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THE UNIVERSITY OF ALBERTA

The Multiplier Effect of Beef Exports on Botswana's Rural Economy

by

David Robert Oke

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled The Multiplier Effect of Beef Exports on Botswana's Rural Economy submitted by David Robert Oke in partial fulfilment of the requirements for the degree of Master of Science in Agricultural Economics.

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Supervisor

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.....

.....

Date.....14.10.87.....

This thesis is dedicated to the memory of my father and mother:

Albert and Mabel Oke

Abstract

The purpose of this study was to determine the benefits to Botswana's rural economy from the exports of its beef products. This was done by the determination of a rural multiplier specific to the beef industry and based on the economic linkages between Botswana's export markets and her rural economy. Particular attention was paid to the benefits accruing to Botswana's rural economy from exports of beef products to the European Economic Community resulting from Botswana's participation in the Lome Convention.

The data collected consisted of revenue accruing to the Botswana Meat Commission from beef exports, the proportion of that revenue paid out to cattle producers, the distribution of payments according to type of producer, the spending patterns of rural producers and the spending patterns of those firms supplying cattle producers.

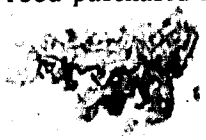
A model was developed to calculate a multiplier specific to Botswana's beef industry and to disaggregate that multiplier according to item and round of expenditure. Associated with this model is the development of an approach to analyse such disaggregated data.

The total rural economic activity resulting from payments to producers determined the total benefit to the rural economy. The distribution of that benefit according to the type of producer determined who benefited. The sector or activity impacted indicated the effect on the local economy such as the amount of income or capital investment generated. The identification of the economic linkages showed why induced economic activities followed the patterns they did. Policy implications and proposals are based on the identification of economic linkages which increased or decreased the economic benefit to the rural areas from beef exports.

It was found that the distribution of payments among large and small cattle producers was more equitable than that estimated by other researchers. Small producers were 76% of all producers selling to the BMC and received 43% of all payments. Large producers were 14% of all producers and received 42% of all payments. The distribution was skewed in favour of producers living in large villages since 49% of producers live in large villages compared with 14% of the total population. Altogether, 81% of Botswana's cattle producers live in the rural

areas.

The rural multiplier was calculated to be 2.4. This multiplier is a function of a propensity to purchase locally for primary linkages ranging from 86% to 63% and for secondary linkages averaging 52%. Government spending and a strong rural construction industry were the main linkages resulting in such a high multiplier. For every Pula (P1.00) paid to a cattle producer, a further P0.40 of secondary income and from P0,06 to P0.17 of capital investment was generated in the rural economy. The linkage showing the greatest potential for development was commercial agriculture since nearly all food purchased in Botswana's rural areas was imported.



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and push my truck when it became stuck in the sand. Not only was their help invaluable but their company made long days in the bush a pleasure. I wish them all well.

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I. Introduction

A. Problem Definition

This research deals with the study of rural economic linkages and how rural development in Botswana can be promoted by the development of such economic linkages. The idea for studying the value of economic linkages in the promotion of rural development originated during the time the author was working in Mochudi, Botswana. Many development projects appeared to be based on external finances and expertise with little attention being paid to the local environment and economic activities already established there. Often, funds brought in for development left as quickly as they came and it was common for projects to die as soon as outside funding and personnel became no longer available. Local people often viewed such projects with detached bemusement instead of developing an identification with and support for them. Rural development under such conditions tended to be a series of imported projects unrelated to each other, unrelated to the existing rural economy and based on the needs of external developers as much as the needs of the local population.

By "linking-up" one sector to another, a development in one sector can have a stimulative effect on another sector. Development is defined in terms of economic linkages as either the enhancement of existing linkages or the development of new ones which increase the sophistication of the regional economy and its ability to take advantage of the opportunities created by existing economic activity either domestic or export-based. Thus, more holistic development strategies can be devised than is now the case and projects can have the advantage of benefitting from already existing economic and social patterns rather than having to create new ones.

Payments to cattle producers and injections of government spending are the two main sources of income for Botswana's rural economy followed by wage employment and remittances. Of these activities, the cattle industry was chosen to be studied since it is the most important cash activity conducted in the rural areas. Its traditional nature causes it to

involve more people than other rural economic activities. Therefore, the study of economic linkages and their role in the development process was studied from the perspective of identifying the linkages between Botswana's export markets for beef products and its rural economy, identifying the economic linkages within Botswana's rural economy which cause existing economic activity and an analysis of these linkages to determine how they may be strengthened to maximize the rural economic impact of Botswana's beef exports.

A multiplier is a measurement of the strength of economic linkages in the rural economy. It measures the amount of induced economic activity created by money entering the rural economy. By strengthening existing linkages or by creating new ones, the level of induced economic activity and the benefits to the rural economy are increased. An increase in such induced economic activity is measured by an increase in the multiplier.

A multiplier is estimated from the economic linkages within Botswana's rural economy to determine the total economic activity induced from payments made to rural cattle producers by the BMC. This multiplier is disaggregated by item and by round of expenditure in order to show the structural impact and the composition of the multiplier. Further, the disaggregation of the multiplier is used to identify strong linkages which stimulate regional economic activity, weak linkages which represent leakages from the region and linkages which have the potential to be strengthened and thereby increase regional economic activity and promote development.

An input-output method is commonly used to estimate a multiplier which can be disaggregated according to sector. However, a small, rural economy in a developing country such as Botswana lacks the intersectoral economic linkages and other prerequisites for the functioning of an I-O matrix. Therefore, a different matrix was required to represent rural economic activity. This matrix used simple arithmetic equations to produce similar results to the I-O method.

Special attention is given to the benefits to Botswana's rural areas from the export of beef to the European Economic Community under the Lome Convention. The Lome

Convention is one of the world's major trade and aid agreements between developed and developing countries and the results of this research are meant to determine the impact of this agreement on a developing country such as Botswana. The equitable distribution of these benefits within Botswana has been given prominence by the EEC. Therefore, this research is especially concerned with how cattle payments and the economic activity induced from them are distributed among producers according to the size of their operations and size of their villages.

B. Objectives

The objectives of this research are to:

1. Compare the relative importance of the EEC market with other importers of Botswana beef products in terms of proportion of total revenues accruing to the BMC which come from the EEC, the type of beef products purchased and the relative price or revenue per kilogram of product.
2. Determine the distribution of payments to cattle producers according to the number of cattle sold and the size of the producer's village. The number of cattle sold is used as a proxy for wealth and the distribution of payments among large and small cattle producers should show whether it is the rich or poor cattle owners who benefit from beef exports. The size of a village is used as a proxy for the level of development of that village and the distribution of payments between large and small villages will show how far revenue from beef exports "trickles down" from the developed to the less developed settlements in rural Botswana.
3. Develop a disaggregated multiplier estimation process which:
   a. Deals with specific rural economic linkages rather than aggregating economic activity into sectors such as is done with input-output models.
   b. Disaggregate the induced economic activity according to the item and round of expenditure so that the amounts spent on each item during each round of expenditure

can be determined.

4. Determine the extent to which the developmental impact on Botswana's rural areas from exports of beef products to the EEC can be enhanced.

C. Organization of the Thesis

There are eight chapters in this thesis. Chapter One is the introduction consisting of the statement of the problem, the objectives and significance of the research and the organization of the thesis. Chapter Two reviews Botswana's natural environment, its people, economy and its beef industry. Chapter Three reviews Botswana's beef exports and the foreign exchange earned by the Botswana Meat Commission (BMC) including the revenue and relative prices earned from the European market. Chapter Four deals with payments to beef producers covering the proportion of total BMC revenue paid to producers and the distribution of these payments to producers according to the number of cattle sold and residence in a small village, large village or urban area. Chapter Five covers relevant economic theories regarding export-led growth, economic linkages, multipliers, the calculation of rounds of expenditure and an explanation of the model used in this research. Chapter Six reviews the results of the producers' questionaire. These results are tested for variance and distinctiveness according to cattle sold and producer's residence and an analysis of producers' spending patterns, income sources and other data background is given. Chapter Seven calculates the multiplier. The composition and magnitude of the multiplier is analysed according to the total induced economic activity associated with producers' spending patterns with each item of expenditure. Chapter Eight is the conclusion summarizing the work and results of this research.

II. Description of Botswana: Its Background and Beef Industry

A. The Land

Botswana is a semi-arid, land-locked nation in southern Africa sharing borders with South Africa, Zimbabwe and Namibia. It has a surface area of 582,000 sq. km., slightly less than that of Manitoba. Two-thirds of Botswana is covered by the Kgalagadi desert. In the north-west corner, the Okavango river drains inland from Angola to form an extensive swamp. In the east, along the South African border and Limpopo and Madikwe rivers, the climate is less harsh and the soils more fertile than the rest of the country.

Soils are predominantly sandy with a high mineral and a low humus content. Being sandy, they retain water poorly. In the Kgalagadi to the west, the sand reaches depths of 120 metres. In the east, it is much shallower with outcrops of rock commonly breaking through the sand cover. The only soils which will support arable agriculture are found in the south-east and around the Okavango delta.

Straddling the Tropic of Capricorn, Botswana has a hot, arid climate. Temperatures vary from an average daily maximum of 33 degrees centigrade in January to an average daily maximum of 22 degrees in July. Rainfall is sparse and irregular. Annual rates of precipitation range from 650 mm. in the north to 250 mm. in the south-west corner of the Kgalagadi desert. In the east of Botswana rainfall averages 400 to 500 mm. per year with the average rate of precipitation declining as one travels west into the Kgalagadi desert. Average rates of precipitation vary from these averages by 30% in the north to 40-45% in the south. Botswana's elevation averages 1000 metres above sea level. [1]

Drought is a recurring problem in Botswana. Both a drop in the level of precipitation or its irregular appearance can drastically reduce yields and restrict grazing in Botswana. In recent times, drought has appeared in cycles. The 1930's, the 1960's and the 1980's have seen droughts that have lasted for years at a time.

[1]National Geographic Society, **Atlas of the World**, National Geographic Society, Washington D. C., 1981.

Permanent water sources are rare in Botswana. In the east, the Limpopo and Madikwe rivers along with a few smaller streams are the only permanent water sources in Botswana. In the north, the main permanent water sources are the Okavango swamp and the Chobe river. In the two-thirds of Botswana covered by the Kgalagadi desert, there are no permanent water sources at all, but in the wet season, from October to March, rivers will flow with run-off for a few months before completely drying out during the dry season.

In the east of Botswana, the construction of small dams and shallow wells to provide semi-natural permanent sources of water is common. In the Kgalagadi, though, the lack of surface water and the deep sand cover prevents the construction of these types of water sources. Therefore, boreholes depending on deep, underground reservoirs of water are the only reliable permanent water source in the Kgalagadi and, indeed, have become the major source of water for all purposes in all of Botswana today.

Vegetation in Botswana must withstand a hot climate, long dry periods each season and intermittant drought. Botswana supports a tree savanna in the wetter areas of the north-east which degrades to a scrub savanna as the annual level of precipitation decreases toward the south-east. Low rainfall and poor soils result in grasses of low productivity, particularly in the Kgalagadi which at best supports a low density of livestock. These grasses are also fragile and vulnerable to fires and serious degradation of the veldt [2] when misused by such practises as overgrazing.

B. The People

The majority of Botswana's population belong to the Setswana speaking tribes. Minority groups include the Baherero in the west, the Kalanga in the north-east and other semi-nomadic groups in the Kgalagadi and remote areas such as the Kgalagadi Bushmen or Basarwa.

[2] open uncultivated grassland in southern Africa

With a large area of land and a population of only one million people, Botswana is one of the world's least densely populated countries. Because of the soils and climate, 80% of Botswana's population live in the eastern strip of land along the border of South Africa which leaves large areas of Botswana which are almost totally uninhabited. [3]

Traditionally, rural life was based on three centres; the village, the plough lands[4] and the cattle post[5]. During the dry season, people stayed in the villages which were traditionally sited near permanent water sources. Because permanent natural sources of water are scarce in Botswana, traditional villages tended to have large populations. The largest village in Botswana, Serowe, has a population of over 30,000 and several other villages have populations of over 15,000.

During the rainy season, when the rains would create seasonal water sources such as pans, the people would move out into the lands area and sow their crops. After the harvest and when the seasonal water sources had dried out, they would move back to the village for the dry season. This pattern has remained largely unchanged to this day.

Today, more than half of the population do not own cattle so cattle posts are kept by only a small proportion of the population. Even among those people who own cattle, very few will reside at a cattle post for any length of time. The usual practise is for a cattle owner to hire someone to live permanently at his cattle post and tend his cattle while the owner himself only comes on an irregular basis to keep informed of the state of his herd. Smaller cattle owners often do not have cattle posts but keep their cattle near their village or at their plough lands.

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[3]Ministry of Finance and Development Planning, **National Development Plan 1985-91**, Government of Botswana, Government Printer, Gaborone, December 1985.

[4]"Plough Lands" or "the Lands" are commonly used words in Botswana meaning the area in the country where a man grows his crops. A plough land is located on communal lands and connotes a rural residence as well as crops and fields. These terms are used in this thesis exactly as they are used in Botswana.

[5]A cattle post is loosely defined as the place where a cattle owner keeps his cattle. Today, many cattle posts are based on a borehole or some other permanent source of water. Cattle therefore, are mostly kept in the same location for the entire year and only move a long distance once they are destined for slaughter. Nomadic herding is not a practise commonly followed.

Today, Botswana is a rapidly urbanising nation and is becoming increasingly involved with the cash economy. Twenty percent of the population now live in urban areas and are engaged in wage employment. A number of cattle owners now live in the urban areas while keeping their cattle at a cattle post. Many cattle owners also hold down full-time jobs while their cattle raising is pursued as a sideline or as a hobby.

Botswana's population is presently increasing at a rate of approximately 3.5% annually. Since 1971, the population of Botswana has doubled. Botswana's population is predominantly young. More than 50% are under 15 years old.

Traditionally, many people in Botswana sought work in the mines in South Africa. At one time, 30% of Botswana's male population could be found in the mines or other temporary employment in South Africa. Although this trend is steadily being reversed, employment in South Africa is a strong influence on the way of life and the economy of Botswana. A result of this is a large number of female-headed households [6] in the country.

C. The Economy

Botswana has a rapidly developing and diversifying economy. This development is largely based on mineral exports since the country gained independence in 1966. Since independence, Botswana's growth in real GDP has averaged approximately 12% per annum. However, the small size of Botswana's population means that it has a very small domestic market. Consequently, its economic prosperity is dependent upon external markets and specialization on a few specific export commodities in which Botswana has a comparative advantage.

Before independence, it was believed that Botswana (or Bechuanaland as it was then called) had little future other than to be a labour reservoir for South Africa. Consequently, there was little economic development and Botswana's economy was dominated by remittance

[6] "Female-headed Household" is a term commonly used in Botswana to describe a family where a husband is not present because the man is either working in the mines in South Africa, has not married the woman or has passed away.

payments from South Africa, subsistence agriculture and the sale of beef usually on the South African market as a peripheral supplier.

Since independence large mineral deposits have been discovered. Copper and nickel are mined at Selibi-Pikwe, diamonds are being mined at Letlhakeng, Orapa and Jwaneng with further deposits being discovered near Tsabong in the Kgalagadi desert. Coal deposits have been discovered at Maru-a-Pula near Palapye. Mineral exports now account for over 80% of Botswana's export earnings as well as being the major source of government revenue.[7]

South Africa dominates Botswana's economy. Seventy-five percent of Botswana's imports originate in South Africa. As well, South Africa is a major market for many of Botswana's exports, particularly for beef products. In addition to these economic ties, Botswana is dependent on South Africa's transportation infrastructure since nearly all of Botswana's trade contacts with the outside world depend upon South Africa's ports, railways and its road network.[8]

Botswana is a member of the Southern Africa Customs Union (SACU). This customs union joins Botswana, South Africa, Lesotho and Swaziland in a trade agreement which eliminates tariff barriers between them. In the past, the SACU has also been a major source of revenue for the Government of Botswana. According to this agreement tariffs on imports into Botswana are charged when they enter South Africa and these funds are then refunded to the Botswana Government.

Competition from South Africa and to a lesser extent Zimbabwe and Namibia often hurts the development of Botswana's domestic industries. The economies of scale enabled by the larger markets of Botswana's neighbours and their superior infrastructures result in the domination of Botswana's retail market by imported goods, particularly from South Africa. Botswana's membership in SACU compounds this disadvantage in that SACU membership

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[7] Ministry of Finance and Development Planning, "National Development Plan 1985-91", Government of Botswana, Government Printer, Gaborone, December 1985.
[8] Department of Customs and excise, "External trade Statistics 1983/84", Central Statistics Office, Ministry of Finance and Development Planning, Government Printer, Gaborone, 1985.

prevents Botswana implementing tariffs and duties to protect its local industries against South African products. Despite this outside competition, the rapid increase in per capita disposable incomes and in the rapid growth of the cash economy have given rise to an active and fast growing manufacturing and business sector.

Donor agencies and their funds have played a prominent part in the development of Botswana's economy. Since gaining independence, Botswana has regularly received one of the largest per capita grants of foreign aid of any country in the world. In particular, the arrangement Botswana enjoys with the EEC regarding the privileged sale of Botswana beef on the European market should be seen in the context of Botswana's ability to attract foreign aid donors.

Despite Botswana's rapid economic growth, unemployment and underemployment are severe problems especially in the rural areas. Botswana's rapid population growth means that the labour force increases by 20,000 people each year. Yet, despite this increase, most of these people lack education and skills so Botswana has a chronic shortage of skilled labour and many important positions require expatriates. It has been estimated by the World Bank that the rate of unemployment and underemployment in Botswana is around 40%.

D. The Cattle Industry

The majority of Botswana's cattle are located in the south-eastern quarter of Botswana. According to Buck, Light, Lethola, Rennie, Mlambo and Muke, in 1981, 70% of the cattle belong to the Tswana breed, 20% are Africander and 10% are Tuli. These are traditional African breeds local to Botswana and South Africa and able to withstand Botswana's harsh climate and grazing conditions. However, these breeds are increasingly being cross-bred with other higher performing breeds using modern breeding methods and imported semen.

Table II.1
Performance Coefficients According to Breed of Cattle for Breeds Common to Botswana.

Breed	Calving %	Mortality (2yrs)	18 Month Weight	18 Month Calf Weight Gain/yr
Tuli	85%	7.1%	287.1 kg.	226.7 kg.
Bonsmara	83%	15.9%	321,5 kg.	224.2 kg.
Tswana	79%	8.3%	294.5 kg.	213.4 kg.
Brahman	71%	18.8%	305.4 kg.	176.1 kg.
Africander	67%	12.0%	276.7 kg.	163.1 kg.

Source: Table modified from Buck, Light, Lethola, Rennie, Mlambo and Muke, "Beef Cattle Breeding Systems in Botswana. The Use of Indigenous Breeds", 'World Animal Review', No. 43, pp.12-16, 1982.

Overgrazing is a serious problem in Botswana. Central, Southern, Kweneng, Kgatleng, North East and South East districts are all overgrazed. Overgrazing is particularly bad in the south east quarter of Botswana where this research was conducted. Overgrazing is closely related to high human populations since over 80% of Botswana's population live in these six overgrazed districts. Those districts which could support higher numbers of cattle such as Kgalagadi, Ghanzi, Ngamiland and Chobe are the most remote and underpopulated districts in Botswana. Kgalagadi and Ghanzi are the driest and require expensive boreholes. Only the largest and richest cattle owners who can afford the transport and drilling costs can afford to expand their operations into these districts. For the majority of Botswana's cattle owners, expanding into the four undergrazed districts is prohibited by costs and expanding their current herds will only aggravate the already serious problem of overgrazing.

Table II.2
Stocking Rates, Carrying Capacity and Rainfall by District in Botswana ***(in hectares per Livestock Unit [ha/LSU]).***

District	No. of Cattle (000 hd)	Stocking Rate (ha/LSU)	Carrying Capacity (ha/LSU)	Annual Rainfall (in mm.)
Central* +	1045	9.4	16	400-500
Ngamiland	308	24.1	9	400-500
Southern* +	268	7.4	16	300-500
Kweneng+	224	11.5	12	300-500
Kgatleng* +	174	3.1	12	400-600
Kgalagadi	76	77.0	26	<300
South East* +	67	0.2	12	500-600
Ghanzi	64	64.4	21	300-400
North East*	63	2.0	24	400-500
Chobe	6	89.3	9	>600
Botswana	2295	14.4	16	<300->600

Source: Table modified from page 93, Field, D., "A Handbook of Basic Ecology for Range Management in Botswama", Land Utilisation Division, Ministry of Agriculture, Government of Botswana, Gaborone, March, 1978.
note: * denotes overgrazing.
note: + denotes districts surveyed in this research.

Hiring of Labour

The pattern of hiring labour to tend cattle varies greatly. Those owning a small herd more commonly keep their herd close to their village or lands area and look after them personally. Often cattle are allowed to roam freely while the owner's activities are limited to maintaining a water source. Those keeping large herds usually keep them far away from their residence at a cattlepost and hire someone to live permanently at their cattlepost to tend them. This person can either be a member of the owner's family or else someone (commonly known as a herd boy) hired from outside the family. Even those with large herds sometimes will let them fend for themselves. One man interviewed during this research owning 80 cattle let his herd run free and only maintained a borehole for them.

Herd Management Coefficients for Botswana

Table II.3
Comparison of Herd Management Coefficients Between the Communal Grazing System and Ranches in Botswana 1982.

Coefficient	Communal Grazing System	Ranch
Calving percentage	47%	75%
Calf mortality	10%	8.5%
Adult Mortality	6%	3%
Weaning Weight	123 kg.	180 kg.
Post Weaning Weight (7-18 months)	89 kg.	106 kg.
Weight of 1.5-year animal produced per cow per year	90 kg.	195 kg.
Age of heifers at first calving	3-4 years	2-3 years
Steer slaughter age (in years)	3.5-6.5	2.5-3.5
Total offtake	8%	17%
Offtake plus growth	12%	18%

Source: Table modified from World Bank, "Botswana: Livestock Subsector Memorandum", page 41, Eastern Africa Projects department, Southern Agriculture Division, September 14, 1983 - unpublished internal document.

If the herd management practises of Botswana's traditional cattle producers could be improved upon the amount of beef produced in the rural areas could be doubled without an increase in the national herd according to Table II.3. Offtake and the annual weight gain per animal for traditional producers is half of that for commercial ranchers. A low calving percentage and a longer average life span per animal before slaughter are other noticeable factors contributing to the gap between traditional producers and commercial ranchers. Under current herd management practises, Botswana's beef industry is functioning at no better than half of its capacity resulting in a comparable loss of revenue to Botswana's rural areas.

Ruthenberg proposed three types of grazing systems: ' total nomadism, semi-nomadism and ranching. To classify these grazing systems, Ruthenberg used climatic features and the carrying capacity of the land.

'Ruthenberg, Hans, **Farming Systems in the Tropics**, Second edition, Clarendon Press, Oxford University Press, Great Britain, 1976

Total nomadism is carried out under marginal conditions where animals must continually move from place to place because water and fodder are insufficient to support a sedantary population. Annual rainfall rates of 50 to 400 mm. per year are associated with total nomadism grazing systems.

Semi-nomadism is common in tropical savanna areas where rainfall ranges from 400 to over 600 mm. per year. Cattle must travel long distances for water and pastures. There is usually no foddering and animal conditioning changes from season to season. The calf mortality is about 50%.

Communal ownership of land is the common pattern of land tenure in this grazing system. As a result, overgrazing and overstocking is a common problem with stock owners wishing to maximize the size of their herds rather than tending toward commercial practises. Economic waste and low efficiency are common with semi-nomadism in comparison with commercial ranching.

Commercial ranching is the commercial alternative to various types of nomadism. It involves commercial management techniques and high levels of capital investment per unit of labour usually in the form of fences and water pumping equipment. Ranching is generally associated with semi-arid areas but ranches are now being developed in semi-humid areas as well. Ranches are characterised by large grazing areas and large numbers of animals although the ratios of labour, capital investment and livestock units per unit of land are still low.

Within Ruthenberg's categories of grazing systems the closest correspondence is between Botswana's traditional grazing system as it existed in the first part of the twentieth century and Ruthenberg's description of a semi-nomadic grazing system.

The main movement of stock to water and pasture in Botswana's traditional system was a seasonal movement. In the dry season stock was moved to the "winter grazing" in the eastern parts of the Botswana where permanent water sources could be found. In the wet season, stock was moved to the "summer grazing" where pans and seasonal water sources became available with the coming of the summer rains.

Land tenure and the management of herds was done on a traditional basis as is stated in Ruthenberg. Traditionally, land was not privately owned but collectively owned by the tribe. This system allowed any tribesman to graze his cattle anywhere on tribal lands he wished. If he wished to set up a cattle post, the only restriction was that the permission of his chief was needed prior to his use of the land. This permission gave exclusive use of the land he marked out for his kraals or for the construction of a dwelling.

Ownership of animals was relatively equitable. Lending of animals (mafisa) and ownership was the basis of political status and social relationships. Cash and economic rationales were not major factors in herd management. Cattle were the major source of draught power for ploughing so that if one did not own cattle or could not borrow them, one was unable to plough his fields and grow subsistence crops.

Recent Developments Affecting the Grazing System

The major developments which have caused Botswana to depart from its traditional semi-nomadic grazing pattern are the development of boreholes, the development of veterinary extension services, a rapid growth in human population, the use of tractors in arable agriculture, the development of a diversified cash economy and changes in the land tenure system.

Boreholes were introduced into Botswana during the colonial period and were used increasingly after independence for watering cattle. Because boreholes allowed producers access to areas which did not have natural water sources, their use increased the geographic area available for cattle grazing and increased the size of the national herd. Boreholes also brought an end to the seasonal migration of stock in the search for water and pasture.

The drilling and ownership of boreholes is much more restricted than the use of land and the ownership of a borehole gives a cattle producer great leverage over the use of the grazing resource. Where there are no other alternative watering sources, grazing is effectively limited to those with access to a borehole. Even though the land and grazing may be

communally owned, where water sources are privately owned and controlled, an area's grazing effectively becomes inaccessable except at the pleasure of the borehole owner.

It is common for smaller cattle producers to purchase water from a borehole owner. Other groups of cattle producers form syndicates which own a borehole collectively. In times of drought or scarcity of water and grazing, it is not uncommon for borehole and syndicate owners to evict the smaller cattle producers who have been purchasing water from them.

