension Services

1. Extension advice is obtained from _____

2. **No. of times** met extension workers in the past 12 months. _____

3. **Types of advice** obtained from extension worker in the past 12 months:

(a) _____

(b) _____

(c) _____

(d) _____

4. Place of contact with extension worker: *(please tick)*

(a) on your farm ☐

(b) at extension worker's office ☐

(c) at demonstration farms ☐

(d) at farmers training centre ☐

(e) in the market ☐

(f) other places _____ ☐

5. Impact of LDA's reduction of extension services on beef cattle production *(please list).*

Examples	***Impact***
(a) Cattle picking & delivery	.....
(b) Purchases	.....
(c) Fattening stock	.....
(d) Holding grounds	.....
	.....

6. Please indicate types of animal health services you get from extension workers, and expenses you have to incur per beef cattle.

(a) Type of Services	**(b) Purposes**	**(c) Expenses/cattle (SI $)**
(a)	.....	_____
(b)	.....	_____
(c)	.....	_____
(d)	.....	_____

7. New changes adopted on farm as results of extension workers advice.

(a) _____

(b) _____

(c) _____

8. (a) Have you any plans to increase your cattle production in the future ?

(i) **Yes** ☐ (ii) **No** ☐

(b) If yes, please indicate desired

(i) herd size ☐

(ii) Type : **(Fattening / Breeding)** ☐

(c) **Reasons:**

(i) _____

(ii) _____

H. Marketing

1. Please list factors that influence your decision to sell beef cattle.

(a) .....

(b) .....

2. Please tick any sources below to indicate where you normally sell your cattle.

(a) LDA ☐

(b) Local butchers ☐

(c) Local people ☐

3. Please indicate your beef cattle purchases and sales in ***1995.***

(a) No. of beef cattle sold ☐ ***cattle***

(b) Price received per cattle

minimum	maximum	average

(c) Timing of sale ***(please tick the months).***

1	2	3	4	5	6	7	8	9	10	11	12

(d) Average live weight——— **kg *(approximately)***

(e) No. of beef cattle purchased ☐ **cattle**

(f) Price paid per beef cattle **S.I. $** ———

(g) Timing of purchase: ***(months)(please tick)***

1	2	3	4	5	6	7	8	9	10	11	12

(h) Average live weight at time of purchase ☐ **kg**

I. Farm Finance

1. Sources of finance for farming.

Source	Amount (S.I. $)	Unpaid Amount	Purpose	Year
(a) Savings	———	———	———	.....
(b) Subsidy	———	———	———	.....
(c) Grant	———	———	———	.....
(d) Loans	———	———	———	.....
(e) Shares	———	———	———	.....
(f) Others	———	———	———	.....

2. Please indicate any employment of farm worker on wages.

(a) No. of days employed per week ☐ **day**

(b) Daily wage rate **S.I. $** ☐ **per day**

(c) No. of weeks employed mostly ☐ **weeks**

3. Livestock tendering is mostly done by: ***(please tick)***

(a) Women ☐

(b) Children ☐

(c) Men ☐

4. What form of compensation do you provide for members who worker voluntary on your farm (without pay). _____

5. Farmer's concern: (***least concerned= 0, less concerned = 1, neither = 3, more concerned = 4, very much concerned = 5***)

Factors	Rank	Reasons
(i) Pasture	☐	.....
(ii) Over-stocking	☐	.....
(iii) Weed problem	☐	.....
(iv) Cattle price	☐	.....
(v) Market outlets	☐	.....
(vi) Lack of support	☐	.....
(vii) Increase production	☐	.....
(viii) Low income	☐	.....

2. Where do you seek answers to the concerns listed above ? .....

J. Household Income and Expenditure

1. Please list annual cash income from different sources.

Source of income	**Approx. annual cash income**
a. Farm income	
(i) Food crops	**S.I. $**
(ii) Plantation crops	**S.I. $**
(i) Coconut	**S.I. $**
(iii) Others	**S.I. $**
(iii) Vegetables	**S.I. $**
(iv) Livestock	
(i) Beef cattle	**S.I. $**
(ii) Others e.g. dairy cattle	**S.I. $**
(ii) Small Ruminants	**S.I. $**
(iv) Piggery	**S.I. $**
(v) Poultry	**S.I. $**
(vi) Others	**S.I. $**