To prevent overgrazing and land degradation, government policy prohibits the drilling of boreholes within an 8 km. radius of each other. This policy has helped ease overgrazing but has also helped consolidate borehole owners' control over the grazing resource.

Botswana enjoys an extensive veterinary extension service which covers the entire country. The main immunizations against disease are provided free by the government with other immunizations being administered free if the owner provides the vaccines. This service has greatly reduced mortality rates and has resulted in an increase in Botswana's national herd.

The growth of the national herd is strongly related to population growth. Opschoor and Veenendaal [10] have found that since the beginning of this century there has been a constant ratio of three cattle for every person in Botswana. Hence, the rapid growth of Botswana's cattle population has mirrored and can even be regarded as being a function of Botswana's rapid human population growth. Consequently, higher stocking rates have contributed to the elimination of the seasonal migration of stock since most available range be occupied during the entire year in order to provide grazing for the increased number of cattle.

The introduction of tractors for ploughing and the development of government support programs for arable agriculture have broken the dependency of arable agriculture on cattle as a means of draught power. Because of its speed and convenience, the use of a tractor either owned or hired is the preferred method of ploughing.

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[10] Opschoor, J. B. and Veenendaal, E. M., "Botswana's Beef Exports to the EEC: Economic Developemnt at the Expense of a Deteriorating Environment", Institute for Environmental Studies, Free University, Amsterdam, the Netherlands, January, 1986.

According to "Botswana Agricultural Statistics 1984", 29% of traditional farmers ploughed with a tractor while 57% used cattle. The remaining 14% used donkeys to plough.

According to the data obtained in this research (which was limited to farmers owning cattle), 65% used a tractor to plough while only 14% used cattle. Of the 65% who used a tractor, 50% hired a tractor and 15% owned a tractor. Donkeys were used by 17% of the farmers, all of whom were in the group comprised of the poorest cattle owners while 3% used some other means. These percentage figures have been weighted to account for the distribution of small, medium and large producers in the population.

The Government of Botswana has recently promoted two programs which heavily subsidize the costs of ploughing fields. One program, the Arable Lands Development Programme (ALDEP) pays 85% of the costs of ploughing the first three hectares of a farmer's field while the other, the Accelerated Rainfed Arable Programme (ARAP), still in its pilot stage pays the costs of ploughing the first ten hectares.

The rapid economic development that Botswana has enjoyed since independence has provided many major income sources other than cattle. In 1984, beef exports accounted for approximately 12% of total export earnings and agriculture accounted for only 7.4% of gross domestic product in 1983. Similarly, cattle have continually declined in importance as a source of income. The data collected in this research indicates that only 31% of total income for small producers (selling less than 6 cattle annually) was obtained from selling cattle. For medium producers (selling 6 to 10 cattle) 49% of total income was earned from selling cattle while the large producers (selling more than 10) earned 77% of total income from cattle sales. Many cattle producers have a range of income sources available to them and it is common to have people working in full-time salaried positions and raise cattle as "hobby farmers".

Freehold ranching and the introduction of the Tribal Grazing Lands Policy are the major departures from Botswana's traditional pattern of communal land tenure.

1. The Tribal Lands Grazing Policy

The Tribal Grazing Lands Policy (TGLP) was initiated in the mid-1970's to encourage more efficient cattle production and better land management. Land degradation caused by overgrazing was recognized as a serious and growing problem. Communal ownership of tribal land was considered to be a causal factor because it failed to provide any means for a producer to capture the benefits of conserving grazing resources. As a solution to this problem of overgrazing, the government initiated the Tribal Grazing Lands Policy which promoted the exclusive use of privately leased ranches in tribal territory.

Yet, despite these goals, the TGLP ran into severe problems. From its very inception, TGLP lacked popular support. Finally, it was the lack of the economic viability of leased ranches that was the worst obstacle to the implementation of TGLP. The cost of fencing a ranch could not be supported by the returns earned from the sale of cattle and ranching was not competitive with the far lower costs of operating a borehole only and letting one's cattle graze openly on communal lands.

As of 1986 the TGLP appears to have stalled. According to the World Bank,[11] as of June 1983, 369 ranches had been demarcated, 177 ranches had been allocated and 137 leases to ranches had been signed.

2. Freehold Ranching

Freehold ranching in Botswana originated with white settlers who came to Botswana during the colonial period. It is continued today by the decendants of those earlier settlers. Batswana[12] are now buying freehold ranches which is an important trend to be noted. The major areas of freehold ranching are in Ghanzi in the Kalagadi and the Tuli Block along the

[11] World Bank, "Economic Memorandum on Botswana", Washington, October 15, 1985

[12] "Batswana" is the plural form of a citizen of Botswana or member of the Tswana tribe. The root word is Tswana, the prefix "ba" creates a plural. The prefix "mo" creates the singular Motswana (one citizen of Botswana). The prefix "Bo" creates the word "Botswana" or the place where the Batswana live. The prefix "Se" creates the word Setswana which is the language and the Tswana culture or any custom of the Batswana.

Limpopo which forms part of the border between Botswana and South Africa.

Although TGLP and freehold ranches are now a significant part of Botswana's cattle industry, collectively owned tribal lands remain the predominant form of land tenure in Botswana. Today 84% of Botswana's cattle are raised on communal tribal lands.[13] Elected Land Boards have replaced the chiefs in allocating land in the communal areas although communal land is still collectively owned and allocated in the traditional manner.

Recent significant changes in Botswana have made Ruthenberg's classification of grazing systems obsolete in describing Botswana's grazing/pastoral system. Although many elements in Ruthenberg's classification still exist, Ruthenberg describes conditions which occurred during a time in Botswana which is now long past. To use Ruthenberg to analyse Botswana's current conditions is as inadequate as it would be to use Harold Innis's staples theory to describe Canada's economy in the 1980's.

Botswana's grazing system is in a state of transition. It is neither ranching not semi-nomadism although it has elements of each. It is based on a traditional form of semi-nomadism which existed in the past but it has incorporated enough modern technology and capital intensive equipment to make it unrecognizable as a traditional semi-nomadic grazing system. To describe it as either commercial ranching or semi-nomadism would be grossly misleading.

Instead of using Ruthenberg's system, Botswana's grazing system would be best understood in terms of its own particular characteristics. The most prominent of these characteristics are: traditional in that traditional land tenure and management practises are followed, transitional in that it is in a state of transition from subsistence to modern, capital intensive in that boreholes are becoming the major source of water, sedentary in that cattle are born and raised in one specific location and commercial in that cash is increasingly a basis for owning and selling cattle.

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[13]Planning and Statistics and Central Statistics Office, "1984 Botswana Agricultural Statistics", Ministry of Agriculture and Ministry of Finance and Development Planning, Government of Botswana, Government Printer, Gaborone, 1985.

Factors Affecting the Rationale of Selling Beef

It is commonly assumed (eg. Schultz) that rural producers behave in an economically rational manner. However, this rationale is not always based on cash and profits. Therefore, some of the factors motivating producers to sell their cattle and how these factors may affect the distribution of producers and payments is reviewed. Because the cattle industry in Botswana is in a state of transition, it responds to both commercial and traditional motivations. The main influencing factors are the size of the herd, the relationship of cattle to arable agriculture and other traditional reasons for owning cattle.

Table II.4
Reasons For Selling Cattle According to Herd Size *(in percentages of Total Producers per Category).*

Reasons for Sale	All Classes	11-20	31-40	51-60	71+
To buy food	31.1	36.4	57.9	40.0	25.6
School fees, taxes, loans	25.4	34.5	14.5	44.0	28.6
Other household expenses	13.7	20.0	17.1	12.0	6.6
Cull or replace animals	11.9	5.5	10.5	0	18.8
Inputs for cattle prod.	7.1	3.6	0	4	12.8
Tractors and arable inputs	10.8	0	0	0	7.6
Total	100	100	100	100	100

Source: Table modified from Bailey, C., "Cattle Husbandry in the Communal Areas of Eastern Botswana"

In their article, "Herd Inventory and Slaughter Supply Response of Botswana Beef Cattle Producers", Ndzinge, March and Greer found that herd size was responsive to both price and rainfall. Using a rational distributed lag model, they found that producers will increase their herd inventory with an increase in prices and/or an increase in rainfall. However, these findings were contradicted by Doran, Low and Kemp who found from similar research in Swaziland in 1980 that beef cattle producers were not responsive to price.

One weakness in the Ndzinge article is that it ignores the effect of traditional motivations for keeping cattle and the effect of herd size on the economic rationale of a producer. Both traditional motivations and herd size affect a producer's economic behaviour.

To account for them would have shown a much clearer relationship between price levels and the propensity to sell cattle or to build up one's herd.

Michael Hubbard and the Carl Bro report supported a "quantum" hierarchy of herd size where the economic rationale and the producer's outlook change as the size of his herd increases. The Carl Bro [14] report gave the following "thresholds" of herd size:

1. **6-10 Head** - Females and immature animals are used for ploughing. The producer is reluctant to sell since he wants to build up his herd to a viable size.
2. **20 - 25 Head** - This is the threshold for maintaining a ploughing team without using unsuitable animals. Below 20 head, the herd is impaired in its ability to maintain a ploughing team and in its ability to breed.
3. **30 Head** - The herd is able to maintain a ploughing team and 1 to 2 beasts may be sold annually. The size of the herd is presenting problems of management.
4. **40-50 Head** - "Begging" water from relatives and natural water sources are becoming unviable and the producer begins to consider setting up a cattle post.
5. **100-150 Head** - The herd can sustain regular and high sales. Sales are made in order to sustain a regular income rather than to meet emergencies.

Carl Bro considered the 20 to 30 threshold to be the major threshold where a herd becomes economically viable. He also considered it a difficult threshold to cross. It was also stated that the larger the herd, the greater is its ability to survive a drought. Hubbard's hierarchy was similar to Carl Bro's given above.

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[14] Carl Bro International A/S Consulting Engineers and Planners, **An Evaluation of Livestock Management and Production in Botswana With Special Reference to Communal Areas**, Government of the Republic of Botswana Ministry of Agriculture and the Commission of the European Communities European Development Fund, January, 1982.

Table II.5
Distribution of Population and Cattle According to Size of Herd

Herd Size	Farms: Number	Percent	Cattle: Number	Percent
1 - 10	17,000	29.7	89,900	3.9
11 - 20	12,000	20.9	175,200	7.6
21 - 30	8,800	15.4	214,400	9.3
31 - 40	4,800	8.4	163,700	7.1
41 - 50	2,900	5.1	126,800	5.5
51 - 60	2,500	4.4	136,000	5.9
61 - 100	4,600	8.0	352,800	15.3
101 - 150	2,100	3.6	253,600	11.0
151 +	2,600	4.5	793,400	34.4
Total	57,300	100.0	2,305,800	100.0

Source: Government of Botswana, "Agricultural Statisics 1984"

According to the statistics given in table IV.11, 66% of Botswana's cattle producers own herds of 30 or fewer beasts which are herds below the size needed to be economically viable. These herds represent 21% of the cattle in Botswana.

A question regarding a producer's motivations for keeping cattle was included in the questionaire used in this research. However, it was poorly understood by the producers and the results are not considered to be valid or reliable.

E. A Brief History of the Cattle Industry in Botswana

The history of the cattle industry in Botswana covers three periods: the traditional period (1700's to 1885), the colonial period(1885 to 1966) and independence period (1966 to present).

The Traditional Period

Traditionally, cattle were owned under the "mafisa" system where the ruling class owned all the cattle and lent them out to a client class who tended them. The lending out of cattle was usually based on clan or family relationships and mafisa cattle formed the basis of political relationships between the rulers and the ruled.

During the 19th century, ownership was de-centralized and tribesmen unrelated to the royal families began to own cattle. Today, the mafisa system endures in the practise of the lending of cattle to a poorer person to plough his fields or to build up his herd. Usually, this is done between members of the same extended family.

During the traditional period, there was no commercial sale of cattle. The traditional reasons for the ownership or stewardship of cattle include: social status, measurement of wealth, lobola and other ceremonial purposes, traditional payments (eg. Kgotla fines), ploughing, transport of sledges, milk and the provision of meat. All these reasons for holding cattle continue today to varying degrees.

The Colonial Period

During the colonial period, the practise of selling cattle for money was introduced to the Batswana and Botswana began exporting beef. This change was caused by the development within Botswana of a demand for consumer items which could only be obtained with cash and outside of Botswana by the increase in international demand for beef.

During the colonial period, new social and economic needs were created which could only be satisfied by obtaining cash. These needs included the payment of school fees, taxes, and the purchase of consumer items. In order to obtain cash to meet them, Batswana began selling cattle for cash.

During this period, the world's major beef importers were in Europe, North America and Japan. The major exporters were Australia, New Zealand and South America. Argentina was the world's main beef exporter. The international beef market had not yet developed to the degree necessary to allow "inferior" producers such as Botswana an outlet on international markets. Further, under British colonial rule, Botswana (or the Bechuanaland Protectorate as it was then called) was considered to have no more potential than as a periphery of the South African economy. Because of these two factors, Botswana's markets for beef exports were limited to the Witwatersrand in South Africa and the Copperbelt in Zambia.

During the 1920's, Botswana exported up to 12,000 head a year. The International Cold Storage (ICS), Botswana's first abattoir was begun in Lobatse. However, this early growth of Botswana's cattle industry was short-lived. The depression of the 1930's caused a collapse of Botswana's beef export industry and the ICS closed down.

Post-World War Two and the Independence Period

The period following World War II saw an increase in the international demand for beef and coincided with Botswana gaining her independence. During this period, the increase in the international demand for beef caused "inferior" producers, including Botswana to be brought into the world beef market. During the 1950's and 1960's, per capita beef consumption in the developed world increased at a rate of 2% per annum. In the 1950's, the predecessor of the Botswana Meat Commission was built in Lobatse. In 1957, the British market was opened to marginal Commonwealth suppliers and in 1958 Botswana beef began to be supplied to Britain for the first time albeit by a South African entrepreneur.

In 1974, Britain joined the European Economic Community. As a consequence of Botswana's Commonwealth ties, Botswana participated in the first Lome Convention and gained privileged access to the EEC market in 1976.

The coming of independence in 1966 gave Botswana's cattle industry greatly increased political power since it was Batswana cattle producers who formed the basis of Botswana's newly independent government. Consequently, increased resources were devoted to the cattle industry. Both the number of boreholes and the provision of services increased and consequently, the size of the national herd and the geographical area opened to grazing was increased.

The Botswana Meat Commission Act of 1967 transferred the ownership of the Lobatse abattoir to the new Government of Botswana under the authority of the newly-formed Botswana Meat Commission.

Beef production and revenues from beef exports increased dramatically during the period following World War II and especially after independence was gained in 1966. In the early 1960's, 100,000 head a year were slaughtered. By the early 1970's, this number had increased to 200,000 head per year. In 1984, 239,000 head were slaughtered for export. Revenue from beef exports increased from P9,000,000 in 1966/67 to P45,000,000 in 1976/77 to approximately P100,000,000 in 1984. Two-thirds of this increase in foreign exchange earnings was caused by increased beef prices and one third was caused by increased volume. [15]

F. The Players in the System

The main players are the Botswana Meat Commission (BMC), the beef producers and the middlemen who arrange for the marketing and transportation of cattle to the BMC. This section identifies each of these players and describes how they interact within Botswana's beef marketing system.

The Botswana Meat Commission (BMC)

The Botswana Meat Commission is a parastatal of the Government of Botswana. Its Chairman and Board of Directors are appointed to their positions by the President of Botswana. The BMC is considered to be a non-profit organization which exists for the benefit of the nation and of the cattle producer.

The BMC has a legal monopoly in the export of beef and beef products. No one except the BMC is allowed to export cattle or beef products unless that person has a special permit to do so.

The BMC operates three abattoirs; in Maun, Lobatse and is currently building one in Francistown. The main abattoir is in Lobatse; the successor to the one built by the British in the 1950's.

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[15]data on the history of Botswana's cattle industry largely taken from Michael Hubbard, "Botswana and the International Beef Trade", unpublished Phd. thesis, June 1983, University of Sussex, England.

The location of the Lobatse abattoir in the extreme south-east corner of Botswana causes a great deal of inequality in terms of access. Its location was decided in the days of the Protectorate more on account of its convenient proximity to the main administrative centre for Bechuanaland in Mafeking, South Africa than on considerations of access by Botswana's beef producers. Therefore, to give more equal access to slaughtering facilities, an abattoir in Maun in the north-west has been completed and another is being built in Francistown in the north-east.

Setting Cattle Prices and the Payment of Bonuses

Cattle prices are set by the BMC at the beginning of the year based on the anticipated revenue for that year. Because the BMC is a non-profit para-statal, any revenue surplus to that needed to meet costs is paid back to producers in the form of a bonus at the end of the year. A producer's bonus is determined by the number of cattle supplied to the BMC by that producer during the year.

The BMC Quota System

A quota system is used by the BMC to determine who may sell, when cattle are to be delivered and how many cattle are to be delivered. Quotas are determined by a committee of the BMC and are awarded to different regions of Botswana during different months of the year. Because the EEC will only purchase beef from the districts which are free of Foot and Mouth disease, the quota system allows cattle only from these districts to be shipped to the BMC during months designated as EEC months.

Producers or their agents apply for a quota two months ahead of the time of delivery stating the date of delivery and the number of cattle to be delivered. These applications are then reviewed by the quota committee and quotas are awarded to producers and agents. A penalty of P2.00 is levied for each animal below the awarded quota not delivered. Despite this penalty, failure to meet quotas is a chronic problem.

The months from September to March are the off-season and usually, any cattle shipped to the BMC during these months are accepted so long as EEC regulations are upheld. The BMC has a variable payment schedule which gives higher prices to cattle delivered during the off-season. Since most producers are small and do not have access to feed lots or other fattening facilities, the seasonal fluctuation in deliveries remains strong.

Process of Making Payments to Producers

Payments are made to producers after their cattle have been received by the BMC and slaughtered. Live cattle are received from a producer or his agent, graded and slaughtered by the BMC and a payment is made to the producer or his agent based on the weight of the animal and the grade awarded. It is common for the BMC, agents and the cattle marketing co-ops to give cash advances to producers which are paid back after payment is made. Producers are often illiterate and most villages lack banking facilities so making payments can often involve many complications. These problems are usually borne by the agents and the co-ops who perform many financial services in the course of delivering cattle and serving as intermediaries in the making of payments.

The Producers

The two main groups of cattle producers in Botswana are those on freehold ranches and those grazing cattle on communal areas in the tribal areas.

1. *Freehold Ranchers*

Freehold ranches are predominantly in the Ghanzi Farms and the Tuli Block and owned mostly by white farmers left over from the days of the Bechuanaland Protectorate. Tuli Block farmers are strongly linked economically and culturally to South Africa although Batswana are now starting to buy freehold farms in this area.

These farmers are greatly involved in the buying and selling of cattle raised in the communal areas as cattle agents, cattle speculators and as fatteners. They comprise 0.6% of Botswana's cattle producers and it is estimated that 23% of the cattle marketed to the BMC originate from them. Their activities as speculators and fatteners tend to exaggerate their prominence as producers of cattle since a great number of the cattle they deliver to the BMC are not been raised by them but bought from rural producers in the communal areas. [16]

These producers in the freehold areas were not included in this research.

2. *Rural Producers in the Communal Grazing Lands of the Tribal Land Holdings*

This group of producers was chosen for this study. The rural areas were defined as those areas which were designated as tribal lands. These areas include all traditional villages, all the arable lands and all the grazing areas used by the people who live in the tribal areas. Eighty percent of Botswana's population and 85% of Botswana's cattle producers live in these areas. It is estimated that 77% of all cattle marketed to the BMC originate in the tribal lands and are raised by rural cattle owners.

The Marketing Channels

Cattle are marketed to the BMC using the following marketing channels: direct sales, cattle agents, producer-owned marketing co-operatives, cattle speculators and other less important marketing channels. Refer to the chart included as Appendix A which details the flow of cattle from producers to the BMC and the proportion of the total kill handled by each marketing channel. This chart is based on 1981 data.

A direct sale to the BMC is made by a producer applying directly to the BMC for a quota and delivering his cattle to the abattoir himself. This marketing channel is open to all producers and is used by the smallest as well as the largest cattle producers. Because of the

[16]Source: Botswana Meat Commission

extra costs and responsibilities of marketing directly, large cattle sales are more prominent with direct sales to the BMC than with the other marketing channels. In 1984, 17% of all the cattle marketed to the BMC were sold to it directly. There are no fees charged for marketing directly to the BMC so producers who use this channel realize higher returns for their cattle. The disadvantages are that these producers are not represented when grades are being assigned and they must bear the responsibilities of transporting cattle to market themselves.

There are nine private cattle agents in Botswana who, in 1984, marketed 65% of all the cattle delivered to the BMC. These agents must be registered with the Government of Botswana and by law are limited to charging 2.5% of the gross payment awarded to each of the beasts they deliver. Railage and transportation costs are deducted from the payment made to the producer.

An agent will apply for a quota to the BMC on behalf of his producers and is stuck with paying a penalty of P2.00 for each animal under his assigned quota if his clients don't deliver. The agent is paid money by the BMC on behalf of his clients and these monies are forwarded to the producer.

Cattle agents commonly engage in cattle speculation, own freehold cattle ranches, will be involved in the fattening of cattle and conduct cattle auctions as a part of their businesses as agents.

There are over 70 producer-run marketing co-operatives in Botswana which, in 1984 marketed 19% of all the cattle delivered to the BMC. These societies are registered with the Government of Botswana and are limited by law to charging 6% of the gross payment made for each animal they deliver. They are penalized P1.00 for each beast under the quota assigned to them.

The Botswana Co-operative Union is the umbrella organization for the various local co-operative societies applies to the BMC for quota its societies in the same manner as the agents.

Cattle auctions are another common means whereby cattle are bought and sold. In 1984, 3,385 cattle worth P505,581 were sold by auction, half of the number sold in 1983. The sellers, generally are small, rural producers and the buyers tend to be commercial farmers, speculators and local butchers. Local butchers are considered to be a significant local market for cattle.

The Botswana Livestock Development Corporation is a government-owned and government-run body which buys cattle from the most remote areas and markets them to the BMC. Its activities predominantly take place in Ngamiland and none of the cattle it handles are sold on the EEC market. It was started with money from the World Bank in 1973 and its purpose was to provide a marketing outlet for people living in the most remote areas of Botswana. It handles less than 5% of the cattle marketed to the BMC. [17]

Cattle speculators[18] purchase cattle outright from producers for cash and re-sell them at a profit. Cattle speculation is a well-developed and common practise in Botswana. In addition to the smaller buyers, there are a few large buyers who buy and re-sell thousands of cattle each year. According to the speculators interviewed, there are regular markets throughout rural Botswana which are highly competitive. Most of these cattle end up with the BMC but a significant proportion are sold locally to butcher shops in both the urban and rural areas. It is estimated that 20% of the cattle delivered to the BMC have been marketed via cattle speculators.

According to the cattle speculators interviewed, a high level of competition among speculators keeps cattle prices high. The average price quoted by the speculators interviewed was between P180.00 and P200.00. This compares with an average gross payout of P246.70 for cattle marketed through agents and P158.78 per beast at cattle auctions in Botswana for the

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[17]Source: Botswana Meat Commission

[18]"Speculator" is a term commonly used in Botswana for those people who buy cattle and re-sell them to the BMC. These cattle can be fattened or finished by the speculator but often they are only transported by him to the BMC directly without any additional finishing. The activity of an outright cash purchase and a later sale for the purpose of profit is the focus of this term. The term "speculator" is given the same meaning in this research that it has in Botswana.

same period. The average price per beast reported paid by local butchers was P220.00. Prices become lower as one moves toward the west of Botswana because of increased transport costs.

Large as well as small producers sell cattle through speculators. Often lack of planning and cash flow problems cause a large producer to sell through a speculator. Many of the larger producers interviewed marketed a large proportion of their cattle by means of speculators.

Cattle speculation is a very controversial topic in Botswana. Producers are suspicious of them. The cattle marketing co-ops also look upon them with enmity. Others regarded them as an essential element in the cattle marketing system. Where the truth lies is hard to determine. Undoubtedly, there are cattle speculators who cheat and take advantage of poor, naive cattle owners. However, the speculators interviewed appeared to be normal businessmen.

The advantages offered to a producer by the speculator are:

1. The producer knows at the time of transaction exactly what he will be paid rather than having to wait until after his animal is slaughtered.
2. The producer obtains cash immediately after a deal has been made. This is often a crucial consideration for a small producer who needs cash immediately to pay for school fees or some emergency such as a funeral.
3. The problems and cost of delivery of cattle are eliminated since it is the cattle speculator who is responsible for the cattle after a deal is made.

The disadvantages to the producer of selling his cattle to a speculator are:

1. The price offered is less than could be obtained from the BMC.
2. It is the speculator rather than the producer who receives any bonus from the BMC.

Records on local cattle sales are non-existent so that information on cattle speculation is extremely difficult to obtain. Despite legal requirements that such sales be recorded, several attempts to find records turned up no recorded information at all. Data on the number of cattle bought and sold, the buyers, the sellers and the prices paid can only be estimated. The information used in this study on cattle speculators is entirely based on interviews and other

secondary sources.

A few other schemes exist as government-initiated interventions in the marketing of cattle. However, their negligible impact on the marketing system and the small number of cattle marketed through them do not merit their mention.

III. The Relationship Between Botswana and Its Foreign Markets for Beef with Particular Emphasis on the European Market

A. Chapter Overview

Nearly all of Botswana's beef products are exported by means of two agreements; the Lome Convention with the European Economic Community and the Southern African Customs Union with South Africa. This chapter deals with the relationship between Botswana and the importers of its beef products and the basic factors which influence this trade. Botswana's major markets are identified along with the relative importance of each in regard to volumes and prices paid. Because special importance is given to the European market, the basic issues influencing Botswana's beef trade with Europe are dealt with at the start of this chapter. To conclude, some points which summarize Botswana's beef exports are given.

B. The Major Importers of Botswana's Beef Products

South Africa and the European Economic Community are the major and dominant importers of Botswana's beef products. Together, they account for 87% of all of Botswana's beef exports. Because both South Africa and the EEC are beef exporters themselves, their imports of beef from Botswana have a weak economic rationale. However, the EEC and South Africa have strong political motives in importing Botswana's beef. The Lome Convention covers aid as well as trade and the preferential entry to the EEC market given to the ACP countries is itself commonly seen as a form of aid. Similarly, South Africa has strong political motives in maintaining economic leverage over its black-ruled neighbours such as Botswana and consequently, has a strong commitment to SACU. Botswana's beef exports are strongly linked with the politics of her customers and any assessment of this trade would be incomplete without attention being paid to these political factors.

C. Trade with the European Economic Community

In 1975, Botswana was a party to the first Lome agreement which allowed Botswana to export beef to the EEC with 90% of the import levy being returned to the Government of Botswana. During Lome I, Botswana was given an annual quota of 17,000 tonnes of beef. Lome II was signed in 1979 which gave Botswana an annual quota of 19,000 tonnes of beef. This annual quota of 19,000 tonnes was continued in the Lome III agreement which was signed in 1984.

The funds returned to Botswana from the import levy are given to producers in the form of payments and bonuses. Since 1975, Botswana has never managed to fulfill its beef quota. This failure to meet quotas has been caused by Foot-and-Mouth disease and recurrent droughts. During interviews conducted as part of this research, officials at the BMC expressed confidence that under normal conditions, these quotas could be met. This failure to meet quotas has not caused the quotas to be reduced but undercuts Botswana's arguments to have the quota increased.

Veenendaal and Opschoor [19] have estimated that the Lome agreement has caused a 20% increase in average prices to Botswana producers. Von Massow [20] concluded that the Lome agreement represents a "substantial financial transfer to Botswana" but that lowered world beef prices caused by EEC protectionism (it is estimated that a 50% reduction in EEC protectionism should cause an increase in world beef prices of 5%) and competition for beef markets have largely negated the benefits of the Lome agreement. He estimated that Botswana realized a loss in welfare during 1975-1979 in that the harmful effects on Botswana's beef industry of EEC beef export policies were greater than the gains received from Botswana's preferential access to the EEC market. Since 1980, Von Massow estimated that the benefits to Botswana from access to the EEC market were greater than the liabilities caused by these

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[19] Opschoor, J. B. and Veenendaal, E. M., "Botswana's Beef Exports to the EEC: Economic Developemnt at the Expense of a Deteriorating Environment", Institute for Environmental Studies, Free University, Amsterdam, the Netherlands, January, 1986.
[20] von Massow, V., "On the Impacts of EEC Beef Preferences for Kenya and Botswana", Quarterly Journal of International Agriculture, Vol. 22, No. 3, July-Setember, 1983, pp. 216-234.

policies. In interviews, several senior BMC officers including the Executive Chairman stressed that the viability of Botswana's beef industry is dependent on the continuation of the Lome agreement.

According to von Massow [21] Botswana produces lean beef which is more economical for manufacturing purposes than European beef which is produced in feedlots. This would indicate that there is a genuine market in Europe for Botswana's beef and it is not being imported by the Europeans only as a form of aid. Veenendaal and Opschoor [22] agreed with this point but came to the conclusion that since lean beef was available from a number of other suppliers, that there was no economic reason for it to be imported from Botswana.

D. EEC Concern Over Inequalities and Environmental Degradation

The EEC has expressed concern recently over apparent inequalities in the distribution of benefits from cattle production and the environmental degradation caused by over-grazing in Botswana. The issue of the distribution of benefits is based on the European Community's concern that a small handful of rich cattle barons are receiving the lion's share of all the payments made to beef producers. In 1986, the European Parliament passed a resolution on the "Disturbance of the Ecological Balance in Botswana". While recognising that Botswana had endured four years of severe drought and had reserved 25% of its total area for national parks and wildlife management areas, the EEC expressed concern over the deterioration of Botswana's natural environment.

Although Botswana's protocol with the EEC on beef exports is not now in doubt, these issues of inequality of distribution and environmental degradation do threaten the rationale for the long-term continuation of this protocol. Concern has been expressed in Europe that the Lome agreement is turning Botswana into a desert and an impression has been created that the beef agreement with Botswana is only making a few large cattle barons richer. These accusations are taken very seriously in Botswana and BMC officials take great

[21] ibid.
[22] ibid.

pains to prove that the common people are better served by this agreement than it appears.

The issue of the distribution of benefits between large and small producers is given considerable importance in this research because the EEC considers it important and because it has a strong influence on the economic impact of beef exports on the rural areas. The actual distribution of small and large producers among the total population is a major aspect of Chapter Four which studies the relationship between the Botswana Meat Commission and the rural beef producers.

It is commonly estimated that 45% to 50% of the rural population have no cattle at all and that of those who do own cattle, half of the national herd is owned by 7% of the population. However, many statements made about the distribution of cattle and benefits are erroneous and create a distorted impression about the distribution of cattle and benefits among the rural population.

Veenendaal and Opschoor estimated that two-thirds of cattle revenues accrued to 2% to 3% of the nation's households. Von Massow stated that 40% of the cattle sold come from the commercial farmers who constitute 1% of the total population of Botswana's producers. These statements by Veenendaal, Opschoor and von Massow are accepted commonly by officials in the European Community and by many others who deal with Botswana. Their figures and those developed in this research do differ considerably.

There are have been many erroneous statements made about the distribution of small versus large producers in Botswana which are based on inadequate information. Often cattle agents and officials of the BMC expressed strong disagreement with researchers who have made unfounded statements which they regarded as harmful to their industry. Seldom have researchers gotten information directly from the BMC. The articles by Veenendaal, Opschoor and von Massow do not give a detailed account of the sources of their information. It appears that this research is the only research which has taken data directly from cattle agents' books to determine such distributions. It should be noted that information on Botswana's cattle industry is often incomplete and difficult to get. In particular, the number of cattle a person

owns is a touchy subject. Therefore, any statement, particularly on the more controversial aspects of Botswana's cattle industry should always be closely scrutinized.

E. Foreign Exchange Earnings Accruing to Botswana from Beef Exports

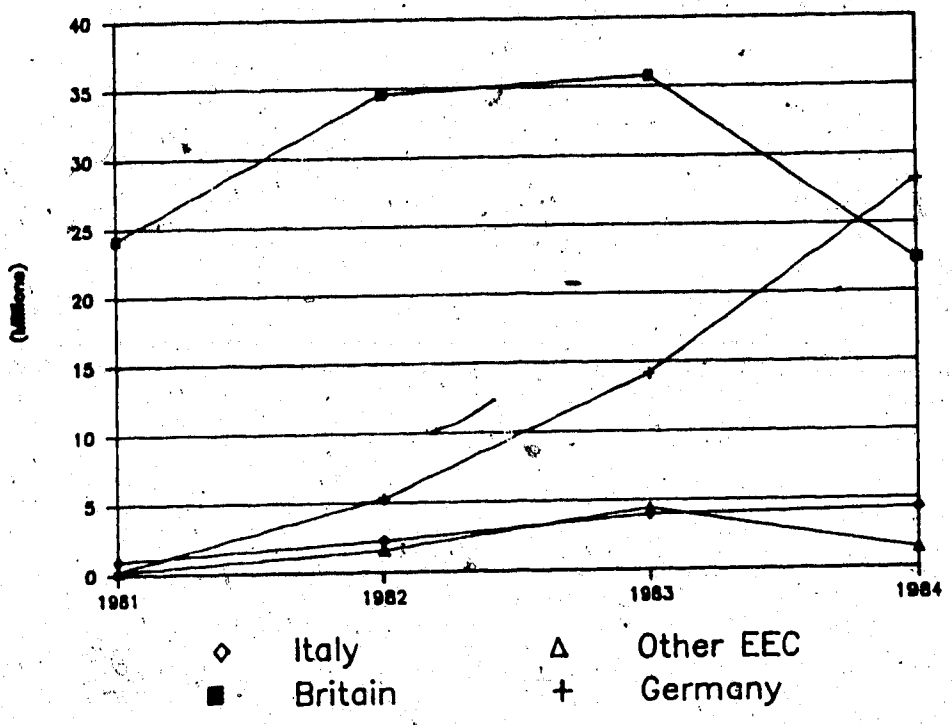
Until recently, Britain has been the only European importer of Botswana beef of any significance. In the 1980's Botswana's markets in Europe have broadened considerably. Italy and in particular, West Germany have become significant markets. 1984 was the first year in which West Germany surpassed Britain in the volume of beef products it imported from Botswana. From 1981 to 1984, the volume of Botswana's beef exports to the EEC have doubled. Not only is the EEC a major market but it is one which is growing in significance.

Table III.1
Value of Imports of Beef Products from Botswana to the European Economic Community 1984-1981 by Country *(in '000 ECU's).*

Country	1981	1982	1983	1984
France	0	613	305	351
Holland	235	985	1,588	923
U.K.	24,199	34,620	35,824	22,460
Denmark	0	0	0	0
Germany	251	5,305	14,211	28,174
Italy	970	2,302	4,026	4,365
Bel. Lux	0	0	52	0
Ireland	0	0	0	0
Greece	0	0	2,575	150
Total EEC	25,655	43,825	58,581	56,423

Source: European Economic Community

Figure III.1
Value of EEC Imports of Botswana Beef Products for Selected EEC Countries 1981-1984 Showing Change in Composition of Importing Countries ***(in million ECU's).***



Source: European Economic Community

Together, Africa and the EEC account for almost the entire total of Botswana's foreign exchange earnings in beef (99.8%). South Africa is the dominant market in Africa buying 22.9% of all of the BMC's total beef production and 26.3% of Botswana's beef exports. Exports to South Africa account for 63% of Botswana's total beef exports to Africa.

Table III.2
Revenue Accruing to the Botswana Meat Commission from Sales of Beef and Beef Products By Regions and Country of Destination Showing % of Total Sales and % of Total for Each Region 1984 *(in Botswana Pula)*..

Country	Value	% of Total	% of Region
Botswana	5,198,935	4.7	12.8
Reunion	7,769,738	7.0	19.1
Mauritius	152,600	0.1	0.4
South Africa	25,573,041	22:9	63.0
Zaire	1,100	0	0
Zambia	34,662	0	0.1
Zimbabwe	1,851,560	1.7	4.6
Africa	40,[illegible]625	36.4	100
Europe*	[illegible]472,811	5.8%	9.1
Germany	30,474,506	27.3%	43.1
Holland	4,463,896	4.0%	6.3
U.K.	29,346,886	26.3%	41.5
E. E. C.	**70,758,111**	**63.4**	**100**
Hong Kong	234,680	0.2%	
Total Export	**106,375,484**	**95.3%**	
Botswana	5,198,935	4.7%	
Total Prod.	**111,574,419**	**100%**	

Source: Botswana Meat Commission internal records
* Note that certain items are accounted for by the BMC under the heading of Europe instead of the country of destination.

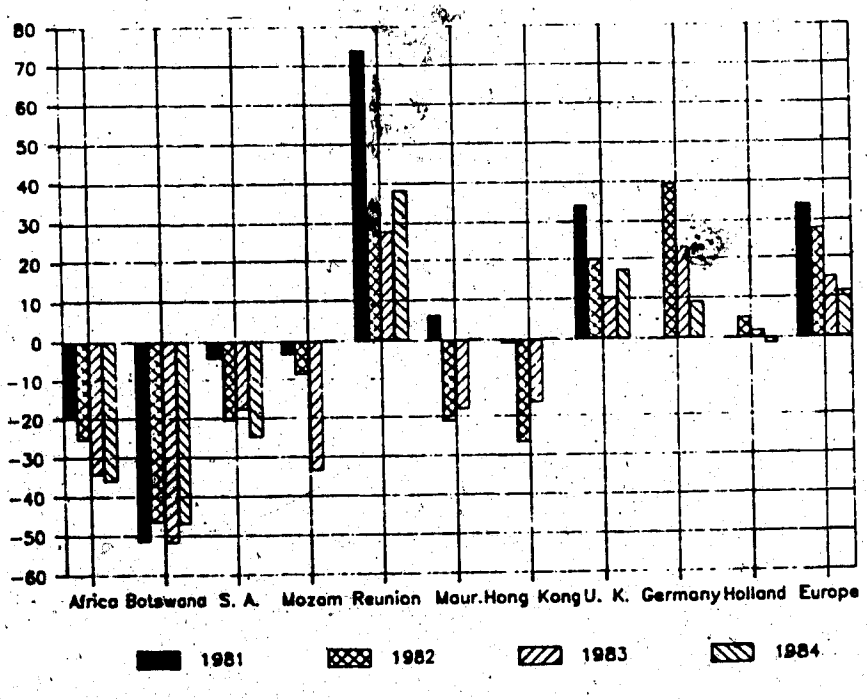
It follows from this trade structure that if Botswana did not have access to the EEC market through the Lome Convention that Botswana's beef exports would be almost totally dependent on the South African market. The issue of apartheid in South Africa has become a major international political issue. The European Community has begun to impose sanctions on South Africa as a response to its policy of apartheid and is aware that countries such as Botswana need support so as not to become unwitting victims of these sanctions. Further, the European Community has publicly supported efforts for front line states such as Botswana to become economically independent of South Africa. Therefore, the European Community's policies opposing apartheid should be a major consideration in favour of keeping the European market open to Botswana's beef products .

Table III.3
Revenue Per Kilogram of Boneless Beef Accruing to the BMC by Country of Destination; 1981-1984 ***(in Botswana Pula).***

Country	1981	1982	1983	1984
Botswana	P1.14	P1.62	P1.47	P1.73
South Africa	P2.25	P2.42	P2.51	P2.46
Mozambique	P2.27	P2.78	P2.03	P0.00
Mauritius	P2.50	P2.40	P2.50	P0.00
Reunion	P4.09	P4.07	P3.90	P4.52
Hong Kong	P2.33	P2.23	P2.55	P0.00
U. K.	P3.15	P3.66	P3.38	P3.85
Germany	P0.00	P4.24	P3.76	P3.58
Holland	P0.00	P3.20	P3.11	P3.22
Average	P2.35	P3.04	P3.05	P3.27

Source: Data collected from the Botswana Meat Commission by the author.

Figure III.2
Difference in Average Revenue Per Kilogram for Boxed Beef Sold by the BMC for Selected Countries From the Average for All Countries Expressed as a Percentage of the Average Price 1981-1984



Source: from data collected by the author.

Table III.3 and Figure III.2 represent revenue per kilogram of boneless beef accruing to the BMC after marketing and transport costs have been deducted. According to officials at the B.M.C., these figures are strongly influenced by currency fluctuations. Yet, the higher prices of the EEC market are evident. If Botswana's access to the EEC were cut off not only would Botswana lose its most important market but the average price it would receive for beef would be lower than it now receives because of the Lome Convention.

IV. The Linkages Between the Botswana Meat Commission and the Rural Cattle Producer

A. Chapter Overview

The economic linkages between the Botswana Meat Commission and the cattle producer are complex and difficult to deal with. They have been little researched and there is a scarcity of information regarding them. In assessing these linkages, this chapter covers three basic areas:

1. The proportion of total BMC revenue which is paid to cattle producers.
2. The distribution of payments to producers according to the type of producers. This will determine whether it is rich or poor producers or producers living in small villages, large villages or urban areas which benefit from marketing cattle through the BMC. Each marketing channel will be analysed separately as to how the distribution of benefits is affected by the marketing channel.

   This question of the distribution of benefits to the rural areas is given great importance by the EEC and so it has been given importance in this research.

   Since the number of cattle sold and the size of village affect the propensity to purchase goods in the rural area, these factors affect the multiplier. Therefore, the distribution of payments among large and small producers and small villages and large villages needs to be known in order to determine the rural multiplier.
3. A review of the traditional and commercial factors affecting the rationale of the cattle producer in selling his beef. By outlining how such factors affect the sale of cattle, the effect of these motivational factors on the multiplier can be shown.

B. Proportion of BMC Revenue Accruing to Producers in the Form of Payments

Unlike many third world exports, Botswana's beef exports are processed products and not raw materials. Table IV.1 shows that processed beef products dominate Botswana's beef exports.

Table IV.1
Botswana Meat Commission Exports of Beef Products According to Products and Showing Their Value in Thousands of Botswana Pula ***(P1,000).***

Product / Year	1984	1983	1982	1981
Beef Carcasses	127	786	4,723	4,868
Boneless Beef	88,081	89,041	79,937	59,908
Beef Extract	292	701	247	535
Corned Beef	4,794	5,330	5,922	5,824
Canned Tongue	298	2	0	0
Pet Food	998	1,149	192	0
Edible Offal	2,298	2,782	2,839	2,304
Compound Offal	1,355	1,190	1,331	1,309
Hides	0	320	626	394
Wet Blue Hides	8,973	5,499	4,247	2,590
By-Products	4,359	4,824	4,913	3,916
Total	111,574	111,623	104,977	81,848

Source: Botswana Meat Commission

From 1978 to 1984, an average of 54.3% of BMC revenues has gone to producers in the form of payments and 45.7% has been retained by the BMC to cover the costs of processing beef, wages to BMC employees and other costs. This research has not dealt with the cost structure of the BMC. Since the BMC is a non-profit parastatal according to Botswana law, the difference between revenue and payments made to producers for cattle is considered to be the value-added component for BMC beef products. No study was made to determine efficiency and monopsony influences on the size of this value-added component.

Table IV.2
Proportion of BMC Revenue Accruing to Producers in the Form of Payments *(in P1,000)*.

Year	Total Revenue	Payments to Producers	Payments as % of Total Revenue
1978	38,300	21,700	56.7%
1979	91,300	45,200	49.5%
1980	51,400	27,600	53.7%
1981	83,300	50,200	60.3%
1982	107,600	64,100	59.6%
1983	119,500	63,400	53.1%
1984	119,900	59,500	49.6%
Total	611,300	331,700	54.3%

Source: BMC Annual Report 1984

The economic impact of the value-added component in Botswana's beef products has been ignored by researchers when the benefits to Botswana of beef exports have been assessed. This study, too, has ignored the economic impact of beef processing on Botswana. Since almost half of all BMC revenues goes to this component, any assessment of the economic impact of Botswana's beef exports is incomplete unless it includes this important forward linkage.

C. Major Marketing Channels

The marketing channels of BMC direct sales, cattle agents, marketing co-operatives and cattle speculators constitute the links between the BMC and the rural cattle producers. All payments made to rural producers and all cattle marketed to the BMC pass through them. Therefore, data regarding each marketing channel has been collected and processed in order to determine which producers are best served by each channel and why. In terms of rural development, this information is important in relation to policies which attempt to benefit certain targetted groups of cattle producers.

Appendix A.2 shows the marketing channels and the flows of cattle and payments between the BMC and rural cattle producers.

Direct Sales to the Botswana Meat Commission

The data used to analyse direct sales to the BMC was collected from the records of the Botwana Meat Commission. The original data consisted of 1,758 recorded sales showing the producer, the number of cattle sold and the net payment made to him for that sale. By accounting for producers making more than one sale annually, these 1,758 entries were reduced to 1,340 producers who sold cattle directly to the BMC during 1984. Whether a producer lived in a small village, large village or an urban area was determined by the postal address of the producer.

During 1984, 70% of the producers selling directly to the BMC sold 15 cattle or less annually and 33% sold 5 cattle or less. The distribution of payments favoured larger producers more than the above distribution of population. The bottom 50% of producers selling the smallest number of cattle received 10% of total payments while almost 40% of total payments were made to the top 1% of producers.

This distribution of the top 1% of producers receiving 40% of the payments is similar to the distribution determined by von Massow. However, direct sales account for only 16% of the total cattle marketed and less than 3% of producers. Further, cattle marketed by speculators appear in this data as if these cattle had been raised by the speculator himself. Although von Massow's distribution is similar to that of direct sales, it is very different from the total distribution of payments and population for all cattle marketed to the BMC.

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Cattle speculators in this data cause the distribution to appear more skewed in favour

of a few large producers than it actually is. According to the McDonald report,[23] approximately 20% of the cattle marketed to the BMC originate in the rural communal areas and are marketed through speculators. This 20% is not accounted for separately in any data on deliveries of cattle to the BMC, and so, the appearance is given that the speculator himself has raised all the cattle he has sold. The four largest direct sales in 1984 of from 1428 to 4238 cattle are obvious examples of people who have purchased cattle from rural producers and have marketed them as if they were their own.

Of those selling directly to the BMC, 33% were from the urban areas, 38% were from large villages and 29% were from the small villages. Those with undetermined addresses were 1.6% of the entire population. The average number of cattle sold annually ranged from 39.3 cattle per producer from urban areas to 27.6 per producer from small villages to 16.4 per producer from large villages. Prices ranged from an average of P223.94 per beast from small villages to P237.79 for urban areas to P249.40 for large villages.

Because producers living in large villages have better access to delivery facilities, small producers from large villages would be more likely to sell cattle directly to the BMC than small producers from small villages. This access to market facilities is the probable cause for producers from small villages to sell a higher average number of cattle than producers from large villages.

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[23]McDonald, Iain, **A Report on Cattle Marketing in Botswana, 1978**, Ministry of Agriculture, Government of Botswana, Gaborone, 1978.

Table IV.3
Distribution of Direct Sales to the BMC According to the Number of Cattle Sold and Residence of the Producer *(shown as a % of total producers, cattle or payments).*

Small Village:	<6	6-10	>10	Total
Producers	10.7	7.0	11.7	29.4
Cattle	1.1	2.1	26.4	29.7
Payments	1.0	2.0	25.1	28.1
Large Village:	<6	6-10	>10	Total
Producers	12.4	9.8	15.9	38.1
Cattle	1.5	2.9	18.7	23.1
Payments	1.4	2.9	20.1	24.4
Urban Centre:	<6	6-10	>10	Total
Producers	10.2	7.0	15.4	32.5
Cattle	1.2	2.0	44.0	47.2
Payments	1.1	1.9	44.5	47.5
Totals:	<6	6-10	>10	Total
Producers	33.3	23.7	42.9	100
Cattle	3.8	7.1	89.1	100
Payments	3.5	6.8	89.7	100

Source: Botswana Meat Commission

The bar graph in Appendix A represents the data given in Table IV.3. Producers are categorized according to the number of cattle sold and their residence. This chart compares the percentage of total producers in each group with the percentage of total payments accruing to each group. Two accompanying pie charts are also included. One shows the distribution of producers according to number of cattle sold and residence of the producer. The other shows the distribution of payments according to these same categories.

Cattle Agents

The data dealing with cattle agents was taken from a sample of cattle agents' records for 1984. Five cattle agents were sampled and of these five, the data from three was considered to be reliable. These three agents together handled 17% of all the cattle marketed to the BMC in 1984. The data was taken directly from each agent's records with one out of

twenty of these agents' clients being sampled. A total random sample of 495 entries were taken.

The reason for choosing the five agents sampled was simply that they were the only agents contacted whose books were available for sampling. There was no bias perceived in sampling agents who are co-operative versus agents who are not co-operative. The three agents used in this survey are some of the largest agents in Botswana and it is assumed that their operations are identical to the operations of any other such agent.

Seventeen per cent of the producers studied in this sample had urban addresses, 53% were from large villages and 30% were from small villages. The average number of cattle marketed ranged from 6.0 for producers from small villages to 4.4 for urban areas and 3.2 for large villages. Prices ranged from P194.88 per beast for producers from small villages to P216.54 per beast for producers from urban areas to P249.71 per beast for producers from large villages.

As with direct sales, producers from small villages marketed the largest average number of cattle and received the lowest average price per beast. It appears that there are no significant speculators who market cattle through agents. Without these speculators, the data shows that cattle producers living in urban areas are not different from producers living in the villages.

Table IV.4
Distribution of Total Sales to the BMC Through Cattle Agents According to the Number of Cattle Sold and Residence of the Producer *(shown as a % of total producers, cattle or payments).*

Small Village:	<6	6-10	>10	Total
Producers	25.5	2.8	1.6	30.0
Cattle	10.4	4.7	27.2	42.4
Payments	9.8	4.9	22.7	37.4
Large Village:	<6	6-10	>10	Total
Producers	46.6	4.0	2.2	52.8
Cattle	21.7	6.5	11.7	39.9
Payments	25.0	7.0	13.2	45.1
Urban Centre:	<6	6-10	>10	Total
Producers	14.2	1.0	2.0	17.2
Cattle	6.5	1.8	9.5	17.8
Payments	6.4	1.6	9.4	17.4
Totals:	<6	6-10	>10	Total
Producers	86.3	7.9	5.9	100
Cattle	38.6	13.0	48.4	100
Payments	41.2	13.5	45.3	100

Source: Data collected by the author

Cattle Marketing Co-operatives

The data used for the cattle marketing co-operatives was compiled from the daily kill sheets from 12 co-op societies and includes the data from 2,734 individual producers. The totals for all co-operatives were calculated on a distribution of 51.2% of all cattle coming from small village co-ops and 48.8% coming from large village co-ops. For a more complete account of the collection of this data, refer to Chapter Six.

Producers from urban areas accounted for 0.5% of those marketing through co-operatives, 58% lived in small villages and 42% lived in large villages. The average number of cattle marketed per producer ranged from 2.8 for producers from small villages to 3.4 for urban areas to 3.5 for large villages. Prices ranged from P208.22 per beast for producers from urban areas to 216.12 for small villages and 221.21 for large villages.

Table IV.5
Distribution of Total Sales to the BMC Through Cattle Marketing Co-operatives According to the Number of Cattle Sold and Residence of the Producer *(shown as a % of total producers, cattle or payments).*

Small Village:	<6	6-10	>10	Total
Producers	52.5	4.7	0.6	58.0
Cattle	40.3	12.3	5.5	58.1
Payments	39.8	13.1	5.5	58.4
Large Village:	<6	6-10	>10	Total
Producers	34.3	5.2	2.0	41.6
Cattle	21.6	11.2	8.6	41.3
Payments	21.2	11.3	8.7	41.2
Urban Centre:	<6	6-10	>10	Total
Producers	0.5	0.1	0	0.5
Cattle	0.4	0.1	0	0.5
Payments	0.4	0.1	0	0.5
Totals:	<6	6-10	>10	Total
Producers	87.3	9.8	2.8	100
Cattle	62.3	23.6	14.	100
Payments	61.3	24.5	14.	100

Source: From data collected by the author.

Of all the marketing channels, the marketing co-operatives seem to be most the responsive to the smaller villages. Producers from small villages sell fewer cattle per producer through co-ops than producers in large villages. This is a reversal of the trend noted with other marketing channels where producers from small villages sold more cattle per producer than producers from large villages. The marketing co-ops have the highest representation from the small villages since 58% of their producers live in small villages compared with 30% for cattle agents and 29.4% for direct sales to the BMC. The co-ops have done a better job than other channels in penetrating the small villages and serving the smaller producers in the small villages. However, producers from small villages marketing through the co-ops continue to receive lower average net prices than producers from large villages.

D. The Distribution of Payments and Producers for All Marketing Channels Combined

According to records obtained from the BMC for 1984, 16.2% of all payments were made to producers selling directly to the BMC, 65.1% to clients of cattle agents and 18.7% to co-op members. Of the total population of producers, 2.7% [illegible]d cattle directly to the BMC, 69.8% marketed through an agent and 27.4% marketed [illegible]ough the co-ops. These figures were used as weighting factors to combine the three marketing channels to determine the total distribution of payments and producers marketing cattle to the BMC. The resulting distribution for all marketing channels is given in table IV.6.

Table IV.6
Distribution of Total Sales to the BMC Through All Marketing Channels Combined According to the Number of Cattle Sold and Residence of the Producer *(shown as a % of total producers, cattle or payments).*

Small Village:	<6	6-10	>10	Total
Producers	32.5	3.4	1.7	37.6
Cattle	14.5	5.7	23.0	43.2
Payments	14.0	6.0	19.9	39.8
Large Village:	<6	6-10	>10	Total
Producers	42.2	4.5	2.5	49.3
Cattle	18.4	6.8	12.3	37.5
Payments	20.5	7.1	13.5	41.1
Urban Centre:	<6	6-10	>10	Total
Producers	10.3	0.9	1.8	13.0
Cattle	4.5	1.5	13.3	19.3
Payments	4.4	1.4	13.3	19.1
Totals:	<6	6-10	>10	Total
Producers	85.0	8.9	6.0	99.9
Cattle	37.4	14.0	48.6	100
Payments	38.8	14.5	46.7	100

Source: from data collected by the author.

The average number of cattle sold per producer during 1984 ranged from 9.9 by urban producers to 5.3 by producers from small villages to 3.8 by producers from large villages.

Prices ranged from P236.78 per beast to producers from large villages to P229.91 to producers from urban areas to P207.57 to producers from small villages.

The large number of cattle sold by producers from urban areas reflects the influence of speculators. Speculators appear to be marketing their cattle mostly through direct sales to the BMC. Where speculators are not present as with the co-operatives and cattle agents, there is no difference in the economic behaviour of producers from urban areas and producers from rural areas.

Producers from small villages consistently received lower prices than producers from urban areas and large villages. The cause of lower prices is hard to determine. There is no reason to believe that cattle owned by producers in small villages are in poorer condition than cattle owned by other producers. The most probable cause for these lower prices is higher transportation costs since co-ops in small villages have greater distances to move cattle to a rail line than co-ops located in large villages.

Producers from small villages sell a higher average numer of cattle than producers from large villages. This trend is consistent for both agents and for direct sales although it is reversed with marketing co-operatives. This indicates that producers (and particularly the smallest producers) from small villages have less access to the BMC through agents and direct sales than other producers and that the co-ops are more oriented to the small villages.

Table IV.7
Distribution of Cattle Producers and Payments Compared to the Total Population ***(Expressed in % of Total).***

Type of Settlement	Total 1981 Population	Total Producers	Total Payments
Urban	17.7%	13%	19.1%
Large	13.9%	49.3%	41.1%
Small	68.2%	37.6%	39.8%

Source: National Development Plan 1985-91 and data collected by the author.
Note:[24]

The distribution of cattle producers is skewed in favour of large villages. Fourty-nine per cent of all producers live in large villages although only 13.9% of the total population live in these villages. Payments are not as favourably distributed toward producers in the large villages since these producers received only 41.1% of all payments. This difference between the distribution of payments and producers is caused by the smaller than average number of cattle per producer marketed by producers from large villages.

Producers from small villages are the most under-represented group of producers. Thirty eight per cent of producers live in small villages compared to 68% of the total population. In particular, it is the remote villages which lack cattle producers and hence receive very little benefit from the cattle industry.

[24]A large village was defined as any rural settlement over 10,000 people. Small villages included all rural settlements less than 10,000. Small villages were of two groups; small but developed villages were 32.5% of total population and remote settlements were 35.7% of total population. Residents of remote settlements included people who lived permanently at a cattle post or a lands area. Almost no one living in remote settlements owned cattle.

Table IV.8
Comparisons Between the BMC, Cattle Agents and the Marketing Co-operatives Showing the Distribution of Producers and Payments According to Number of Cattle Sold and Residence of the Producer ***(in % of Total).***

# Sold	Producers <6	6-10	>10	Payments <6	6-10	>10
BMC	33.3	23.7	43.9	3.5	6.8	89.7
Agents	86.2	7.9	5.9	41.2	13.5	45.3
Co-ops	87.3	9.8	2.8	61.3	24.5	14.2
Total	85.0	8.9	6.0	38.8	14.5	46.7
Settlement	Producers Urban	Small	Large	Payments Urban	Small	Large
BMC	32.5	29.4	38.1	47.5	28.1	24.4
Agents	17.2	30.0	52.8	17.4	37.4	45.1
Co-ops	0.5	58.0	41.6	0.5	58.4	41.2
Total	13.0	37.6	49.3	19.1	39.8	41.1

Source: from data collected by the author.

As one goes from direct sales to marketing co-operatives, small producers and producers in small villages become more dominant. The average number of cattle marketed by a producer through the co-ops was 3.3, through an agent the average was 4.2 and directly to the BMC, the average was 27.1. Marketing large numbers of cattle make it economical for a producer to market his cattle by himself. Small producers are more dependent on a middle man, either an agent, a co-op or a speculator to handle marketing arrangements.

Adjusting the Distribution to Account for Cattle Speculators

According to the McDonald report[25], 20% of all cattle marketed to the BMC are purchased by speculators from producers in the communal areas. The inclusion of speculators in the records of cattle deliveries creates the impression that these speculators have raised the cattle they market themselves. This causes the economic impact of small producers to be underestimated and large producers to appear more prominent than they really are. Therefore, it was felt that some effort should be made to adjust the data in order to eliminate the effect

[25] McDonald, Iain, **A Report on Cattle Marketing in Botswana, 1978**, Ministry of Agriculture, Government of Botswana, 1978.

of speculators on the distribution of the population and payments between producers.

Information on cattle speculation is very difficult to acquire. Records are scarce and information on their activities is rarely available. According to interviews with two speculators, prices averaged between P180 to P200 per animal. The reason given for these relatively high prices is that the speculative market is highly competitive and this competition keeps prices up. The markets for the buying and selling of cattle on a cash basis are well developed with producers having the luxury of choosing whichever buyer will give them the highest price.

In order to estimate the effect of speculators, it was assumed that speculators came from the group of large producers selling more than 10 cattle per year. For the sake of simplicity, the number of cattle sold but not the residence of the producer was considered. Producers were divided into only three groups; producers selling less than 6 cattle, producers selling between 6 and 10 and producers selling over 10 cattle.

It was estimated from interviews that the average price paid for a cow by a speculator was P190.00 or 78.5% of the average net price of P242.00 paid by the BMC. Therefore, 15.7% (20% x 78.5%) of total BMC payments are then paid to rural producers by speculators. This 15.7% was deducted from the 46.7% of total payments paid to large producers and then assigned the same distribution weighting for payments as the marketing co-ops. It was estimated that the return to a speculator from the sale of a cow to the BMC was 11.5% (100% - 78.5%). Therefore, 2.2% (11.5% x 20%) of total payments made to producers by the BMC ended up as returns to cattle speculators.

To estimate the distribution of population between small, medium and large producers, the number of producers selling to a speculator were added to the number of those producers already accounted for in the data as selling cattle to the BMC. As a result, the total population of cattle producers was increased. The proportion of small, medium and large producers are expressed as a percentage of the new total number of producers (previous producers plus those selling to speculators). The resulting distribution after accounting for

speculators is given in table IV.9.

Table IV.9
Distributions Between Producers Comparing Distribution Totals With Effect of Including Speculators.

	Producers			Payments		
	Small	Medium	Large	Small	Medium	Large
Not Accounting for Speculators	85.0%	8.9%	6.0%	38.8%	14.5%	46.7%
Accounting for Speculators	85.5%	9.0%	5.5%	48.4%	18.3%	33.2%

Source: data collected by the author.

This adjustment to compensate for speculators has a negligible effect on the distribution of producers according to the number of cattle sold. The effect on the distribution of payments is more pronounced. The amount of money paid to producers selling more than 10 cattle drops 29%. Payments made to producers selling between 6 and 10 is increased by 26% and payments made to producers selling less than 6 cattle is increased by 25%. These figures indicate the extent to which the data is distorted in favour of large producers when speculators are not accounted for.

E. The Effects of Traditional and Commercial Factors on the Distribution of Producers

Because of a long and severe drought, the purchase of food was an abnormally prominent reason for selling cattle in 1984 and 1985. This was especially true for poorer producers with small herds. This fact was borne out in interviews with some owners who had sold their last animal in order to feed their families. During drought conditions, small producers are more likely to sell cattle in order to buy food but in a year of good rains and good crops, they should be expected to hold back cattle in order to build up their herds. Consequently, the proportion of cattle supplied to the BMC by large producers will increase during a year of good rains and decrease during a drought.

Botswana was experiencing the fifth year of a severe drought when this study was conducted. As a result, a significant proportion of the national herd had died and arable agriculture had been almost totally destroyed. The estimates of cattle deaths vary greatly because of a lack of accurate data. The highest estimate encountered was that 40% of the national herd had been lost over the duration of the drought. Table IV.10 compiled from the data collected in this research shows the loss in crops caused by the drought.

Table IV.10
Average Annual Cash and Subsistence Income Received by Farmers from Arable Crops During 1984.

No. Cattle Sold:	<6	6-10	>10
Av. Income from Crops	0	P32.74	P30.86
Av. % of Food from Crops	14%	14%	18%
Av. % of Food from Crops with Normal Rains	68%	71%	74%

Source: Data collected by the author.

Smaller cattle owners should be less responsive to price changes than the larger producers. Small producers struggle to maintain a herd and to build it up to a viable level. Consequently, they tend to sell a cow only in order to meet an emergency irregardless of the price. Larger producers have achieved the security and viability of their herds. Consequently, they have the luxury of selling cattle to maintain an income and will respond more to price changes.

If Ndzinge is correct that a price rise will initially result in a holding back of cattle, larger producers should become more prominent suppliers to the BMC during a time of falling prices and become less prominent during a time of rising prices. Since smaller producers are less responsive to prices, they will sell cattle despite price changes. A price rise would then cause larger producers to hold back cattle and smaller producers will become more prominent as suppliers to the BMC. A drop in price would cause large producers to sell cattle and smaller producers will become less prominent as suppliers.

In 1985, there was both a severe drought and low prices. The drought caused small producers to sell cattle in order to buy food and the low prices induced large producers to sell but the exact extent of the influence of these two factors has not been determined.

F. Conclusion

A little more than half of total BMC revenue accrues to producers in the form of payments for cattle since Botswana's beef products have a high degree of value added content.

Large producers and producers living in urban areas are more prominent in direct sales to the BMC and least prominent among producers selling through the marketing co-ops. Producers selling through cattle agents are in between these two extremes. The basic reason for this is that smaller producers lack the resources to market their cattle directly to the BMC and therefore are more likely to engage a middleman.

There was no difference between producers living in rural areas and those living in urban areas once cattle speculators were eliminated from the calculations. It was expected that larger and richer producers would keep a residence in an urban area while smaller, poorer producers would live in the rural areas. This expectation was not borne out by the data. For producers marketing through either cattle agents or marketing co-operatives, the distribution between large and small producers was not affected by whether the cattle producer lived in an urban or a rural area.

Smaller producers are less likely to be influenced by price changes and are more likely to be influenced by other factors than larger producers when deciding to sell their cattle. Small producers predominantly want to build up their herd to a viable level and consequently will only sell when absolutely necessary while large producers who already have a viable and sustainable herd are more likely to respond to price changes in deciding to sell their cattle.

When prices rise, larger producers should hold back cattle in order to build up their herds. During a drought, smaller producers are more likely to sell cattle to compensate for lost crops. Therefore, a price rise will cause smaller producers to be more prominent BMC

suppliers while good rains and crops will cause small producers to hold their cattle back from market.

When smaller producers become more prominent, the economic impact in the rural areas of beef exports should be more reflective of their economic behaviour. When conditions cause large producers to be the more prominent BMC suppliers, the economic impact is more reflective of their purchasing patterns.

V. Theories of Economic Linkages and Multipliers

A. Chapter Overview

An economy benefits from exports to the extent that economic linkages exist between the export sector and the domestic economy. A multiplier measures the strength of such linkages by measuring the level of activity in the local economy induced by exports.

Theories of economic linkages are reviewed in this chapter and include the four types of economic linkages identified by Hirschman and the staple theory first developed by Harold Innis. For this research, a distinction is made between primary linkages which are linkages between the export good and the local economy and secondary linkages which are based on the general development of the economy.

A review of the theory of multipliers follows. A multiplier model was developed for this research and a description of it is given. Its functioning is based on the identification of economic linkages in the rural economy and its purpose is to disaggregate the multiplier according to round of expenditure and item purchased. The approach used to analyse the results of a disaggregated multiplier model is also given.

B. Linkages to the Domestic Economy and the Integrative Process

Economic Linkages

An economic linkage is an economic relationship where one sector's output is purchased as an input by another sector. It is defined as "the effect that the growth of one industry has on the growth of others." [26] The concept of economic linkages implies a stimulative relationship in that economic activity in one sector stimulates economic activity in other sectors whenever economic linkages exist between them.

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[26] Crane, David, **A Dictionary of Canadian Economics**, Hurtig Publishers, Edmonton, 1980

Several writers such as Hirschman, Innis and Meier have noted that the export sector must be linked with the domestic economy in order to be effective in stimulating the domestic economy. Where there are no linkages between the export sector and the domestic economy, an enclave economy is said to exist which merely extracts resources with no beneficial effect upon the domestic economy.

> *"For appraising a country's development prospects, the knowledge that its export staple is endowed with a certain constellation of linkages is obviously more revealing than the information that the staple is a tropical agricultural product."*
> Source: Hirschman, "A Generalized Linkage Approach to Development with Special Reference to Staples"

> *"Linkages capture much of the development story for a reason that has already been given: development is essentially the record of how one thing leads to another, and linkages are that record, from a specific point of view."*
> - Source: Hirschman, "A Generalized Linkage Approach to Development with Special Reference to Staples"

> *"The essence of the development through trade model is that the export sector should not remain an enclave, separate from the rest of the economy, but that an integrated process should be established. The integrative process within countries depends on the varying strength of the stimuli from their exports, according to the nature of their export base, and on the different response mechanisms within the exporting countries. The strength of the potential for development through trade will accordingly differ, depending upon the strength of the forces in the integrative process."* - Source: Meier, "International Economics; the Theory of Policy"

This issue of linking the export commodity to the local economy has also been referred to as an integrative process. In his book, Meier gave the following effects of a strong integrative process:

1. An acceleration in the "learning rate" of the economy. This refers to the rate at which skills and technology are acquired by the local economy from the export sector.
2. An enrichment of the economic and social infrastructure. Good linkages between the export sector and the local economy should result in an upgrading of infrastructures such as roads, communications, etc.
3. An expansion of the supply of entrepreneurship. The business skills gained by those involved in the export sector are applicable to other sectors of the economy and

consequently, development in these other sectors is enhanced.

4. A mobilization of a larger surplus above consumption in the form of taxation. The export sector can also be a significant source of government revenue.

The staple theory was developed by Harold Innis, W. A. Mackintosh and Donald Creighton [27] to describe Canada's early economic development. This theory stated that Canada's economic development was stimulated by the development of a series of staple exports such as fish, fur, timber, wheat and minerals. Canada's domestic economic growth and development were stimulated by backward, forward and neutral linkages between Canada's export sectors and its domestic economy. This theory has been used to describe the economic growth and development of developing countries also. In Botswana's case, beef products are the staple export and the economic benefits to Botswana's rural areas from these exports depend upon the linkages between her export sectors and her rural areas.

The concept of a "staples trap" is one of the premises of the staples theory. Innis proposed that as institutions, infrastructures and people's livelihoods become based upon a specific staple export they develop a vested interest in the perpetuation and growth of that staple export. A staples trap exists when a staple has little or no further potential for growth yet vested interests promote the further channelling of resources into the production of that staple. As a consequence of being "trapped" in a particular staple export, "good money is thrown after bad", investment is diverted from other more efficient activities and the economy stagnates.

It is necessary to know whether a particular staple has a potential for further growth. This is the value of the concept of a "staples trap" to this research. If a particular staple export has no further potential for growth, resources would be better invested in other activities. In regard to Botswana, if no further opportunity exists to increase revenue from beef exports, this should be recognized and other products should be identified in order to stimulate further economic activity and development in the rural areas.

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[27] Crane, David, **A Dictionary of Canadian Economics**, Hurtig Publishers, Edmonton, 1980

One of the earliest references in development literature to economic linkages is found in Albert Hirschman's book, "The Strategy of Economic Development[21]". Hirschman pioneered the concept of linkages, using a backward and forward linkage and, later in his work, he added a consumption and fiscal linkage. These linkages are as follows:

Backward Linkage - This linkage includes all inputs used in the production of the export commodity. For Botswana's cattle industry, this linkage consists of all inputs into the production of cattle.

Forward Linkage - This linkage consists of further processing of the primary product before it is exported. The Botswana Meat Commission is the forward linkage since all exported beef is processed by the BMC.

Consumption Linkage - This linkage covers the demand for consumer goods created from earnings gained through the export of commodities. Any consumer item purchased by a cattle producer in Botswana's rural areas is included in this linkage.

Fiscal Linkage - This linkage deals with the investment of funds accumulated from the export industry into another different industry. Hirschman regarded this linkage only from the point of view of governments taxing exports and investing these funds into other sectors. In this research, it is proposed that fiscal linkages also exist in the private sector such as the investment of cattle revenue into non-cattle activities by private producers. However, no other writers have recognized the possibility of a private sector fiscal linkage. All investments into business, arable agriculture and other sectors which originate from cattle income are included in this linkage.

Refer to Appendix B where a complete list of all items of expenditure are given and categorized according to which linkage they belong.

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[21]Hirschman, A. O., **The Stategy of Economic Development**, Yale University Press, New Haven, 1959.

Primary and Secondary Linkages

This research has differentiated between primary and secondary linkages in order to differentiate between linkages that are a function of the specific export commodity and linkages that are a function of the region's general economic development. This differentiation between primary and secondary linkages has not been done by previous researchers.

A primary linkage is defined as a linkage between the export industry and any other sector in the economy. It occurs when a cattle producer spends income earned from the sale of cattle in the domestic economy. A secondary linkage is defined as a linkage between two sectors or industries, of which, neither one are necessarily involved with the export industry. An indirect linkage occurs when a cattle producer's employee purchases food at a local shop or when the owner of that shop purchases grain from a local farmer for resale in his shop and so on.

In order to maximize the local impact of an export industry the development of both direct and indirect linkages are necessary. The initial level of income spent locally is a function of the strength of the direct linkages which exist between the export commodity and the rural economy. However, it is the strength of the indirect linkages that sustains the level of local spending over subsequent rounds of expenditure. A highly developed, differentiated and sophisticated economy by virtue of its high level of development has a high degree of linkages. Consequently, it can take better advantage of any income entering its region. A primitive economy because of its relative lack of development lacks the same linkages. Consequently, it possesses fewer opportunities to benefit from export income.

C. Multipliers

A Keynesian multiplier explains how an economy is stimulated through increased spending. Keynes postulated that the degree by which an initial injection of income was multiplied over several rounds of expenditure could be calculated from time series data by

comparing the change in the initial income caused by such an injection with the change in total income for the economy induced by the original injection of income. A multiplier is defined as "the number by which the change in income or some other element of aggregate demand in the economy is multiplied, to calculate the resulting total change in Gross National Product [29]." It is expressed in terms of a ratio of total economic activity created by the project or industry divided by the original income realized from the project or industry. This can be expressed as:

$$K = 1/(1-g) = Y/B = 1 + N/B$$ [30]

where the multiplier (K) is a ratio of non-basic spending (N) divided by basic spending (B) plus 1 or total income (Y) divided by basic spending (B). Included in Schwartz's formula is the relationship of the propensity to purchase non-basic goods (g) to the multiplier. A multiplier is determined by the propensity to purchase non-basic goods (g) since the induced local economic activity is a function of this propensity. An employment multiplier measures an impact in terms of a change in employment while an income multiplier measures an impact in terms of a change in income.

Multipliers can be used to measure the impact of exports. From this perspective, the theory of multipliers is related to models of export-led growth. A multiplier which measures the impact of an export industry on the local economy is expressed in terms of a ratio of total economic activity induced by that export compared to income earned directly from that export.

A multiplier can focus on a locality, a district or a province as well as a national economy. From this perspective, the theory of multipliers is related to theories of regional economics. A regional multiplier determines the ratio of total economic activity induced within the defined region divided by the income originally entering the region.

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[29]Crane, David, **A Dictionary of Canadian Economics**, Hurtig Publishers, Edmonton, 1980

[30]Schwartz, Harvey, **A Guide to Regional Multiplier Estimation**, Project Assessment and Evaluation Branch, Department of Regional Economic Expansion, Minister of Supply and Services, Government of Canada, 1982

The region studied in this research is defined as the communally-owned tribal land holdings in Botswana. This is a spatial definition since these areas are spatially defined according to Botswana law. Yet, the communal areas have a cultural and socio-economic aspect to them also. Urban areas are dominated by a cash economy and modern amenities while in the communal areas, subsistence agriculture and the traditional Setswana way of life are predominant although modern and traditional ways of life both exist.

The size of the village of residence is also considered important since the size of a village is strongly related to the services provided, the relative degree of economic development and to the standard of living. Although the size of the village is poorly related to spatial characteristics, it is given importance because the size of a village is often more determinant of a village's development than its location.

By defining the region of study as the communal areas, any money leaving the communal areas is regarded as a leakage and is no longer considered. Money going outside of the region and returning again was not determined because of a lack of time and resources. This rural-urban-rural linkage does exist but another more sophisticated study would be needed to determine its structure and magnitude. This is a weakness in the calculation of a multiplier. It is expected that the size of the final multiplier will be underestimated since it excludes any money returning to the region once it has left.

Models to determine a multiplier are usually based on aggregated economic activity whereas a multiplier which was specific to one industry and was disaggregated according to item and round of expenditure was desired. The equation used by Schwartz in his long-run model is a good example of the approach taken. All of these variables; Y, B, N, g and K measure economic behaviour that is aggregated in that it cannot be broken down to show specific economic activities. A description follows later of a disaggregated multiplier model which shows the variables Y, N, B and g specific to each item and round of expenditure.

The Theoretical Approach to Rounds of Expenditure

Apedaile et al defined a multiplier as "... the value of a chain of spending in reaction to an autonomous increase in income".[31] If the multiplier represents a chain of spending, then the rounds of expenditure are the links in that chain. At each round of expenditure, some income is spent within the region and some is spent outside of the region. This process continues for each round of expenditure until all the income which originally entered the region has left it. The total induced economic activity is the sum of all the income spent in the region for all rounds of expenditure.

The calculation Apedaile et al used was based on two marginal propensities to spend within the region; that of households (b) and that of businesses (b^*). From these two propensities, all the subsequent rounds of expenditure were estimated. It was assumed that spending alternates between households and businesses so that the propensity to spend for one sector would be used for all even-numbered rounds of expenditure and the propensity to spend for the other sector would be used for all odd-numbered rounds. This resulted in two possible multipliers; (K^1) when income is initially received by a household and (K^2) when income is initially received by a business.

The following equations represent the calculation of the total economic impact of income entering a region by calculating the sum of all consequent economic activity within the region:

1. $K^1 = 1 + b + bb^* + b^2b^* + b^2b^* + \ldots + b^n b^{*n}$
2. $K^2 = 1 + b^* + b^*b + b^{*2}b + b^{*2}b^2 + \ldots + b^{*n}b^n$

In the first equation (K^1) for income entering via households, the propensity to consume for households is used for each odd-numbered round of expenditure. In the second equation (K^2) for income entering via businesses, the propensity to consume for businesses is used for each even-numbered round. Note that 1 is added to the sum to account for the

[31] p.366, Apedaile, L. P., Matthews, V. and Stewin, L. L., **Evaluation of Public Intervention for Regional Development : the Edson Area Report**, The University of Alberta, May 4, 1972, Edmonton.

income which originally entered the region.

The approach used to calculate rounds of expenditure in this research evolved out of the approach used by Apedaile. The basic difference between the approach used here and Apedaile's approach is that the propensities to spend in this research are specific to economic linkages not to a household and business sector generally. Where Apedaile aggregated two propensities to spend; one for the household and one for the business sector, the approach taken here was to use propensities to spend which are specific for each item of expenditure. In order to do this, it was necessary to know 1. what proportion of income was spent on consumer items and factors of production by consumers and producers, and 2. what proportion of total spent for each was spent in the rural ar[illegible] These propensities to spend were combined with the input structures for businesses and the purchasing patterns for co[illegible]rs to develop a simulation of spending patterns rather than an aggregated estimation of these patterns.

D. The Model Used to Calculate Induced Economic Activity During Each Round of Expenditure and to Calculate the Multiplier

The purpose of this model is to show the composition of a multiplier as well as its magnitude. By disaggregating a multiplier by item and round of expenditure, it can be determined which sectors are impacted, to what extent and during which rounds. This approach also provides a record of money moving through the economy over several rounds of expenditure.

The theoretical basis for this model is that economic activity is a function of economic linkages. An economic linkage in this model is defined as a relationship between an item whose purchase is a source of income and items used as inputs or consumer goods whose purchase is the direct result of the sale of that item. The structure of an economy is determined by a structure of these economic linkages.

These linkages can be represented in matrix form. All consumer items and inputs purchased in the economy are first identified. The matrix between these items as sources of income and as expenditures represents the economic linkages occurring in this economy. For example, if income j represents income entering the economy as a payment to a tractor owner and expenditure i represents a purchase of diesel made by that tractor owner, the purchase of diesel by tractor owners is one specific linkage with N_{ij} representing the strength of that linkage since it shows the proportion of money spent on the hiring of tractors which results in purchases of diesel.

The matrix used in this research deals with specific linkages representing actual items purchased rather than categorizing them according to backward, forward, consumption and fiscal. It should be noted that backward, forward, consumption, and fiscal linkages are categories or types of linkages rather than linkages themselves. The specific linkages used represent actual expenditures such as purchases of meat, diesel, machinery and so on. To use categories of linkages (backward, forward, consumption and fiscal) in the matrix itself would be awkward and confusing because: 1. several items of expenditure function as more than one type of linkage (eg. a purchase of diesel is a backward linkage when used as fuel for a water pump, a consumption linkage when used in a private vehicle and is a fiscal linkage when used to power arable agricultural machinery) and 2. each category of linkage contains numerous actual linkages which are very diverse in their structure and their propensity to be purchased in the region (machinery of which 18% is purchased in the region and labour of which 100% is purchased in the region are both backward linkages) so linkages were not aggregated according to category in order to preserve this diversity. It is only after induced economic activity is estimated in terms of actual expenditures is this activity able to be categorized in terms of backward, consumption and fiscal linkages.

Forward linkages are not used in this matrix. The multiplier in this research is calculated on backward linkages, consumption linkages and private sector fiscal linkages only. It is the author's opinion that forward linkages by their definition can never used in an

estimation of a multiplier since a multiplier estimates total activity occuring only after a particular point of reference. Since forward linkages by definition include all economic activity occurring before that point of reference, all forward linkages are eliminated. In this study, payments to rural cattle producers were used as the point of reference for the estimation of a rural multiplier since it was at this point that income entered the rural economy. All activity occurring after these payments were made was included in the mutliplier. Economic activity occurring in the BMC is the forward linkage to this multiplier and so was not included since it occurred before these payments were made. In order for the BMC to be included, the reference point for the multiplier would need to be changed to the point where revenue is received by the BMC. However, with this change, the BMC would then no longer be a forward linkage but rather, payments to cattle producers would change from being a reference point to being a backward linkage to this multiplier.

The matrix used in this research to estimate a disaggregated multiplier was not patterned after an input-output matrix but since both are similar in concept and function a comparison has been made between them. Both models view the economy as being a system of interdependent relationships or linkages between entities or industries and both represent such a structure of economic linkages on a matrix. Both disaggregate economic activity by item of expenditure or by industry and sector. Consequently, the economic impact of the multiplier estimated from each can be disaggregated according to its sector or industry in the case of I-O or item of expenditure in the case of the matrix used in this research.

The greatest differences between these two models result from the difference in their focus of study. An input-output model is oriented towards a developed industrial economy whose region is large; usually a national economy. The model used in this research was meant to study a semi-subsistence, rural economy in Africa whose region was small. The smallness and simplicity of the rural Botswana economy allowed the luxury of dissaggregating to the level of actual items of expenditure. In a larger, more sophisticated economy, economic activity would need to be aggregated according to industry or sector as is usually done in I-O.

Households were not dealt with as a separate sector in this research as is done in I-O since the majority of economic activity in Botswana's rural areas consisted of household or "informal" spending such as paying a local tractor owner to plough a field or the purchase of a chicken from a neighbour. Instead, household spending was disaggregated to the level of specific items purchased. Import and export sectors were not specified either as in I-O. Rather, each linkage in the matrix included a factor which represented the propensity for that item to be purchased in the rural economy (refer to equations given below in this chapter). Most items purchased in Botswana's rural economy are purchased both inside and outside of the economy. Instead of specifying import and export sectors, such economic activity was represented as a propensity for an individual or small business to purchase an item or input within the region.

An input-out model uses matrix algebra to estimate a multiplier while the model used in this research estimates a multiplier by calculating each transaction arithmetically for each round of expenditure. The matrix algebraic method is more convenient, disaggregates according to sector or industry but does not disaggregate according to round of expenditure. The arithmetic method involves hundreds of simple arithmetic calculations and disaggregates for both item and round of expenditure. However, the lack of development and economic activity in a small, developing and rural economy results in an I-O matrix which lacks the density necessary for matrix algebra to be used. Therefore, the arithmetic method was used instead since the density of the matrix is irrelevant to its function.

Table V.1
Matrix Representing Potential Linkages Between All Items When Used as Sources of Income and Items of Expenditure for Each Round of Expenditure.

Expenditure:	1	2	3	...	j
Income 1:	N11	N12	N13	...	N1j
Income 2:	N21	N22	N23	...	N2j
Income 3:	N31	N32	N33	...	N3j
				...	
Income j:	Ni1	Ni2	Ni3	...	Nij

In this research, Botswana's rural economy is represented by a system of 33 items used either as consumer goods or inputs and 234 equations. Out of a possible 1024 linkages 234 are active in that transactions of money occur. Refer to Appendix B for a list of these 33 items.

This model distinguishes between rounds of income and rounds of expenditure. Every purchase or transaction is both an expenditure and a source of income. For example, a purchase of fuel is an expenditure to the purchaser and a source of income to the seller. This dichotomy between income and expenditure necessitates distinguishing a round of income from a round of expenditure. A round of income is money entering the economy and a round of expenditure is that money being spent. The non-basic spending on purchase i during round of expenditure r becomes income realized from that purchase during round of income r+1.

The Equations Used in This Model

1. $K = Y/Y^1 = 1+(N/Y^1)$

The final multiplier (K) is defined as total income (Y) divided by income received during round of income 1 (Y^1) or the total non-basic spending divided by income received during the first round of income plus 1. In this research, Y^1 is the payment made to cattle producers by the BMC.

2. $Y = X: Y^r = X^r$

Total income (Y) equals total expenditures (X) and income realized during round of income r (Y^r) equals expenditures during round of expenditure r (X^r).

3. $X = N+B: X^r = N^r+B^r$

Total expenditures (X) equal total non-basic (N) plus basic (B) expenditures. Expenditures during round r (X^r) equals non-basic (N^r) plus basic (B^r) expenditures during round r.

4. $Y = \sum_{r=1}^{n} Y^r$

Total income (Y) equals the sum of all income for all rounds of income (Y^r).

5. $N = \sum_{r=1}^{n} N^r$

Total non-basic spending (N) equals the sum of all non-basic spending for all rounds of expenditure (N^r).

6. Item i = Item j

An item whose purchase creates income in the economy (j) is the same item when it is used as an input (i). The only difference between j and i is that j denotes an item when it is a source of income and i denotes an item when it is an expenditure.

7. $Y = \sum_{i=1}^{n} Y_i$

Total income (Y) equals the sum of all income realized from sales of all items. (Y_i).

8. $N = \sum_{j=1}^{n} N_j$

Total non-basic spending (N) equals the sum of all expenditures on all consumer and input items purchased locally (N_j).

9. $Y_i = \sum_{r=1}^{n} Y_i^r$

Total income realized from sales of item i (Y_i) equals the sum of sales of item

i for all rounds of income (Y_i^r).

10. $N_j = \sum_{r=1}^{n} N_j^r$

Total non-basic spending on input item j (N_j) equals the sum of non-basic spending on input item j for all rounds of expenditure (N_j^r).

11. $Y_j^r = N_j^{r-1}$

Income realized from the sale of item i during round of income r (Y_i^r) is the same amount as non-basic spending on input item j during round of expenditure r-1 (N_j^{r-1}).

12. $N_j^r = \sum_{i=1}^{n} N_{ij}^r$

Total non-basic spending on input item i for round r ([illegible]als the sum of all non-basic spending on input item j when used as inputs for items i (N_{ij}^r).

13. $N_{ij}^r = Y_i^r \times I_{ij} \times P_{ij}$

Non-basic spending on input item j when it is used as an input for item i during round of expenditure r (N_{ij}^r) equals;

a. the income realized from the sale of item j during round of income r (Y_i^r) times
b. the proportion of income realized from the sale of item i which is spent on input j when input j is used as an input for item i (I_{ij}) times
c. the proportion of expenditure on input j when it is used as an input for item i which is purchased in the rural economy (P_{ij}).

These two factors (I_{ij} and P_{ij}) are used in the matrix representing linkages to translate item of income i (Y_j) to item of non-basic spending ij (N_{ij}).

14. $g^r = N^r/Y^r = Y^{r+1}/Y^r$

The propensity to purchase locally for round r (g^r) equals non-basic spending during round of expenditure r (N^r) divided by income realized during round of income r (Y^r). It also equals income realized during round of income r+1 (Y^{r+1}) divided by income realized during round of income r (Y^r).

The Approach Taken to Analyse the Results of This Model

The purpose of this analysis is to identify those linkages, items and sectors which most stimulate rural economic activity, those which least stimulate this activity and those which have the greatest potential for development. A linkage is considered strong and beneficial to the rural economy if the propensity to purchase locally is high. A linkage is considered weak and not beneficial to the rural economy if the propensity to purchase locally is low. The concept of the "effective multiplier" is included in analysing the relative benefits to the rural economy of each linkage.

The rounds of expenditure to be looked at are round 1, rounds 2 to round n and the total for all rounds. Round 1 is based on primary linkages between the export staple and the local economy. Rounds 2 to round n are based on the secondary linkages and on the general development of the rural economy. The total for all rounds shows the total economic impact of money entering the rural economy through the specific linkage under study.

The results from these rounds are grouped together to show a pattern of primary and secondary linkages which results in the final economic impact. Three types of patterns are possible; where both linkages are strong, where both linkages are weak and where one linkage is strong but the other is weak. A pattern where all linkages are strong shows a strong impact on the rural economy. This pattern is associated with a viable local industry such as brick manufacturing or housing construction. A pattern where all linkages are weak shows a weak impact on the rural economy. This pattern is associated with goods imported from outside the region such as automobiles or tractors. A pattern showing a strong and a weak linkage shows

a potential for development since the strong linkage is based upon a viable local activity but the weak linkage prevents this activity from being fully taken advantage of.

Two analyses will be undertaken. One from the perspective of spending by producers and the other from the perspective of spending on specific items. The analysis based on producers' spending will determine the multiplier and the composition of the multiplier specific to the type of producer. The analysis based on items purchased will determine the multiplier which is specific to each item purchased by the producer. With both analyses, the above approach of studying the patterns of primary and secondary linkages will be taken.

An analysis of the multiplier orientated towards producers relates local economic activity according to round of expenditure and item or sector with each type of producer. The first round of expenditure is based on the producer's propensity to purchase locally. The second to final rounds show the secondary linkages activated by the purchase of these goods. The multiplier for each group shows which group of producers has the greatest impact on the local economy and which sectors receive this impact.

A multiplier specific to each item is determined by calculating a multiplier when 100% of income is spent on the one item specified. This exercise is carried out for all items until the induced economic activity specific to each item is calculated. In analysing this multiplier, the propensity of the producer to purchase each item locally is included with the primary and secondary linkages. The first round of expenditure is based on the primary linkages between the item and the local economy, the second to last rounds of expenditure are based on the secondary linkages activated by the purchase of the item and the total for all rounds constitutes the total economic impact created by the purchase of the item.

The concept of the "effective multiplier" relates to the economic structures associated with the multiplier. The sectors impacted by induced economic activity and the effect this has on the local economy is a function of the structure of economic linkages activated by the export commodity. One export commodity will have a different structural impact on the local economy than another different export commodity. Therefore, the magnitude of the multiplier

effect alone does not give a complete picture of the impact of an export commodity. In analysing the multiplier, the structural composition of the multiplier as well as its magnitude is important in order to fully understand the impact t[illegible]xport earnings from each specific commodity has on the local economy.

One aspect of the "effective multiplier" is the potential existence of an illusion of economic activity when money circulates around the economy without in fact having much effect. One example of this illusion is found in the retail merchandising sector in rural Botswana. The goods sold in this sector are all imported. A large amount is spent in the rural areas on these items and this entire amount is accounted for as economic activity in the rural areas. However, only a small proportion of this expenditure is spent on local inputs such as labour while the rest leaves the region. If the wholesale sector was located in the rural areas, this illusion would be reinforced. Retailers would spend a large amount on goods purchased from wholesalers and this whole amount would again be accounted for as rural economic activity. Yet, again, only a small proportion of this expenditure would be spent by the wholesaler on local inputs despite a large amount of spending being accounted for as rural economic activity. Botswana's rural retail sector showed a high level of economic activity but because of structural aspects, its benefit to the rural economy is much less the level of rural retail purchases would indicate.

It could be argued that personal income and capital investment constitute the only real economic impact on a regional economy. If this is so, then a multiplier which has a high proportion of income and capital investment is preferable to a multiplier which has a low proportion of these even though the latter multiplier may be greater in magnitude. The "effective multiplier" would then be a measure of the personal income and capital investment created by an injection of funds from an exported commodity.

VI. Spending Patterns, Income Sources and Background Information Derived from a Survey of Cattle Producers

This chapter covers a review of the collection of the data, an analysis of the data obtained from the questionaires asked of producers and their wives. Three types of questions are considered: expenditures by producers and their families, parametric questions providing descriptive information such as income sources and non-parametric questions providing background information. A statistical analysis of the data includes a measurement of the variance of the data and of the distinctiveness of various groups of producers. The purpose of this analysis is to determine the strengths and weaknesses of the data in regard to analysing income sources, spending patterns and the calculation of the multiplier. An analysis of the results covering income sources, background information and spending patterns of producers concludes this chapter.

A. Procedures Used to Collect the Data

Two sets of data were needed. One set determined the spending patterns of cattle producers and their families. A second set was needed to determine the spending patterns of firms supplying inputs and consumer goods to cattle producers. These two sets of data were collected through surveys and from secondary sources.

The sample for the first survey consisted of 69 randomly selected producers from a population of 1,743 selling cattle through the cattle marketing co-operatives in five districts in Botswana. The second set of data was collected by various means. Four surveys were conducted involving 15 tractor owners, 18 rural retail stores, 9 local building contractors and 13 local brick manufacturers. Data was collected from: the records of 33 loans for boreholes made by the National Development Bank regarding the costs of boreholes, District Agriculture Offices regarding purchases of fencing materials by 603 local farmers, the Ministry of Education regarding school fees and the cost structure of inputs for a bus company. Interviews were conducted with each Veterinary Officer and District Agricultural Officer in

each of the districts surveyed and with officers of the Ministry of Commerce and Industry. A full account of these surveys is given in Appendix C.

B. The Problem of Unquantified Responses

Nearly every questionnaire had responses to some questions that were unquantified. An unquantified response is a response which gave inadequate information such as a respondent confirming that money had been spent on a purchase but did not know the amount spent. Usually these unquantified responses were caused by a lack of memory. Some examples of unquantified responses were "Yes, I purchased some of commodity X but I forget what I paid for it" or "Yes, I received an income remittance from my relative but I never kept track of how much has been remitted to me over the past year."

In most cases the respondent could remember the brand name, size and number purchased of an item. This information was recorded in lieu of data on money spent and was filled in later from information gained in a price survey of local shops.

In dealing with unquantified responses where neither the price nor the amount purchased was remembered, two options could be followed: 1. the mean of all defined responses could be substituted for each unquantified response or 2. unquantified responses could be disregarded with only quantified responses being included in the sample.

Both approaches involved undesireable consequences. Not enough information existed to indicate that the substitution of the mean would be an appropriate substitute for an unquantified response. Also, substituting the mean for each unquantified response would reduce the variance of the sample. However, all unquantified responses represented expenditures and the exclusion of these responses would create a bias toward responses showing no money being spent and the mean for each question would be reduced.

It was decided to eliminate all unquantified responses from the sample. The bias toward responses showing no expenditures resulting from the elimination of unquantified responses from the sample was less disadvantageous than the lack of information implicit in

substituting the mean for an unquantified response.

The existence of unquantified responses made it impossible to determine total expenditures for each producer. For example, if clothing was unquantified for one producer and so eliminated and food was unquantified for another, the totals for these two producers could not be compared because food and clothing are two different types of expenditure. There was no such bias involved in eliminating undefined responses for a specific question since all responses were for the same item. Therefore, only the mean for each specific question could be calculated. The total average expenditure by each group of producers was calculated by totalling the mean expenditure for each question for each group of producers.

C. The Statistical Tests Performed on the Data

Measures of Relative Variance

It was anticipated that the data from parametric questions would have a high degree of variance because of its sources, the manner in which it was collected and the wide range of subject matter which was being covered. Because of this anticipation, testing for variance was considered to be important and the coefficient of variance was used as a measure of the relative variance of the data.

Producers were categorized into six groups according to village size and the number of cattle sold annually. Producers were initially divided into two groups, one from small villages and one from large villages. Each of these two groups was further divided into another three groups of producers: small producers selling less than 6 cattle, medium producers selling from 6 to 10 cattle and large producers selling more than 10 cattle to produce a total of six groups of producers. A separate measurement of variance was taken for each of the six groups of results for each parametric question.

Measuring the variance for the results from questions covering expenditures involved taking 360 separate measurements. Expenditures covered 60 questions and six measurements

were calculated for the results of each question.

Table VI.1
Distribution of Groups of Producers According to Measures of Coefficients of Variation for Data Regarding Expenditures

Coefficient of Variation	No. of Measurements
0*	71
1-99%	36
100-199%	102
200-299%	100
300-399%	51
Total	360

*note: 0% Coefficent of Variation is caused by groups where no expenditure was recorded so therefore, the coefficient of variation was 0.

There were 15 parametric questions covering descriptive information including income sources. As with the questions covering expenditures, six tests were done on the results of each question which resulted in 90 separate tests.

Table VI.2
Distribution of Groups of Producers According to Measures of Coefficients of Variation for the Results of Parametric Questions Covering Descriptive Data.

Coefficient of Variation	No. of Groups
0*	14
1-99%	35
100-199%	15
200-299%	18
300-399%	8
Total	90

*note: 0% Coefficient of Variation is caused by groups where all readings recorded were 0 so therefore, the coefficient of variation was 0.

The modal group for the coefficients of variation for the results covering expenditures was 100% to 299%. The modal group for the results covering descriptive questions was 1% to 99%. These coefficients show high levels of variance relative to the mean and were in accord with the expectations mentioned earlier regarding the data. The coefficients of variation were higher for the group of questions covering expenditures than for the group of parametric

questions covering descriptive items. In particular, the questions covering the amount and composition of income had the least variance of all.

It was expected that the high coefficients of variation would result in wide confidence intervals and cause difficulties in proving distinctiveness between groups of producers. It was also expected that the lower levels of variance realized for the results from descriptive questions would result in a higher level of distinctiveness for the results of the descriptive questions than for questions covering expenditures.

Wide confidence intervals caused by the high levels of variance undermined the precision of the results. To overcome this, it was decided to group results and to emphasize results representative of a number of questions rather than the results from specific questions.

Tests for Distinctiveness Between Groups of Producers

The purpose of conducting tests for distinctiveness was to determine whether the two characteristics of village size and the number of cattle sold influenced the behaviour of cattle producers. The degree to which producers grouped according to cattle sales and village size were distinct in their economic behaviour would constitute a measurement of the influence these two variables had on cattle producers' behaviour. If there was no distinctiveness between these groups of producers, it could be concluded that village size and cattle sales had no significant influence and the results could then be pooled.

Statistical proofs of distinctiveness among groups of producers may be undermined because of the income inelasticity of some items of expenditure. Items such as mealie meal are basic necessities whose consumption does not increase as income increases. Consequently, no statistically significant proof of distinctiveness would be shown among groups of producers in regard to such purchases. For this research, distinctiveness in regard to the complete spectrum of producers' behaviour was emphasized over distinctiveness regarding one particular aspect or purchase. Therefore, the income inelasticity of certain items was considered to have the effect of causing the statistical proofs of distinctiveness among groups of producers to show less

distinctiveness than actually existed.

Because two criteria were used: annual sales of cattle and the size of the village of residence, a two-way anova test would have been a preferable test. However, a two-way anova test must have the same number of readings for each group and the existence of unquantified responses prevented this. Instead, a one-way anova, a difference of means t-test and Chi-X tests were conducted.

A one-way anova test was conducted to test for distinctiveness between producers grouped according to cattle sales. One test was done for producers from small villages and one for producers from large villages for each question. A confidence level of 90% probability was chosen to indicate a positive response.

Table VI.3
Results from the One-Way Anova Testing Distinctiveness Among Groups According to Number of Cattle Sold.

Size of Village:	Small	Large	Total
Questions on Expenditures			
Positive Results:	4	7	11
Total No. of Tests:	60	60	120
Descriptive Questions			
Positive Results:	7	6	13
Total No. of Tests:	15	15	30

For expenditures, 9% or 11 responses out of 120 tests were positive. For descriptive questions, 43% or 13 responses out of 30 tests were positive.

To test for distinctiveness regarding producers grouped according to the number of cattle sold, a difference of means t-test was done on all the parametric results . Three tests were done according to cattle sold:

1. Between small producers and medium producers (<6 to 6-10).
2. Between medium producers and large producers (6-10 to >10).
3. Between small producers and large producers (<6 to >10).

Three such tests were done for producers from small villages and three for producers from

large villages. Six tests were done on the results from each question. A 90% probability was chosen to signify a positive result of distinctiveness.

Table VI.4
Results from the Difference of Means t-Test Testing Distinctiveness Among Groups According to Number of Cattle Sold.

Size of Village:	Small	Large	Total
Questions on Expenditures			
Positive Results:	39	44	83
Total No. of Tests:	180	180	360
Descriptive Questions			
Positive Results:	19	17	36
Total No. of Tests:	45	45	90

The results for cattle sales showed that for expenditures, 23% or 83 out of 360 tests were positive. For descriptive questions, 40% or 36 out of 90 tests were positive. These results were evenly distributed between small and large villages.

To test for distinctiveness between producers living in small and large villages, three difference of means t-tests were conducted on the results of each of the questions covering expenditures. Each test compared the mean from a small village with the mean from a large village. Only the means from groups selling the same number of cattle were compared. A 90% probability was chosen to signify a positive result of distinctiveness.

Table VI.5/
Results from the Difference of Means t-Test Testing Distinctiveness Between Groups According to the Size of the Villages of Residence.

No. of Cattle Sold:	<6	6-10	>10	Total
Questions on Expenditures				
Positive Results:	11	11	17	39
Total No. of Tests:	60	60	60	180
Descriptive Questions				
Positive Results:	4	5	3	12
Total No. of Tests:	15	15	15	45

The results comparing the means for village size showed that for expenditures, 39 tests out of 180 were positive. For descriptive questions, 27% or 12 tests out of 45 were positive. The results were reasonably evenly distributed among producers grouped according to the number of cattle sold except for expenditures, where greater distinctiveness between small and large villages was observed for large producers.

For non-parametric questions used to provide descriptive information, a Chi-X test was used to determine distinctiveness in regard to village size and cattle sold. A 90% probability was chosen to signify a positive result of distinctiveness.

Table VI.6
Results from the Chi-X Tests on the Results of the Non-Parametric, Descriptive Questions Testing Distinctiveness Among Groups According to the Size of the Villages and the Number of Cattle Sold.

Criteria	Positive Results	Total Tests
Size of Village:	8	33
No. Cattle Sold:	14	33

In regard to the size of village, 24% or 8 out of 33 tests were positive. For the results grouped according to the number of cattle sold, 42% or 14 out of 33 tests were positive.

It was concluded from the results of the above statistical tests that the variables of village size and number of cattle sold were significant influences on the behaviour of cattle producers although only a weak case could be made for this conclusion. It was thought that

these results underestimated the strength of these variables because of income inelasticity, high coefficients of variance and the uncertain results of some non-parametric questions.

High coefficients of variation were interpreted to mean that other influences were obscuring the influence of cattle sales and village size in the data. Such influences included patterns of purchasing where items meant to last for several months were purchased in bulk and the large number of responses which showed no expenditure at all on many items. Cattle sales and village size could well be influential, but these influences could not be clearly seen because of the effect of other such influences. Some of the non-parametric tests were poorly understood by respondents although tests were run on them despite this. Therefore it is questionable whether a lack of positive results for some of these questions resulted from a lack of distinctiveness or from poor comprehension by the respondents.

It was decided to keep the results grouped according to village size and cattle sold and not to pool them. Because of the weak statistical basis of the results, the reliablility of the results from specific questions was undermined. Therefore, it was decided to focus on patterns occurring over a number of questions rather than on the results from specific questions.

D. Interpretation of the Results

The Results of the Descriptive Questions Regarding Composition of Income

The variables of village size and number of cattle sold annually were most influential in regard to both cattle and non-cattle sources of income. In particular, wages, family remittances and total income showed distinctiveness to both of these variables. Arable crops were eliminated by the drought and so no valid conclusions can be drawn in regard to them. Because of very few responses, only the most basic conclusions can be drawn in regard to pension income and income from businesses.

Table VI.7
Composition of Total Income Showing Amount from Each Source in Botswana Pula and Percentage of Total Income According to Size of Village and Number of Cattle Sold Annually.

Small Villages

Source:	<6 Cattle Amount	%	6-10 Cattle Amount	%	>10 Cattle Amount	%
Cattle Sales	401	56	1686	46	3962	84
Sale of Crops	0	0	0	0	85	2
Wages	194	27	1200	33	366	8
Remittances	136	19	317	9	86	2
Business	0	0	0	0	0	0
Pensions	0	0	459	13	0	0
Other Sources	0	0	39	1	251	5
Total Income	710	100	3661	100	4739	100

Large Villages

Source:	<6 Cattle Amount	%	6-10 Cattle Amount	%	>10 Cattle Amount	%
Cattle Sales	486	23	1871	51	4104	74
Sale of Crops	0	0	57	2	0	0
Wages	1443	69	1578	43	498	9
Remittances	112	5	40	1	38	1
Business	80	4	0	0	623	11
Pensions	0	0	180	5	124	2
Other Sources	4	0	65	2	196	4
Total Income	2105	100	3648	100	5579	100

Source: data collected by the author

There appears to be considerable economic activity in the rural areas outside of the cattle industry. Non-cattle economic activity occurs predominantly in the large villages but significant non-cattle economic activity goes on in smaller villages as well.

In the small villages, income from cattle sales was the majority of total income for the smallest and the largest groups of producers. Small producers gained 56% of their income from cattle sales while large producers gained 84% of their income from cattle sales. Medium producers selling 6 to 10 cattle, gained only 46% of total income from cattle sales. In the large villages, the percentage of total income gained from cattle sales increased with the number of cattle sold. Small producers from large villages gained only 23% of their income from cattle sales compared to 51% for medium producers and 74% for large producers.

Wage employment was the most important non-cattle source of income. Wages comprised 69% of total income for small producers in large villages. This compares to 27% of total income for small producers from small villages. For large producers, wages were only 8% or 9% of total income. These results indicate that small producers from small villages have a relative lack of opportunity to participate in the cash economy. Medium producers are most involved in wage employment and large producers seem to be content to live off cattle income and are disinclined to pursue other income sources.

Remittances were the second most important source of non-cattle income. Generally, the poorer one is, the greater is the tendency to receive remittances. However, this tendency is moderated by the fact that a lack of economic resources inhibits the ability of a family to gain outside income. The poorest group: the small producers from small villages, gained 19% of their income from remittances. Although this is the highest level of remittances in percentage terms, it amounts to P136.36 which is less than half of the P317.14 gained by medium producers from small villages. Large producers received negligible amounts of remittances.

Table VI.8
Comparison of Total Annual Expenditures to Total Annual Income *(in Botswana Pula).*

Cattle Sold	Small Villages Expend.	Income	Large Villages Expend.	Income
<6 cattle	2126	710	2904	2102
6-10 cattle	4352	3661	5531	3648
>10 cattle	4593	4739	8546	5579

Source: from data collected by the author

The levels of total income reported by respondents were generally lower than the levels of total expenditures. Total expenditures by producers were calculated from their responses to questions on expenditures. From experience gained in collecting this data, the levels of expenditure should be considered to be more reliable than the levels of income. It is common for producers to be reluctant to disclose their incomes for fear of paying increased taxes and so levels of income should be expected to be underestimated.

The same pattern existed for expenditures as was established for income. Both expenditures and income increased as the number of cattle sold increased. Also, income and expenditures are greater for producers in large villages than for producers from small villages.

The per capita gross domestic product for Botswana for 1983 was approximately P990.00. Since the average number of dependents per producer was 7, the data on incomes and expenditures shows that cattle owners do not enjoy incomes higher than the national average.

The Results of The Chi-X Tests Done on Non-Parametric Questions

The results show that producers in small villages tend to be more traditional and closer to their herds than their counterparts in the large villages. Producers from small villages are more likely to tend their cattle themselves and to obtain inputs such as water and labour from relatives. Producers from large villages tend to obtain such inputs commercially through business dealings and to hire someone to tend their cattle.

Since larger producers and producers from large villages are more likely to have cash their behaviour is closely associated with cash spending. They water cattle from boreholes they own, are more likely to plough fields with tractors they own and tend to hire someone to mind their cattle. Small producers especially from small villages are associated with activites not related to cash. They plough their fields with donkeys or animal draught, rely on natural water sources to water their cattle and tend their cattle themselves.

All the single-owner boreholes were owned by large producers living from large villages while large producers from small villages were more likely to own a borehole through a syndicate. Small producers from large villages predominantly bought water from a borehole owner or from the government while small producers from small villages predominantly bought water from a relative. The poorest producers would use only natural water sources where no money was needed to obtain water.

Ploughing was predominantly done by farmers hiring a tractor owner to plough their fields. Thirty-four out of 69 of those interviewed hired a tractor. Only ten out of 69 used cattle while 17 owned their own tractor. A statistically significant relationship was obtained between the herd size and the method used to plough one's fields. In particular, a statistically significant relationship was shown between the number of cattle sold and both tractor ownership and the use of cattle to plough fields. For those who used cattle to plough fields, there was a statistically significant relationship between herd size and the use of females to plough fields showing that females and other unsuitable animals will be used when herds are small. There was a statistically significant relationship between selling less than 6 cattle annually and the use of donkies to plough fields. These small producers were the only ones to use a donkey to plough their fields. Only one producer selling more than 10 cattle used animal draft at all to plough. The hiring of a tractor to plough was equally found in all groups.

There was a statistically significant relationship between the motivations for selling cattle and the number of cattle sold annually. A positive Chi-X score was obtained showing that small producers preferred to build up their herds and large producers preferred to sell cattle for cash. Whether a producer sold cattle on a regular basis, for special purposes or only for emergencies, showed a statistically significant relationship with the number of cattle sold. As the number sold decreased, a producer was less likely sell cattle regularly and more likely to sell cattle only for special purposes or emergencies.

Female-headed households owning cattle were generally small producers except for a couple of rich widows. Eight producers or 11% of the total of 69 were women which compares to 20% of Botswana's total households which are headed by women.

Spending Patterns of Rural Cattle Producers

The results for the 60 questions covering expenditures were grouped into nine groups; arable expenses, personal expenses, other expenses, cattle input costs, housing costs, education costs, food costs, fuel costs, and clothing and furniture costs. This was done for simplicity of

analysis and to overcome the problem of high coefficients of variation. Both the total amounts spent on each item and the amounts spent locally on each item were calculated. Combined, these two amounts were used to determine the propensity to purchase goods locally for each item. The amounts spent locally were determined by asking producers the percentage of their expenditures spent locally. The total amounts spent by each producer for each item were multiplied by this percentage figure to determine the amount spent locally by each producer on each item.

The amounts spent on each item are expressed as mean amounts and as percentages of total amount spending by each group of producer. Because the reported total incomes were suspect, the total amounts spent by each group of producer was used as the base for any amounts expressed in percentage terms. It was felt that expenditures expressed in percentage terms were more revealing that the mean amounts although both expressions are given.

Table VI.9
Local Expenditures by Item by Cattle Producers According to Size of Village and Number of Cattle Sold *(in Botswana Pula).*

Village Size:	Small:			Large:		
Item / # Sold:	<6	6-10	>10	<6	6-10	>10
Arable	73	281	194	274	312	554
Other	9	65	57	28	257	111
Personal	69	129	395	44	150	352
Cattle	242	511	601	271	847	1359
Housing	77	943	722	19	175	436
Education	103	25	170	146	194	163
Food	1054	584	819	1143	1384	1866
Fuel	59	90	58	78	69	182
Clothing	112	141	232	400	201	348
Furniture	33	0	57	46	203	0
Total	1831	2768	3306	2451	3792	5371

Source: from data collected by the author

Table VI.10
Percent of Total Estimated Income Spent Locally by Cattle Producers on Each Item According to Size of Village and Number of Cattle Sold.

Village Size:	Small:			Large:		
Item / # Sold:	<6	6-10	>10	<6	6-10	>10
Arable	3.4	6.5	4.2	9.4	5.6	6.5
Other	0.4	1.5	1.2	1.0	4.6	1.3
Personal	3.2	3.0	8.6	1.5	2.7	4.1
Cattle	11.4	11.7	13.1	9.3	15.3	15.9
Housing	3.6	21.7	15.7	0.7	3.2	5.1
Education	4.9	0.6	3.7	5.0	3.5	1.9
Food	49.6	13.4	17.8	39.4	25.0	21.8
Fuel	2.8	2.1	1.3	2.7	1.2	2.1
Clothing	5.3	3.2	5.1	13.8	3.6	4.1
Furniture	1.5	0.0	1.2	1.6	3.7	0.0
Total	86.1	63.6	72.0	84.4	68.6	62.9

Source: from data collected by the author

Arable Expenses

This group of expenditures includes all arable agricultural expenses. The majority of expenses were for tractors and equipment used for the ploughing of fields and for fencing material. Negligible amounts were spent on other inputs such as fertilizers and pesticides.

Those living in large villages spent a larger proportion of their income on arable expenses than those living in small villages. Those living in small villages spent a greater proportion of their income hiring tractors than farmers from large villages while farmers from large villages spent a larger proportion of their income operating tractors they owned. This is attributed to small villages being more subsistence oriented and having lower levels of cash income than small villages particularly among small producers.

There was little difference in the amounts spent on the purchase of fencing materials except that small producers spent nothing on fencing whatsoever. Medium producers spent a greater proportion of their income on fencing than those selling more than 10 cattle. This is attributable entirely to differences in income levels.

Producers from small villages had a greater propensity to purchase arable agricultural inputs in the rural areas than producers from large villages. This is attributed to producers from small villages hiring a tractor while producers from large villages tend to own their own tractors and associated equipment. Hiring a tractor involves spending money locally since the man hired lives locally. The expenses incurred in operating a tractor involves spending money in an urban area because this is where the majority of these inputs are purchased.

Personal Expenses

This group of expenditures included health expenses, ceremonial expenses (weddings and funerals), the purchase of vehicles and bus tickets. Expenditures ranged from a low of .9% of total expenditures for small producers in large villages to 15.1% of total income for large producers living in large villages.

The purchase of vehicles was the most influential item determining this pattern. Large producers from large villages spent 12.1% of their total expenditures on the purchase of vehicles. Medium producers spent 5.0%. Small producers generally and all producers from small villages spent nothing at all on the purchase of vehicles.

Expenditures on health ranged from 0 spent by small producers from large villages to 1.6% spent by large producers from small villages. Government health services are heavily subsidized to the extent of being free to those unable to pay. Since this question included expenditures on traditional doctors, much of these expenditures were spent on traditional medicine. Ceremonial expenses showed a similar pattern with expenditures ranging from 0.1% for small producers from large villages to 6.2% for large producers from small villages. Large producers from large villages spent only 0.1% on ceremonial expenses but this is considered to be an aberration.

Expenditures on bus tickets showed an opposite trend to the other items in this group. Generally, small producers spent a larger proportion of their incomes on bus tickets than large producers. Expenditures ranged from 4.8% for small producers from small villages to 0.9% for

medium producers.

Other Expenses

This group included other business expenses, payment of loans and taxes. Other business expenses and loans constitute a private sector fiscal linkage since they cover cattle income which is invested in arable agriculture and unrelated businesses. Other business expenses consisted entirely of producers investing income in the construction of a village shop. Medium producers from large villages spent 2.3% of their income on this. Large producers from large villages spent less than 0.1% of their income on such investment while no small producer or any producer from a small village spent money on the construction of a village shop. It appears that large producers are already earning a comfortable living from cattle alone and have little incentive to diversify their business. Small producers do not have the excess capital to invest and the economic opportunities and the way of life in small villages do not encourage producers to branch off into other commercial ventures.

Borrowing money is a prominent economic activity particularly for larger cattle producers. Expenditures for the repayment of loans ranged from 0 for small producers from small villages to 9.9% for medium producers from large villages. Small produeers spent negligible amounts on loans while large producers spent between 5.7% and 7.7% of their income on the repayment of loans. Borrowing was strongly related to the purchase of cattle for breeding purposes, purchase of tractors and other related agricultural equipment.

The payment of taxes ranged from 0.4% of total income for small producers from small villages to 2.3% for medium producers from large villages. The relationship of paying taxes to the number of cattle sold and the size of village was statistically significant. Small producers paid fewer taxes than large producers and producers from small villages paid fewer taxes than producers from large villages. Taxes are not a large expense compared to other expenses. Further, the collection of taxes is done unevenly which explains why producers living in small, hard to reach villages pay fewer taxes than those in large villages which are

easily accessible.

Cattle Input Costs

This group includes all expenses directly related to the raising of cattle. The proportion of total expenditures spent on cattle inputs increased slightly as the number of cattle sold increased mostly because large cattle owners tend to use boreholes while smaller cattle owners use cheaper water sources. Producers in small villages spent slightly less than producers from large villages because they perform many of the tasks themselves that producers from large villages hire a herdboy to perform. There was a high propensity to purchase cattle inputs in the local economy (98% to 75%) because most cattle inputs are purchased through the government which has depots located in the rural areas.

The number of cattle sold annually had little effect on animal husbandry practises except where cash was involved. Practises such as de-horning, vaccinating and spraying for ticks were followed by both small and large producers in small and large villages since these services are supplied almost free of charge by the government. Supplementary feeding was affected by the number of cattle sold and the size of the village because this must be bought. The propensity to purchase supplementary feed increased with an increase in the number of cattle sold and the size of the village. Large producers were more likely to purchase cattle for breeding purposes but the size of village had no influence on such purchases. The large producers and producers from large villages spent more on herdboys than small producers and producers from small villages both in terms of money and in food supplied to herdboys. Producers in small villages spent more on kraals than producers in large villages, likely as a result of producers from small villages being more involved in the tending of their cattle than producers from large villages.

Housing Costs

This includes money spent on building supplies, the hiring of a builder and/or the hiring of a building contractor. Producers from small villages spent more than three times the proportion of their income on housing than did producers from large villages. In small villages, this ranged from 4.7% of total expenditures for small producers to 28.8% for medium producers. In large villages, this ranged from 0.7% of total expenditures for small producers to 6.5% for large producers. This difference is hard to explain. In most large villages, very few traditional rondovels now exist. It could be that the market for "European" cement block houses has been satisfied in the large villages and people from the small villages are now catching up to the large villages.

Education Costs

This group includes expenditures on secondary schools and other institutions such as the brigades, technical institutions and university. The proportion of total expenditures spent on education varies inversely with the number of cattle sold although there is very little difference in the absolute amounts spent either in terms of cattle sold or size of village. The figures range from 5.4% of total expenditure by small producers from small villages to 2.2% by large producers from large villages. A high proportion of this money is spent in the rural areas. Figures range 99% to 75%. This is caused by the high number of secondary schools and brigades located in rural areas.

Food Costs

Expenditures on food ranged from 53.6% of total expenditure for small producers from small villages to 21.7% for large producers from small villages. Botswana was experiencing the fifth year of a severe drought during the time this survey was conducted. Therefore, expenditures on food should be expected to have been more prominent than during a year of good rains.

Most food was purchased in the rural areas (98.5% to 82,1%). This indicates that there are a large number of shops selling food in the rural areas and it is consistent with indicators mentioned earlier which indicate a high degree of economic development in the villages.

A number of food items showed little or no distinction between groups of producers. These were generally staple food items and included purchases of sorghum, maize, rice, samp, sugar, tea, cooking oil and clothing. Those items showing the greatest distinction were those items either being income elastic or provided by subsistence means in the smaller villages. These included meat purchased from a store, beans, vegetables purchased from a store, milk, soap, bread flour, paraffin and furniture. Soap was the item whose purchase was most influenced by village size and number of cattle sold. Producers spent more on soap as one moved from small villages to large and from small producers to large producers. Expenditures on bread flour increased as one moved from small producers to medium producers but declined for large producers selling since these producers tended to buy bread already baked.

Fuel Costs

This group included expenditures on wood, paraffin and other fuels. The amounts spent on fuel ranged from 3.6% of expenditures for medium producers from small villages to 1.4% for medium producers from large villages. There is no statistically significant difference between the absolute amounts spent on fuel between the various groups of producers. It was expected that people in large villages would spend more on fuel than those in small villages because wood is more easily gathered in the smaller villages. It was expected that richer people would spend more on fuels such as paraffin and gas than poorer people. However, this was not born out in the results. The propensity to purchase fuel in the rural areas ranged from 58% to 98%.

Clothing and Furniture Costs

It was impossible to determine any trends for expenditures on clothing and furniture in regard to the number of cattle sold and the size of village because of the problem of high levels of variation. With furniture expenditures, problems of high variance were compounded by the small number of people who spent money on furniture. Expenditures on clothing ranged from 4.2% to 7.0% of total expenditures. Expenditures on furniture ranged from 0.1% to 7.1%. The propensity to purchase clothing locally ranged from 59% to 99% while the propensity to purchase furniture locally was approximately 50%.

E. Simple Estimates of Income Elasiticity

Income elasticity can indicate the relative priority to producers of expenditures. Simple estimates of income elasticity can be approximated according to whether the percentage of total income spent on an item varies directly or inversely with the level of income. If the amount spent on an item remains constant despite variations in the level of income, that item is income inelastic and is probably a necessity of life. The proportion of total income spent on such items will vary inversely with the level of income. When the proportion of total income spent on an item varies directly with the level of income, this indicates the item is income elastic and that the item is more a luxury than a necessity. The number of cattle sold was used as a proxy for income since four out of six difference of means t-tests showed distinctiveness among levels of income according to the number of cattle sold. Hence, as the number of cattle sold increased it was considered that income increased also.

Food and education were the two groups of expenditures which showed definite income inelasticity. This would indicate that very high priority is placed on them. The importance of obtaining food is self-evident. The importance placed on education is supported in that one of the most commonly-stated reasons for selling a cow was to pay school fees even though in terms of amounts spent, only a small proportion of total income (2-5%) was spent on it. It should be noted that no fees are levied for attendance at primary schools so

that expenditures on education are entirely for secondary schools and post-secondary institutions. Expenditures for school uniforms were considered to be a clothing instead of an education cost.

The proportion of expenditures spent on arable agriculture, cattle inputs, fuel and clothing showed little change with a change of income levels. The proportion of total income spent by the poorest groups on these expenditures was very similar to that spent on them by the richest groups. This would indicate that after food and education needs had been met that these expenditures have the next highest priority.

The types of expenditures which showed the greatest income elasticity were housing, furniture, personal expenses and other expenses. This would indicate that these expenditures have a lower priority than other expenditures and many of them could be considered to be relative luxuries.

F. The Propensity to Purchase Locally

Table VI.11
Propensities to Purchase Locally According to Group of Expenditures and For Total Expenditure *(Figures Shown in Percentages).*

Village Size:	Small:			Large:		
Item / # Sold:	<6	6-10	>10	<6	6-10	>10
Arable	54.8	93.9	64.8	46.6	48.9	44.9
Other	33.3	100.0	17.8	59.0	31.8	14.4
Personal	57.0	77.1	91.7	52.0	37.5	27.2
Cattle	87.3	82.4	73.5	98.7	79.6	74.8
Housing	77.0	75.2	72.2	97.1	74.2	78.5
Education	89.8	100.0	100.0	100.0	82.4	88.4
Food	92.6	46.9	82.1	98.2	88.9	98.5
Fuel	96.5	57.5	57.3	98.2	92.6	97.7
Clothing	91.8	68.6	100.0	95.9	86.0	57.9
Furniture	100.0	0.0	25.6	56.8	71.7	0.0
Total	86.1	63.6	72.0	84.4	68.6	62.9

Source: from data collected by the author

The total propensity to purchase locally ranged from 86% to 63%. Generally, the aggregate degree to which producers purchased goods locally was similar for both small and

large villages and the tendency for this propensity to vary inversely with the number of cattle sold was observed for both.

The behaviour of medium producers from small villages is a departure from this trend. This group spent 64% of their income in the rural areas compared to 86% and 72% for small and large producers respectively from the small villages. The group of medium producers from the large villages spent 69% of their income locally. Probable causes for medium producers having such a low propensity to purchase locally will be discussed later.

There were some structural differences which are hidden by the similarities in the propensity to purchase locally between small and large villages. A less developed retail sector in small villages caused producers in these villages to purchase more goods outside their villages while higher cash incomes in the large villages resulted in a structure of consumption that favoured goods produced outside of the local areas. The interaction of these two structural factors resulted in little difference between large and small villages in the magnitude of the total propensity to purchase locally.

Producers in small villages have smaller cash incomes than producers in large villages and so their structure of purchases favours goods made locally. Vehicles, tractors and equipment purchased in urban areas are more likely to be purchased by producers living in large villages while producers from small villages will hire tractors and equipment from a local operator. Housing construction which is strongly linked to the local economy was a much more prominent expense for producers from small villages than from large villages.

There are fewer retail facilities in the smaller villages, so residents of these villages must purchase more items outside of their village than residents of larger villages. Producers from small villages had a lower propensity to purchase food, fuel and other retail items locally because the retail sector in the small villages is less developed than in large villages. The data collected for this research indicates that once residents of small villages leave their villages they go to an urban area to shop rather than to another larger village.

G. Summary

The data suffered from high measurements of variance. This undermined the precision of the data and to compensate for this, tendencies occurring over a number of questions were emphasized over the results from specific questions. The high measurements of variance also undermined statisical proofs of distinctiveness among groups of producers and between sizes of villages. The results gave a weak basis for concluding distinctiveness for the two catagories of cattle sales and size of village. However, it was concluded that distinctiveness was greater than the results indicated because of the high measurements of variance and the income inelasiticity of several items of expenditure.

Large villages were seen to be more economically diverse and offering higher levels of cash income than small villages. Producers from large villages had more non-cattle sources of income than producers from small villages. This was supported by data on income sources. Producers from small villages appeared to follow a more traditional way of life less dependent on cash income. This was shown by results from the chi-X tests on the descriptive data.

As the number of cattle sold increased, so did the level of cash income and this influenced the general economic behaviour of cattle producers. The structure of consumption altered so that as the number of cattle sold increased, producers tended to purchase more goods produced outside of the rural economy. Income sources also altered with the number of cattle sold so that medium producers developed more non-cattle sources of income than small producers but large producers developed fewer non-cattle sources of income than medium producers.

The propensity to purchase locally was affected by the size of village and the number of cattle sold. Large producers and producers from large villages had a structure of consumption favouring imported goods while producers from small villages tended to purchase more goods outside of their villages because of a less developed retail sector. These two structural factors interacted resulting in a total propensity to purchase locally which showed little difference between villages and which varied inversely with the number of cattle sold.

VII. The Calculation of the Multiplier and Analysis of Its Composition

The procedure used to calculate the multiplier is described in Chapter Five. The data showing non-basic spending for each round will be used so that the term "rounds of expenditure" rather than "rounds of income" will be used.

Figures are expressed in both absolute amounts and percentages. Percentages are expressed as a percentage of the total estimated income of each group of producer. The total of all percentages equals the percentage which total induced activity is of the original payment to the producer. To use percentages has the advantage of allowing a comparison between groups of producers without the distortion caused by unequal levels of income.

The items of expenditure have been grouped into five groups which include personal income, consumer retail spending, fixed assets, inputs and personal expenses. The analysis of the multiplier studies the total impact on the rural economy in contrast to the more limited activity of studying producers' spending patterns done in the previous chapter. Because of this different perspective, these five groups have been identified rather than maintaining the previous nine groups which were based on produeers' spending patterns.

Because of the high variance of the data, patterns for groups of expenditures will be emphasized over results for specific items of expenditure.

A. Part I. Analysing Induced Economic Activity According to Each Group of Cattle Producer

The economic activity in each of the five groups is analysed separately. A description of each of the groups is given including the level of economic activity it represents and the items that compose each group. A comparison between the economic activity occurring during the first round of expenditure and from the second to final round is made to compare the effect of producer spending to the effect of secondary economic linkages. General tendencies are determined for the six types of producers to determine the effect of the number of cattle sold and the size of village on the induced economic activity. Finally, exceptions to the tendencies are noted.

Table VII.1
Total Induced Economic Activity in the Rural Economy Resulting from All Income to Beef Producers for All Rounds of Expenditure *(expressed as a percentage of total payment made to each group of producers).*

# Cattle Sold	Small Village <6	6-10	>10	Large Village <6	6-10	>10
Income	44.4	37.3	41.5	42.1	38.0	35.7
Consumers	83.1	38.9	51.7	79.1	54.3	46.7
Durables	8.0	22.4	25.4	6.0	18.1	17.4
Inputs	13.3	16.9	14.2	22.6	14.6	14.9
Personal	10.3	5.2	8.3	9.8	8.5	6.4
Total	159.1	120.7	141.1	159.7	133.6	121.1

Source: from data collected by the author
Please refer to Appendix H which details the spending patterns shown in this table in terms of Botswana Pula.

Table VII.2
Total Induced Economic Activity in the Rural Economy Resulting from All Income to Beef Producers for Round Two to Final Round of Expenditure *(expressed as a percentage of total payment made to each group of producers).*

# Cattle Sold	Small Village <6	6-10	>10	Large Village <6	6-10	>10
Income	36.2	26.7	37.0	39.2	32.3	28.3
Consumers	22.2	16.9	18.5	20.8	18.3	16.9
Durables	4.8	4.4	5.0	5.5	6.2	5.3
Inputs	7.1	7.1	6.5	7.3	6.0	5.7
Personal	2.6	2.0	2.2	2.4	2.2	2.0
Total	73.0	57.1	69.2	75.3	65.1	58.2

Source: from data collected by the author
Please refer to Appendix H which details the spending patterns shown in this table in terms of Botswana Pula.

Personal Income

This group consists of wages paid to workers and profits accruing to businesses in the rural areas. Personal income generated during all rounds of expenditures is equal to approximately 40% of the money originally paid to producers. This makes personal income the second largest of the five groups composing the multiplier. The amount of income generated

ranges from P950 for small producers from small villages to P3000 for large producers.

The majority of personal income is generated after the first round indicating personal income generation is a function of secondary linkages rather than primary linkages between producers and the economy. For small producers from small villages, 72% of personal income is generated after the first round. For small producers from large villages, 93% of personal income is generated after the first round. For each group except large producers, a greater proportion of personal income is generated after the first round in large villages than in small villages.

All profits are generated after the first round of expenditures except profits to local builders. Therefore, all personal income generation during the first round is either profits to local builders, wages paid by producers or other personal income such as the purchase of a chicken from a neighbour.

The absolute amount of personal income created varies directly with the number of cattle sold and the size of the village. This tendency remains unchanged through all rounds of expenditure. In percentage terms, this trend is reversed; the proportion of cattle payments which results in personal income varies inversely with the number of cattle sold and the size of the village. This trend is most marked in terms of wages and income accruing to people in lower income levels. The creation of profits and income to people in higher income levels remains relatively constant for all groups.

Medium producers from small villages create less personal income than any other group of producer in per centage terms. This exception exists for both wages and profits. Yet, this group pays twice as much to a local builder in percentage terms than any other group. Large producers from small villages are the only other exception, creating more in profits in percentage terms than any other group.

Retail Consumer Spending

This group consists of all consumer spending. It is composed of expenditures on clothing, food, furniture, meat, purchases from neighbours and ceremonial expenditures. The most prominent of these are retail purchases of food, followed by clothing and purchases from neighbours. In terms of both amounts spent and as a percentage of income this group accounts for the largest amount of expenditures. Total induced economic activity for this group varies from P1,700 arising from medium producers from small villages to P4000 for large producers. In percentage terms, expenditures range from 38% of total estimated income for medium producers from small villages to 83% for small producers from small villages.

Most of the activity in this group occurred during the first round of expenditures. For small producers from small villages, 26% of retail consumer activity occurred after the first round. For medium producers, 38% of activity occurred after the first round. Of all items in this group, expenditures for food showed the greatest drop after the first round of expenditure.

In terms of total expenditures, the amount spent on items of this group varied directly with the number of cattle sold and the size of the village. This trend held for both the total multiplier and for spending after the first round of expenditure. However, in terms of a percentage of total expenditure, this trend was reversed. The percentage of total expenditure spent on consumer items varied inversely with the number of cattle sold and the size of the village. This trend is most influenced by retail purchases of food and reflects the income inelasicity of food purchases. For other consumer items, a trend is more difficult to develop.

The medium producers from small villages are an exception to this trend. In real and percentage terms, this group spent less than any other group on consumer items in the rural areas. This behaviour is consistent with a lower propensity to purchase goods locally in general. Another notable exception are small producers from large villages who spent almost twice as much in percentage terms for clothing as any other group.

Fixed Assets

Fixed assets includes borehole drilling, the manufacture of bricks, money paid to a building contractor, purchases of cattle, purchases of cement, fencing materials, machinery, building materials and tools used in the manufacture of cement bricks and blocks. This comprises expenditures on fixed assets for arable agriculture, cattle, other businesses and the construction of housing. Expenditures on arable agriculture and other businesses constitute a private sector fiscal linkage.

The most prominent items in this group were purchases of building materials and of cattle. Borehole drilling and purchases of machinery were the next prominent items. Cement, payments to building contractors and the purchase of tools for the manufacture of cement blocks involved negligible amounts of money.

Expenditures on fixed assets ranged from P1,500 for large producers from large villages to less than P200 for small producers from both small and large villages. These amounts represent about 27% of all payments made to larger cattle producers and about 7% of all payments made to small cattle producers. Expenditures on housing and building materials were very prominent for producers living in small villages.

After the first round the amount spent on fixed assets dropped considerably except for small producers. For small producers, 83% to 90% of all the expenditure on fixed assets occurred after the first round while for medium and large producers only about 30% occurred after the first round. Small producers spent very little directly on fixed assets. For larger producers, fixed assets are a prominent expenditure since 70% of expenditures from this group occurred during the first round. Total expenditures on fixed assets associated with larger producers were 10 times the total expenditures associated with the small cattle producers.

After the first round, there was no appreciable difference in percentage terms between the six groups of producers in expenditures on fixed assets. This indicates that the different amounts spent on fixed assets between the groups of producers was caused by the different purchasing patterns of different cattle producers.

The small amounts that the small producers spent on fixed assets and the large amounts producers from small villages spent on housing are the main tendencies for this group. Very little expenditure on fixed assets is generated by small producers either in real or percentage terms. Because of high expenditures on housing by producers from small villages, spending on fixed assets is higher in small villages in percentage terms than large villages. There are no noteworthy exceptions to these tendencies.

Inputs

This group consists of all inputs for arable agriculture, raising of cattle and other variable expenses. These include payments to borehole owners, tractor owners for ploughing, purchases of diesel, arable agricultural inputs, supplementary feeding, veterinary, repairs, oil and repairs to machinery and boreholes. Induced economic activity for this group of items ranged from P260 for small producers from small villages to P1,500 for large producers from large villages. This represents about 15% to 23% of all payments made to rural cattle producers.

No one expenditure dominated this group. The most prominent expenditures were to borehole owners for water, purchases of diesel, supplementary feeding, repairs and to tractor owners for the ploughing of fields. Purchases of oil and payments for borehole repairs followed. The least prominent expenditures are for veterinary and arable agricultural inputs which were heavily subsidized by the government.

The majority of induced economic activity on input items was generated during the first round of expenditures. Expenditures on inputs during the first round were more prominent in large villages than in small villages. This should be expected since the large villages have higher cash incomes, are more developed economically with better facilities and are more oriented toward a cash economy than the small villages. In percentage terms, after the first round there is little difference between groups of producers except for a slight decline in percentage terms in spending on input items as the number of cattle sold and the size of the

village increases.

After the first round, expenditures on diesel and repairs became dominant. Agricultural and cattle inputs became far less prominent since most spending on them occurred during the first round by cattle producers directly.

In terms of actual expenditures, the amount spent on inputs varied directly with the number of cattle sold and the size of the village. However, this difference can be attributed to differences in the total amounts spent because when these expenditures are translated into percentage terms, there is very little difference between groups of producers.

Small producers from large villages caused more induced spending in percentage terms on inputs than any other group. This level of expenditure resulted from this group of producers spending more than double the amount on repairs of machinery than any other group except large producers from large villages. The other exception was medium producers from small villages who caused the next highest level of induced spending on inputs which is attributed to much greater spending on the hiring of tractors than any other group.

Personal Expenses

This group of expenditures includes expenditures on buses, health, school fees and taxes. The most prominent expenditure was for school fees, followed by taxes, buses and health in that order. Expenditures on this group ranged from P200 for small producers from small villages to P500 for large producers from large villages.

Most expenditure for personal expenses occurred during the first round. Only 25% to 30% of expenditures on this group occurred after the first round.

The actual amounts spent varied directly with the number of cattle sold and the size of the village. However, in percentage terms, personal expenses varied inversely with the number of cattle sold and the size of the village. This trend is consistent for the payment of school fees and for buses. In per centage terms, spending on taxes increased from small to medium producers and then declined for large producers. This trend was caused by medium

producers being more involved with jobs paying wages which are more vulnerable to taxation than the raising of cattle.

Medium producers from small villages created about half the levels in percentage terms of other groups for school fees. This low level of school fee payment was reflected in a lower level of expenditure for this group during the first round and a much higher relative level of expenditure for this group after the first round of expenditure.

Summary of Tendencies During All Rounds of Expenditures

Exceptions to the Established Tendencies

There were a number of exceptions to the trends developed above. In particular, medium producers from small villages were a consistent exception. This group of producers created less induced personal income but paid twice as much to a local builder than any other group. Their propensity to purchase consumer items locally was lower than any other group, especially for purchases of food. They spent more on the hiring of tractors to plough fields and spent half in percentage terms on school fees of what was spent by other groups.

Some other noteworthy exceptions were that large producers from large villages created the most induced profits in percentage terms than any other group. Small producers from large villages spent twice as much on clothing in percentage terms than any other group and twice as much on repairs to equipment.

The data on income and expenditures explain why medium producers from small villages most commonly depart from the trends established above. This group had a relatively high level of income which was five times the income reported by small producers from small villages. Their level of expenditures were almost equal to the level of large producers from small villages. Therefore, even though they sold fewer cattle, their standard of living was the same as a large producer.

The data on incomes showed a higher level of contact with the outside world for medium producers than for other groups. Medium producers had three to six times the level

of wage income that other groups in small villages had. Much of this wage income must have come from outside the village because of the shortage of wage jobs in small villages. This group also had the highest level of remittance income of any other group, exceeding the level of the next highest group by more than double. This would indicate that producers in this group had a higher level of outside contacts through their families. Further, this group is the only group of producers from small villages which received pension income which indicates long term employment outside the village at a younger age and a return to the village after retirement.

Medium producers from small villages were the oldest of any group of producers from the small villages, having an average age of 67 years. Small producers averaged 48 years and large producers averaged 62 years. Medium producers from large villages averaged 54 years of age. This age could explain the low level of payment of school fees. Because of the advanced age of these producers, they were less likely to have dependents of school age.

The number of dependents of producers in this group was not appreciably different than for other groups of producers. This pattern of behaviour reinforces the above conclusions about age and payment of school fees. Further, the higher level of remittance payments would indicate that family members were more likely to be working outside of the village and consequently, those of school age would be more likely to be living outside of the village too.

Producers in this group ploughed a much greater area than other producers which indicates a greater interest in commercial arable agriculture. This explains why producers from this group paid far more to hire tractors to plough their fields than other groups of producers.

This group did not have a higher propensity to own a vehicle nor did it spend more money on bus transport than other groups. However, a producer from this group did spend less time at his plough lands or cattle post than other producers other than large producers from large villages.

Analysis of the Impact on the Rural Economy

The most important groups are personal income and fixed assets since they represent income created and capital investment. Expenditures for school fees and health could also be considered as capital expenditures since they contribute to human capital and so aid development.

Most personal income was created after the first round of expenditure and so, it is mostly a result of secondary economic linkages. Therefore, there was little difference between small and large producers in the creation of personal income. The main linkage for the creation of personal income was through spending on subsidies and the salaries of its employees stationed in the rural areas. Personal income created by the retail sector is low since only 5% of the money spent on food and 10% spent on clothing and furniture accrued to wages.

Since induced personal income equals about 40% of payments made to producers, a drop of 1% in payments to producers would result in a further 0.4% drop in income to other non-producers.

Expenditures on fixed assets and capital investment predominantly occurred during the first round and so were dominated by producer spending patterns. The exact amount of capital expenditure is difficult to determine since items in this group cover inputs as well capital expenditures. For example, cattle purchases covers both the purchase of breeding stock as well as cattle sold to local butchers. Induced spending on capital investment amounted to between 17% and 5% of total payments made to producers. Total spending on fixed assets was 17% of total payments made while those items which are solely capital investments amounted to 5% of total payments to producers.

In terms of induced economic activity, it could be argued that rural development is more greatly enhanced by payments made to medium and large producers rather than small producers. Small producers made almost no capital expenditures while the creation of personal income is largely a function of secondary economic linkages independent of producers'

spending.

Table VII.3
The Propensity to Purchase in the Rural Areas (g^r) Associated With Each Round of Expenditure *(Expressed as a Percentage of Income Realized Per Round).*

Round of Expenditure	Small Village <6	6-10	>10	Large Village <6	6-10	>10
Round 1	86.1	63.6	72.0	84.4	68.6	62.9
Round 2	37.0	41.9	42.3	38.1	41.8	41.3
Round 3	65.6	57.5	65.5	69.4	64.4	62.6
Round 4	45.2	46.3	43.2	42.9	45.5	46.5
Round 5	61.0	59.6	63.2	63.4	60.2	59.2
Round 6	47.6	48.5	46.3	46.2	48.1	48.8
Round 7	58.2	57.3	59.6	59.6	57.7	57.0
Round 8	49.5	50.1	48.5	48.5	49.8	50.2

Source: from data collected by the author

There is a lack of a uniform progression in the propensities to spend during progressive rounds of expenditure. These propensities to spend did not follow a pattern alternating between uniform household and firm propensities because part of a household's spending goes to other households and part of a firm's inputs are purchased from other firms. Also, different firms have different propensities to spend locally and the composition of these firms changes through progressive rounds of expenditures. For example, purchases of inputs by retailers were more prominent during the second rather than subsequent rounds of expenditure while purchases of diesel and repairs of equipment were more prominent after the first round of expenditure.

The most obvious pattern observed for these propensities to spend locally is a fluctuation between a high and a low propensity for each odd-numbered round of expenditure. With each progressive round of expenditure, these fluctuations decrease in magnitude, converging toward an average propensity to spend locally. Differences in the propensities to spend locally between groups of producers also decrease in magnitude with subsequent rounds of expenditure.

During round 2, the propensity to spend locally is less for small producers than for the larger producers. This was caused by small producers spending a greater proportion of their income on consumer goods. Since these goods are largely imported, the propensity to spend during the second round is lower than other producers who have purchased goods more strongly linked to the rural economy.

Table VII.4
Summary of Propensities to Purchase Locally *(Expressed in Percentage of Payments Made to Producers).*

Round of Expenditure	Small Village			Large Village		
	<6	6-10	>10	<6	6-10	>10
Round 1	86.1	63.6	72.0	84.4	68.6	62.9
Average Round 2 to 9	52.0	51.6	52.6	52.6	52.5	52.2
Total Induced Spending	159.1	120.7	141.1	159.7	133.6	121.1
Multiplier	2.59	2.21	2.41	2.60	2.34	2.21

Source: from data collected by the author

The average propensity to spend for secondary linkages is over 50%. This indicates the existence of some strong secondary economic linkages in Botswana's rural economy. The primary linkages between the producers and the local economy are stronger since the propensity to spend during the first round is consistently greater than the average propensity to spend during the second and subsequent rounds. The average propensity to spend locally from round 2 on is almost identical between types of producers.

The total induced economic activity and the multiplier decrease with an increase in the number of cattle sold. There does not appear to be any constant pattern between small and large villages. The main exception was medium producers from small villages who had the lowest propensity to purchase locally except for large producers from the large villages. This is keeping with the reasons listed earlier for this group being a consistent exception.

B. Part II. Determining Which Items and Groups of Items Contribute Most to the Multiplier

The following analysis follows the procedures described in Chapter Five and studies the multiplier from the perspective of determining the induced economic impact associated with each item of expenditure. The same five groups of expenditure consisting of personal income, consumers' retail spending, fixed assets, inputs and personal expenses are used here as were used to analyse induced activity associated with producers' spending patterns.

Table VII.5
Total Induced Economic Activity Caused by Spending by Type of Expenditure Showing First Round, Second to Final Round and Total Induced Activity ***(from An Initial Expenditure of Pula 100.00).***

Group of Expenditures	First Round	Second to Last Round	Total Induced Activity
Pers. Income	70.38	66.67	137.05
Retail	46.77	68.14	114.91
Fixed Assets	32.00	34.09	66.09
Inputs	50.06	65.62	115.69
Personal	84.81	126.62	211.44

Source: from data collected by the author

Personal Income

For every P100[32] entering the economy in the form of personal income, P137 of induced economic activity is created. P70 of this activity occurs during the first round and P67 occurs during subsequent rounds of expenditure. The propensity for personal income to be paid to people living in the rural area is almost 100%. Ninety-seven percent of payments to house builders are paid to residents of the rural areas. One hundred percent of payments for wages and profits go to residents of the rural areas. Payments of wages to low income people have the greatest impact on the rural economy since P160 of induced activity occurs for every P100 paid in wages.

Retail Consumer Goods

P100 spent on retail consumer goods results in P102 of induced economic activity. P41 occurs during the first round and P61 occurs during subsequent rounds. The propensity to spend locally is 88%.

Purchases from a neighbour have the greatest economic impact on the rural economy with P260 of induced activity for every P100 spent. Retail purchases of groceries have the least impact with P22 of induced economic activity for every P100 spent. Purchases of meat have the next highest impact since most of the meat sold is purchased from rural cattle producers. Purchases of clothing and furniture have an economic impact almost as low as purchases of groceries.

Almost all of the products sold as groceries, furniture and clothing are imported so that the only inputs purchased in the rural areas are for labour, profits, transportation and the depreciation of the shop building. Therefore, the weakest link for this group of items is in the second round of expenditure. This link could be strengthened by promoting commercial agriculture, clothing and furniture manufacturing and the processing of agricultural products in the rural areas.

Fixed Assets

Expenditures on fixed assets have the lowest economic impact on the rural area from the perspective of induced economic activity. For every P100 spent on this group of items, P57 of induced economic activity is created. P27 of this occurs during the first round and P30 occurs during subsequent rounds. The propensity to purchase fixed assets in the rural area is 85%.

Manufacturing of bricks, payments to building contractors and the purchase of cattle have the greatest economic impact in this group with induced economic activity created from P100 on these items ranging from P134 to P169. The drilling of boreholes creates P29 of activity from P100 spent while purchases of cement, machinery, fencing materials, other

building materials and tools create negligible induced economic activity. These latter items have very low levels of activity because they are based on the importation of industrially produced goods usually from South Africa or Zimbabwe. Until these goods can be produced in Botswana's rural areas, there is no possibility of substantially increasing the multiplier effect for this group of items.

Inputs

For every P100 spent on inputs, P132 of induced economic activity is created. Of this, P53 occurs during the first round and P79 occurs during subsequent round of expenditure. The propensity to purchase locally for this group is 91%.

Payments for arable agricultural inputs, supplementary feeding and veterinary services have the greatest economic impact of any of the items in this group with P260 created for every P100 spent. Purchases of oil, diesel and repairs to equipment have the lowest impact since they are based on imported industrial goods and have a low propensity to be purchased locally. Payments to tractor and borehole owners have a higher impact because many of the purchases of inputs are made locally. The economic impact from tractor and borehole owners rapidly declines following the first round of expenditure because the inputs for boreholes and tractors are imported, industrially-produced goods. As with fixed assets, there is little opportunity for increasing the multiplier effect for this group until these inputs can be produced in Botswana's rural areas.

Personal Expenses

For every P100 spent on this group of items, P204 of induced economic activity is created, P80 of this is created during the first round and P124 is created during subsequent rounds. The propensity to spend locally for this group is 97%.

Expenditure for health, school and taxes are the items with the greatest impact. P260 of induced activity is created for every P100 spent on these items. Payments for bus transport

create P32 for every P100 spent which is much lower. P20 of this is created during the first round and a further P12 is created during subsequent rounds. The propensity to purchase bus tickets locally is 50%.

The reason for the high impact of payments for health, school and taxes is the subsidies on these services given by the government and the provision of these services in the rural areas. With health, a large part of this money goes to traditional doctors who are also based in the rural areas.

Summary

The items with the greatest impact on the rural economy are agricultural inputs, supplementary feed, veterinary services, health payments, school fees and purchases from neighbours. All of these items create P260 of induced economic activity for every P100 spent on them. Except for purchases from neighbours and some health expenses, they are all based on the provision of government services in the rural areas. The propensity to purchase these items locally is also 100%. From this, it can be concluded that government spending on services for the rural areas is currently the most effective linkage for the creation of induced economic activity in the rural areas.

Payments for labour, profit, building contractors, builders, ceremonial purchases, cattle, purchases of meat, bricks and cattle have the next greatest impact on the rural economy. Between P121 and P169 of induced economic activity is created for P100 spent on these items. The propensity to purchase these items locally ranges from 100% to 77%.

Purchases of diesel, oil, fencing materials, other building materials, machinery, repairs to machinery, cement and tools have the smallest economic impact. The economic impact ranges from P13.99 of induced activity for every P100 spent on fencing to P0.06 for every P100 spent on tools to manufacture cement blocks. The propensity to purchase locally ranges from 74% for fencing materials to 18% for machinery to 7% for cement block manufacturing tools.

As the amount of induced economic activity declines, so does the propensity to purchase an item in the local economy. There is no case where an item has strong links with the local economy, but is hampered by a low propensity to purchase that item in the rural areas. Therefore, there is no case of an item where rural economic activity could be significantly increased by attempting to increase the propensity of local cattle producers to purchase that item locally. Where there is a low propensity to purchase items locally, those items do not have the economic linkages to the local economy to merit the attempt to increase the propensity to purchase locally.

The more an item is linked with industrial inputs, the less it is linked with the local economy. Such items as diesel, tractors and other such machinery are not and cannot be manufactured in Botswana's rural areas. They are imported from the outside economy and the only benefit realized from their sale is in profits and wages to the merchant of such items and his employees. According to this research, such profits account for no more than 10% and wages account for no more than %5 of the total money spent on such purchases. Therefore, for these items, there is no potential for significantly increasing the amount of induced economic activity from money spent on their purchases.

Retail purchases of food is the item which probably has the greatest potential for development. During the period of this research, nearly all the food sold in retail village shops was imported. There was some processing of sorghum in the rural areas which is sold in Botswana. However, because of the drought, none of this sorghum was grown in Botswana but was instead imported from South Africa.

VIII. Summary, Conclusion and Policy Implications

A. Summary

The purpose of this research was to determine the economic benefits to Botswana's rural areas of beef exports especially to the EEC market under the Lome convention. These benefits were determined by identifying the economic linkages between Botswana's export markets and her rural economy and by estimating the multiplier for Botswana's rural economy.

The theoretical basis of this research was the role of economic linkages in the development process since development "is essentially the record of how one thing leads to another, and linkages are that record...". [33]

Harold Innis' staples theory is an early theory based on this concept. Innis proposed that Canada's early economic development was based upon the export of staple commodities and the extent of domestic economic development was determined by the linkages which existed between the export commodity and the local economy. According to Innis, economic growth and development were achieved by developing new export staples after existing staples had exhausted their potential for development or were caught in a "staples trap".

Hirschman identified four economic linkages: a backward, forward, consumption and fiscal linkage. These four types of linkages are the basic types of linkages used in this research.

There are non-monetary aspects to economic linkages. Meier alluded to these when he referred to a "learning rate" and to development as an "integrative process". Human or intellectual capital is developed from the experience gained by linking local people to an industry. This is the result of the "integrative process" of economic linkages.

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[33] Hirshchman, A. O., "A Generalized Linkage Approach to Development with Special Reference to Staples", from **Essays on Economic Development and Cultural Change in Honour of Bert F. Hoselitz**, Nash, M. (ed.), University of Chicago Press, University of Chicago, 1977.

A model for a disaggregated multiplier was developed which calculated the total economic impact of money entering Botswana's rural areas and disaggregated it according to item and round of expenditure. The functioning of this model is based on a system of equations representing specific economic linkages and the propensities to purchase local goods and services specific to each linkage. Rounds of expenditure are simulated by inputting non-basic spending from the previous round of expenditure through these equations to calculate non-basic spending for the next round. The rural multiplier for payments to beef producers was the measurement used to determine the total rural benefit realized from these payments.

The data used in this research was obtained in Botswana through surveys and other sources. A sample of cattle producers, retail merchants and others were surveyed to determine the spending patterns of cattle producers and the movement of their money through subsequent rounds of expenditure. Data was also obtained from the Botswana Meat Commission, a sample of cattle agents and co-operative marketing societies to determine the linkages between Botswana's beef export markets and her rural cattle producers.

Analytical Approaches Developed in this Thesis

Several original approaches to the theory of economic linkages and multipliers have been developed in this research. The most prominent of these are:

Private Sector Fiscal Linkage

A fiscal linkage takes money from one sector and causes it to be spent on capital investment in another sector. Hirschman and others assumed that a fiscal linkage consisted of a government confiscating a surplus from one sector and reinvesting it into other sectors. In this research a private sector fiscal linkage is proposed since it was found that private capital earned from cattle sales was being reinvested as capital investment into other sectors such as purchasing retail shops and arable agricultural improvements. Implicit in this distinction

between a public and private fiscal linkage is a bias as to whether it is governments or local producers who make investment decisions. Because the activities of beef producers showed the existence of a private sector fiscal linkage the concept of a private sector fiscal linkage is proposed in this research.

Distinguishing Between Primary and Secondary Linkages

A distinction was made between linkages which are a product of the export industry and linkages which are a product of the general level of development of the local economy. Primary linkages are defined as those linkages between the export industry and the local economy. Secondary linkages are defined as those linkages which exist independently of the export industry and are a function of the general level of economic development and integration existing in the local economy. This distinction enables one to determine whether economic benefits are being stimulated by the export industry or by the level of development of the local economy.

Model for Disaggregated Multiplier

The model used to determine the rural multiplier is specific to one export commodity and is disaggregated according to item and round of expenditure. Further, every industry has a specific impact on the local economy. Not only does the multiplier change from industry to industry but the sectors which absorb its impact change from industry to industry. Disaggregation was necessary to determine the composition and effect of the multiplier and which linkages were responsible for the impact. The multiplier models Schwartz and Apedaile used did not do this and so a modified model had to be developed which did.

An approach to analysing the data from a disaggregated multiplier model was developed which was based on distinguishing between the economic activity occurring during the first round and during subsequent rounds of expenditure. Distinguishing between these linkages was used to determine which linkages were responsible for the structure and level of

induced economic activity.

The Concept of an "Effective Multiplier"

The concept of an "effective multiplier" focusses on the composition rather than the magnitude of the multiplier in determining the impact of induced economic activity. Because of differing economic structures, each sector is impacted differently by each export commodity. For example, some exports are labour intensive while others are capital intensive. Therefore, the composition as well as the magnitude of a multiplier should be known in order to fully understand the impact of export earnings.

B. Conclusions

Figure VIII.1 shows the flow of money from Botswana's export markets to her rural beef producers and its total impact on her rural economy. Level One shows the linkages between beef importers and the Botswana Meat Commission. Level Two shows the linkages between the BMC and the rural producers. Level Three shows the primary and secondary linkages between beef payments and the rural economy and the total impact on the rural economy of these payments to beef producers.

Level One Linkages - Revenue Accruing to the Botswana Meat Commission

South Africa and the European Community are the dominant markets for Botswana's beef exports accounting for 87% of the BMC's total sales. The revenue generated from beef exports has continually increased from nothing in the early 1900's to over P100,000,000 per year. Yet, proportionately, it has continually declined from 100% to less than 20% of Botswana's total foreign revenues as the export of diamonds and minerals have expanded.

Botswana's beef markets in the EEC are diversifying. Initially, Britain was Botswana's sole European customer but Germany has now replaced Britain as Botswana's largest EEC importer. Other EEC nations such as Italy are also becoming prominent importers which

indicates a growing European market for Botswana beef. Botswana's beef is grass fed in contrast to the beef produced in Europe which is grain fed in feed lots. This indicates that the demand for Botswana's beef has an economic basis apart from the Lome agreement. However, it is the Lome agreement that allows Botswana a competitive advantage in the European market over other non-Lome suppliers of grass fed beef.

Level Two Linkages - The Distribution of Payments to Beef Producers According to Number of Cattle Sold and Size of Village

Botswana's beef products are manufactured products. Approximately 50% of BMC revenue accrues to value-adding inputs and approximately 50% is paid out to producers as payments for the delivery of their cattle. So far, all assessments of the benefits to Botswana from the sale of beef to the EEC have ommitted the value-added component of Botswana's beef products.

It has been commonly assumed that all the benefits from Botswana's beef exports go to a small group of cattle barons. Although there is a definite bias in favour of large producers and producers living in large villages, the distributions identified in this research show that these earlier assumptions are unfounded. Small producers comprised over 76% of all producers delivering cattle to the BMC and received 43% of all payments made by the BMC to producers. Large producers comprised 14% of all producers but received 42% of all payments. The distribution of cattle producers and payments is skewed in favour of large villages. As villages become smaller and less developed, the benefits accruing to them from beef exports rapidly decrease.

Level Three Linkages - Spending Patterns of Producers, Secondary Spending Patterns and the Calculation of the Multiplier

The data to determine the spending patterns of producers was characterised by high variances which caused difficulties in proving distinctiveness among groups of producers when

grouped according to the size of their village and the number of cattle sold annually. Because of these high variances, tendencies observed over a variety of items of expenditure were regarded as being more reliable than the results from specific items of expenditure.

The propensity of beef producers to purchase locally ranged from 86% to 63% and varied inversely to the number of cattle sold. In some instances, the propensity to purchase locally in small villages was high because of the lower levels of income in the small villages but in other instances, it was undermined by the lack of retail facilities in small villages relative to large villages. However, these factors cancelled each other out so that there was little difference in the magnitude of the aggregate propensity to purchase locally related to the size of the village although the size of the village did affect structural aspects of this propensity.

The average propensity to purchase locally averaged 52% for the second to last round of expenditure. The total induced economic activity ranged from 121% to 160% of the total income earned by cattle producers to give a rural multiplier from 2.2 to 2.6 depending on the number of cattle sold and the size of the producer's village. Combining all groups of producers, the amount of induced rural economic activity is 144% of the amount paid to producers to give a rural economic multiplier of 2.44 for cattle payments.

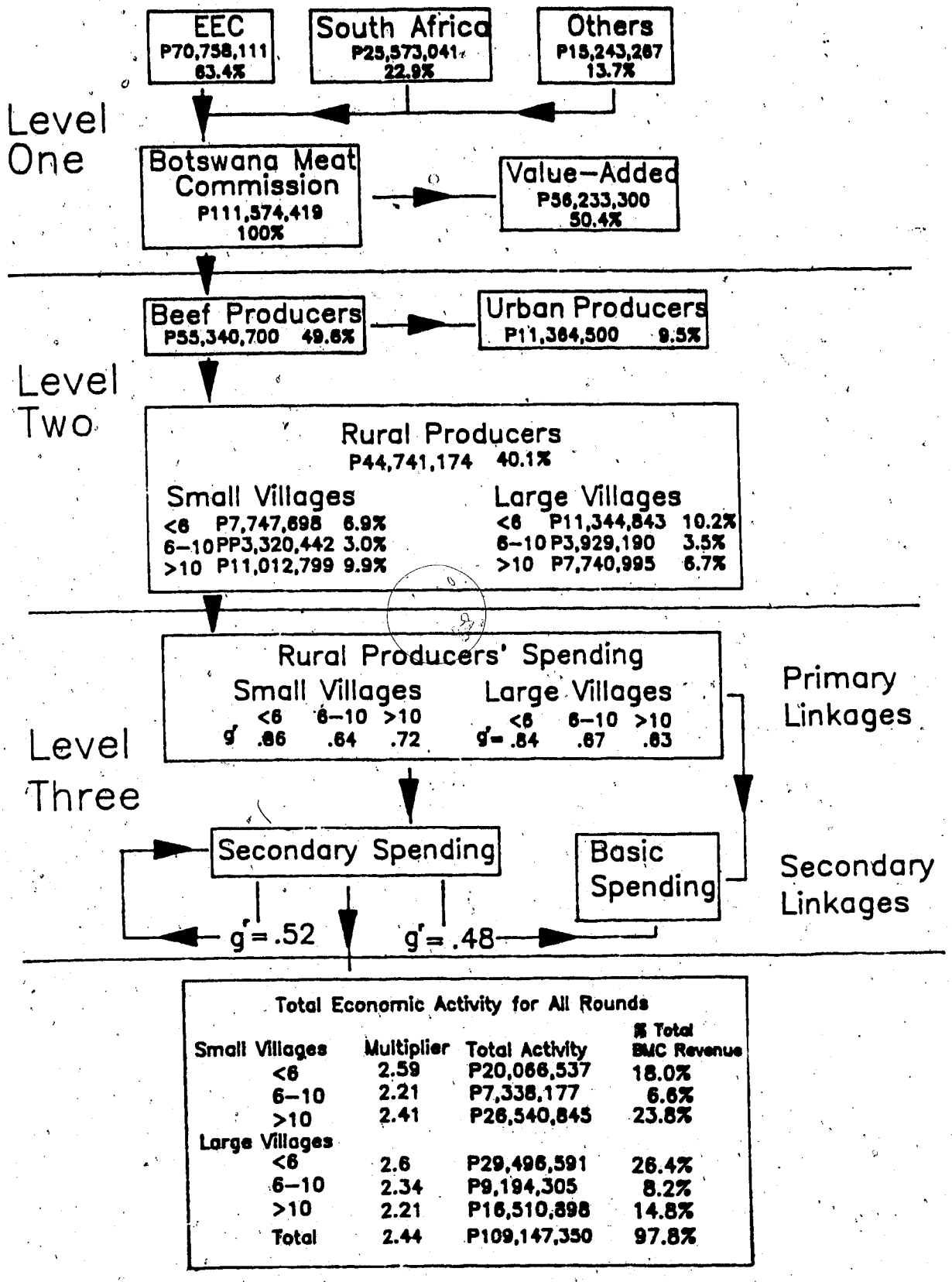
The major primary linkages responsible for this multiplier were purchases of consumer items in the village, the provision of government services and purchases of agricultural and cattle inputs such as the hiring of tractors and the purchase of water. The major secondary linkages were government spending on services and wages for government employees in the rural areas and the local contruction industry.

The figures calculated in this research indicate that there is considerable benefit to Botswana and to its rural peoples from access to the European market through the Lome agreement. The rural multiplier is 2.44 and its composition is such that for every P1.00 earned by a rural producer, a further P0.40 of income and between P0.06 and P0.17 of capital investment is generated through a private sector fiscal linkage. These benefits are much more

equitably distributed than has been previously estimated.

There have been no previous attempts to determine a multiplier for Botswana's rural economy so no comparisons can be made between this work and similar work carried out on Botswana's rural areas. Research done by Hazell and Roell dealt with the change in the pattern of consumption by rural residents as their income and other factors changed but they did not estimate a multiplier for the rural areas which they researched. Therefore, the reliability of the multipliers estimated in this research cannot be judged by comparing them to the results of similar work.

Figure VIII.1
The Flow of Funds from Botswana's Export Markets to Her Rural Areas Showing the Impact on the Rural Economy in Absolute Terms and as a % of Total BMC Income for 1984.



Total Economic Activity for All Rounds

	Multiplier	Total Activity	% Total BMC Revenue
Small Villages			
<6	2.59	P20,066,537	18.0%
6-10	2.21	P7,338,177	6.6%
>10	2.41	P26,540,845	23.8%
Large Villages			
<6	2.6	P29,496,591	26.4%
6-10	2.34	P9,194,305	8.2%
>10	2.21	P16,510,898	14.8%
Total	2.44	P109,147,350	97.8%

C. Policy Implications

It was proposed in this research that economic linkages could be studied from the point of view of promoting rural development. Development would then be promoted by strengthening weak linkages or creating new linkages which would increase induced economic activity in the rural economy. The strength of economic linkages is determined by estimating the multiplier effect of regional economic linkages. An increase in development and induced economic activity would be measured by an increase in the multiplier effect of the region's structure of economic linkages.

The following policy implications are derived from applying this approach toward the data collected in this research and other results obtained:

1. The provision of services in the rural areas by the Botswana Government such as education, veterinary and agricultural support has created some of the strongest secondary linkages in Botswana's rural economy. Any earnings originating from the sale of cattle paid to the government for such services generated a multiplier of 3.6. For every P1.00 initially spent in the rural areas on such services, another P2.60 of induced economic activity was created. The multiplier effect of these linkages should be noted and be used as a design criterion for government planning for these services in the rural areas.

2. Efforts should be made to increase the market access of cattle producers from small villages to the BMC. Producers from small villages sold an average of 5.3 cattle during 1984 while producers from large villages sold an average of 3.8 cattle. The higher average for producers from small villages is interpreted as showing that small producers from small villages must have a limited access to the BMC compared to producers from large villages since the average number of cattle sold per producer should become

smaller as the proportion of small producers increases compared to the total population. The average number of cattle marketed through co-ops was smaller for small villages compared to large villages while it was greater for small villages when cattle were marketed through agents and direct sales. This indicates that these limitations to market access lie with cattle agents and direct sales as the larger cattle markets in the large villages are better suited to their operations. Efforts to increase market access for producers in small villages would increase cash incomes for these producers and would be a means of increasing the levels of funds injected into the economies of the smaller villages.

3. The need to promote commercial arable agriculture is supported by the results of this research. The propensity to purchase food in the local areas ranged from 58% to 99% which indicates a strong potential to develop this linkage. Yet, excluding purchases of meat, only 11.5% of money spent in village food shops remained in the rural economy during the following round of expenditure which is a significant leakage of funds. This policy would be a promotion of import subsititution by substituting food grown in Botswana for that which is now imported from South Africa by local merchants. Arable agriculture in Botswana is predominantly subsistence so this policy would also consist of a transition from subsistence to commercial farming.

Many types of processed food sold in Botswana can be grown and processed locally such as maize, sorghum, rice, beans, samp and vegetables . Purchases of such items ranged from 8% to 28% of total expenditures by cattle producers or between P408.82 and P714.86 per family per year.

Table VIII.1
Retail Expenditure on Maize, Sorghum, Rice, Beans, Samp and Vegetables Showing Total and Local Expenditures in Pula and % of Total Expenditures Including the Propensity to Purchase Locally

Type of Producer	Total Spent	% of Total Income	Spent Locally	% of Total Income	Propensity to Buy Locally
Small <6	598.00	28	542.80	26	91%
Small 6-10	602.43	14	351.89	8	58%
Small >10	475.63	10	423.78	9	89%
Large <6	408.82	14	399.22	14	98%
Large 6-10	714.86	13	635.43	11	89%
Large >10	641.02	8	637.24	7	99%

Source: from data collected by the author.

This analysis on commercial agriculture and retail food sales has only considered the secondary economic effects of this activity. This policy recommendation is conditional upon several other factors of economic viability. Also, this survey was conducted after five years of severe drought when arable agriculture had been all but destroyed so that the lack of crops shown by the data collected should be considered to be abnormal.

4. The rural economy would benefit if government development programs for arable agriculture such as ALDEP and ARAP placed a lower priority on tractors and large machinery in the development of arable agriculture. Expenditures on tractors, machinery, diesel and other industrial inputs were the weakest economic linkages with a multiplier of approximately 1.04, creating only P0.04 of induced economic activity for every P1.00 spent. This represents a serious leakage of funds from the rural economy.

Attention should be paid to the development of simple agricultural implements which could be manufactured in the rural areas such as the Makgonatsotlhe plough. Other approaches by which secondary spin-offs from the development of commercial arable agriculture could be promoted should be considered. This analysis has focussed

on the secondary economic impacts of the purchase of agricultural machinery. It should be noted that other factors exist which should also be taken into account in assessing the viablility of this recommendation.

5. The rural construction industry has a rural multiplier of 2.5 creating an additional P1.50 in induced economic activity for every P1.00 spent on construction in the rural areas which is the second highest multiplier after the provision of government services. This high multiplier is based on high levels of local labour and other local inputs especially manufactured cement blocks. To promote this industry, the policy of government construction projects being tendered to rural based contractors should be continued. Building codes in the rural areas should also favour rural building techniques and locally found materials so that rural building contractors will not be excluded from contracts in the future.

6. Government subsidies for rural business and arable agricultural development (ARAP, ALDEP and FAP) should be continued. These policies promote the development of rural economic fiscal linkages which increase the multiplier effect of beef exports by keeping income circulating in the rural areas. In particular, special attention should be paid by these policies toward assisting cattle producers from smaller villages to invest surplus cattle income into commercial arable agriculture and retail businesses. Smaller villages were shown by this research to be less economically diverse and enjoying fewer retail services than the large villages which decreased their ability to take the same advantage from beef income as large villages.

7. Continued access to the European market through the Lome agreement should be pursued by Botswana. Cattle payments to Botswana's rural beef producers have significant secondary benefits to its rural economy. For every P1.00 in payments to a

rural beef producer lost, a further P1.44 in induced economic activity would be lost to the rural economy with P0.40 of this being disposable income accruing to rural residents. From the results of this research, it is estimated that in 1984, small producers accounted for 85.5% of all producers receiving payments from the BMC and they received 48.4% of all payments made (refer to Chapter IV). These figures indicate a degree of equitable distribution of payments which should be acceptable according to the criticisms which have been made by the EEC and others. The EEC is is Botswana's major beef market since 63% of Botswana's beef exports were sold on the European market in 1984. According to BMC officials interviewed during the course of this research, the loss of this market would destroy the Botswana beef industry as it exists today. If access to the European market were lost, the South African market would be the only market of consequence accessible for Botswana's beef products. Politically, the access to the European market is important in promoting Botswana's economic independence from South Africa.

D. Other Observations

1. Emphasis for future growth in the cattle industry should be given to the improvement of herd management practices. According to herd management indices given earlier, rural producers could double their offtake without any increase in the national herd. Expansion of the cattle industry by opening new areas to grazing is impossible in the east where most producers live and the Kalahari's sparse grazing and large capital and tranport costs eliminate all but the largest and richest cattle producers from the Kalahari. Therefore, the only realisitic opportunity for increased cattle production is through improved management practises resulting in a greater off-take from a static herd size.

2. Rural economic expansion would be best pursued by attempting to diversify the rural

economic base particularly by developing new leading sectors. The cattle industry has no opportunity for significant expansion other than through improvements in herd management so the opportunities for stimulating rural economic growth through expansion of the cattle industry are limited. The existence of strong primary and secondary linkages in the rural areas indicates that the inputs and the markets for several economic activities can be supplied in the rural economy. Currently, the main leading sectors in the rural economy are cattle and government spending.

3. The European Community has been critical of environmental damage from overgrazing and the inequitable distribution of benefits from the cattle industry in Botswana. From the results of this research, equitable distribution of cattle benefits and environmental protection appear to be contradictory goals. The majority of cattle owners are small owners and their inclination is toward increasing their herd to a viable size rather than to sell. Such an inclination is bound to lead to environmental degradation when there are no resources available to support a larger national herd particularly in the eastern part of Botswana.

The EEC could promote economic equality in the rural areas more effectively by promoting more non-cattle economic opportunities in the rural area (see observations 1 and 2 above) since the cattle industry has few opportunities for expansion. Further, it appears that small cattle herds can be as much of a drain on economic resources as an asset since over 60% of producers have herds smaller than necessary to be economically viable.

E. Limitations on the Results of This Research

1. Botswana was experiencing its fifth year of drought when this research was being conducted. A determination of how good rains would affect cattle producers' propensity to sell cattle, to raise subsistence crops and buy food from retail outlets was

attempted. However, these attempts were speculative and further research should be conducted to determine how the rural economic activity recorded in this research would change with good rains.

2. The benefits to the rural economy of beef exports and other economic activities have been judged only from the perspective of the induced multiplier effect they have on the rural economy although it is recognized that a complete assessment of benefits should include a wider range of criteria than such a multiplier. Although economic activities such as the purchase of farm machinery have a small impact on the rural economy, they may have a significant benefit for the urban areas in Botswana and these potential benefits were not considered in this research. Further, although the development of a linkage may have a large multiplier affect on the rural economy, other factors may determine that such a development may not be economically feasible.

3. The results of this work cannot be easily compared to the results of other studies. The model used in this research to estimate a rural multiplier is different than has been used in other research. There is little work available regarding calculation of economic multipliers for rural regions in developing countries especially in Africa and no such previous work done in Botswana.

F. Further Research

1. Botswana's beef exports involve a large value-added component of about 50%. Therefore, any future assessment of the benefits gained by Botswana from its beef industry should include an assessment of this value-added component.

2. The dissaggregated multiplier model developed in this research should be used in the study of other regional and especially rural economies so that it can be determined how

widely it may be applied and how it may be further refined. It is hoped that this model can be tried in a developed country to assess whether it has a wider application beyond rural economies in developing countries.

3. The existence of a staples trap in the cattle industry should be given further attention. The problem of overgrazing particularly in the east of Botswana should be interpreted as a symptom that a staples trap already exists. Offtake could be doubled by improved management practises. Three points should be covered: 1. the extent to which further expansion of the cattle industry can be accomplished by improved herd management practises and how these practises can be promoted, 2. if there is no realistic opportunity for cattle production to be expanded, what other developments such as commercial arable agriculture, game ranching, etc. can take the place of cattle in providing further stimulus to Botswana's rural economy and 3. what linkages could be strengthened or created which would increase the economic benefits to the rural population of the existing level of cattle production especially increasing the wage labour input into the raising of cattle and if the possibility of developing these linkages is realistic.

4. The concept of a private sector fiscal linkage should be given closer attention. It is commonly assumed that transfers of resources from one sector to another can only be accomplished through government transfers. One aspect of this should include the transfer of human resources involved in this linkage (eg. the transfer of experience gained in managing cattle to that of managing a rural retail shop). Further, the identification of rural people with development efforts should be considered in the concept of a private sector fiscal linkage especially in light of the findings of Brown [34] and others that indifference and even passive resistance by rural people against government development policies is common in African countries.

[34]Brown, C., "Rural Local Institutions for Agricultural Development in Botswana: No Objection but No Acceptance", unpublished paper, Carleton University, 1987.

5. Further study should be done comparing the results of the matrix used in this research with results usually obtained using an I-O matrix.

6. The concept of the study and use of economic linkages to promote rural development should be continued. This should be done from the perspectives of both assessing the value of specific development projects and assessing the development potentials of a regional economy. The extent to which secondary economic activity is induced through the economic linkages associated with development projects is a valid criteria for assessing the value of such projects. Regional development strategies should use an assessment of a regional economy's structure of economic linkage so that strong linkages which stimulate the economy can be identified and preserved, weak linkages which represent leakages from the region can be strengthened or new ones created.

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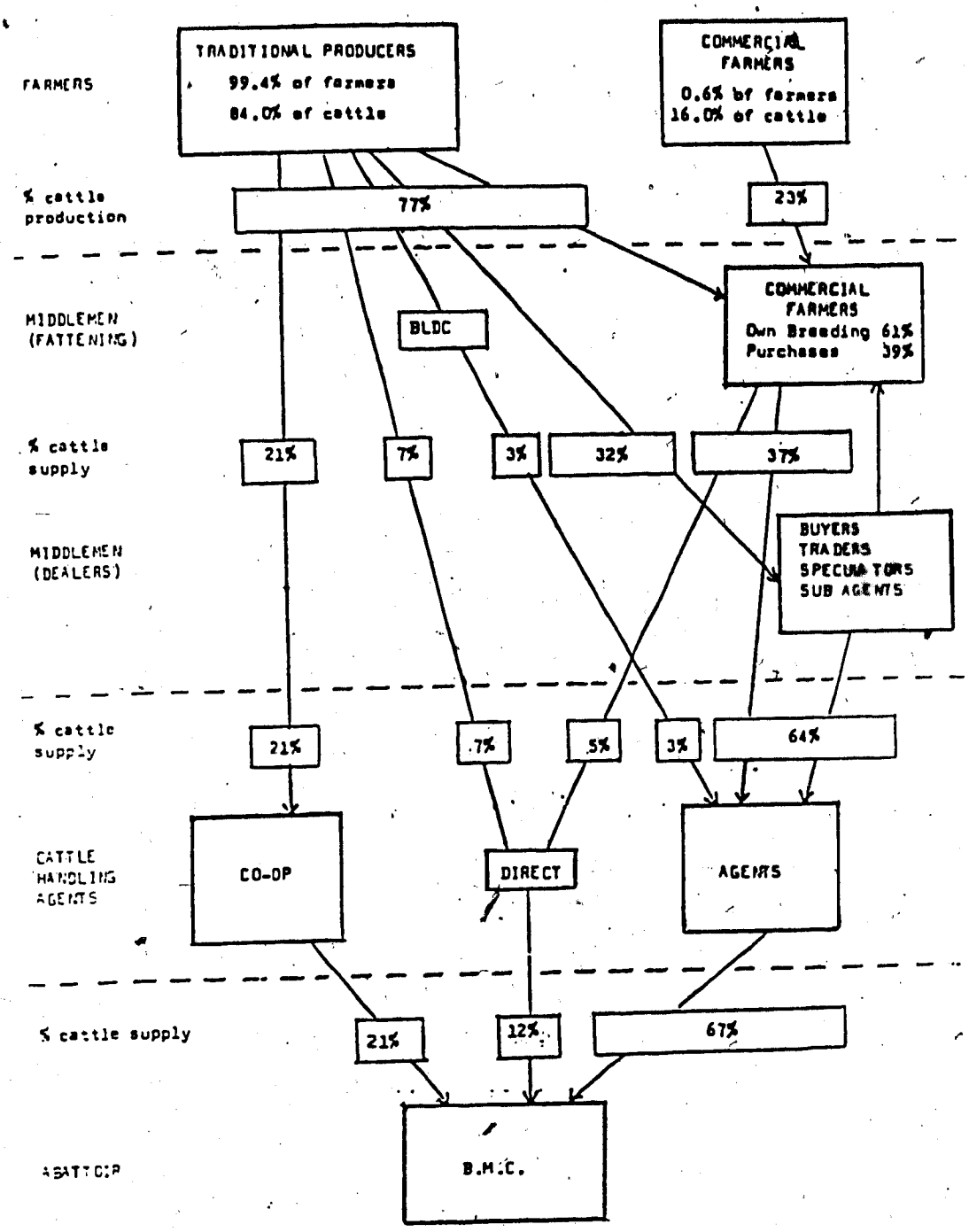
Appendices

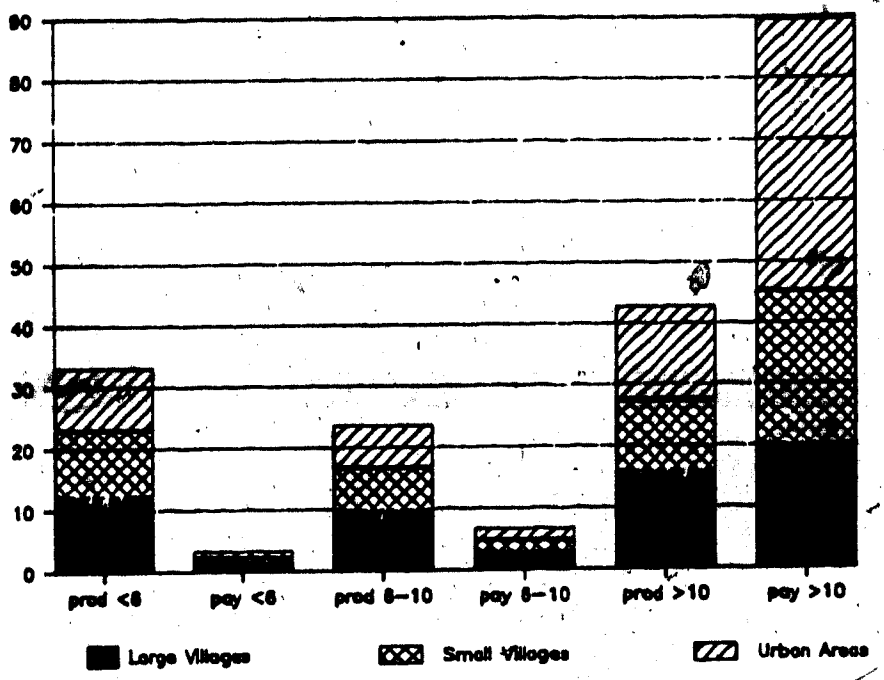
Appendix A: The Linkages Between the Botswana Meat and the Rural Cattle Producers

Figure A.1
The Flow of Funds and Cattle Between The Botswana Meat Commission and Rural Producers.

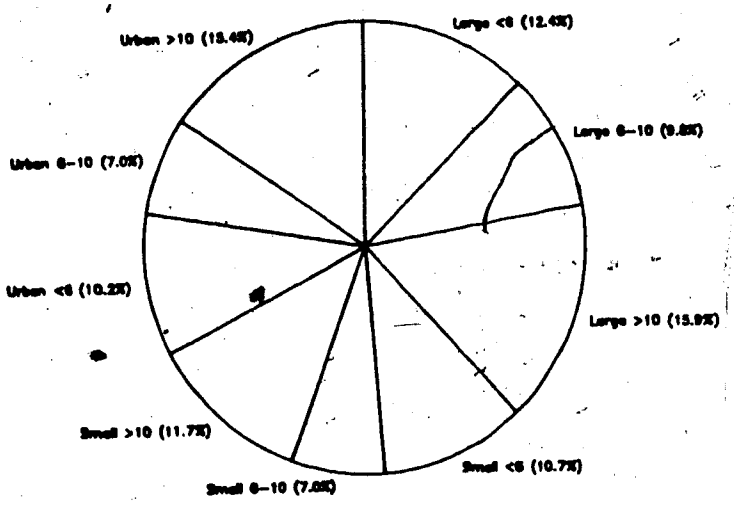


Source: Berenschot-Moret-Bosboom Management Consulting for Development, **Technical Assistance Services to Livestock Owners in Communal Areas in Botswana, Final Report (1983 extension)**, Annual Report Prepared for the Botswana Co-operative Union, Lobatse, November, 1983, Appendix VIII.

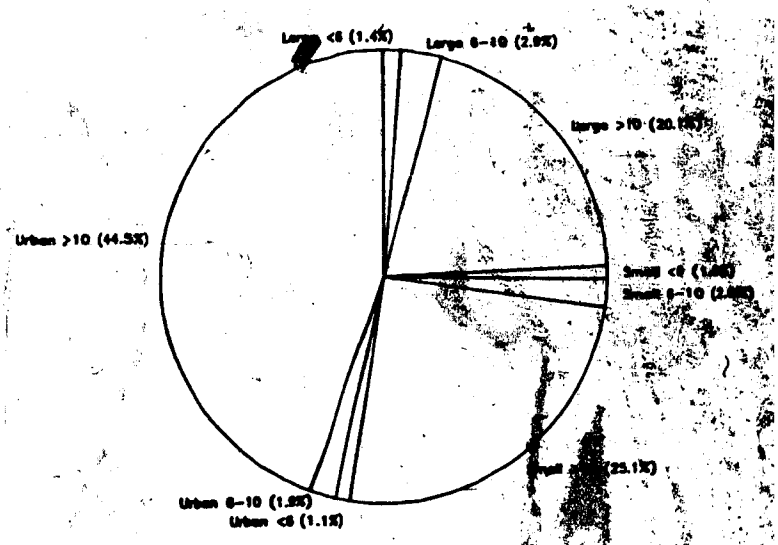
Figure A.2
Distribution of Population and Payments According to Number of Cattle Sold Annually and the Residence of the Producer For Direct Sales to the BMC - 1984 *(in % of Totals)*



Percentage of Total Producers In Each Group According To No. Sold and Residence

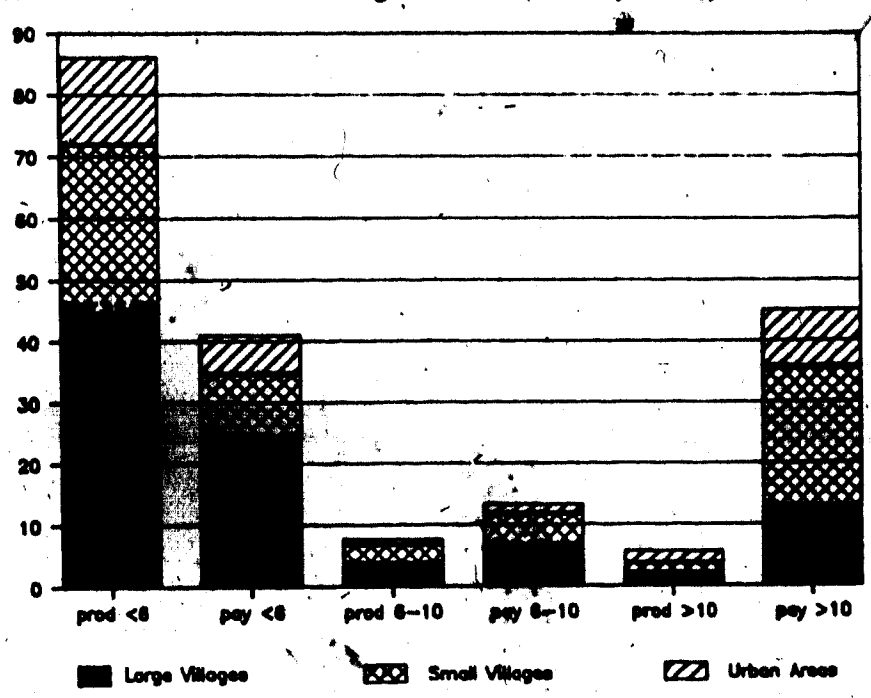


Percentage of Total Payments Made to Each Group According To No. Sold and Residence

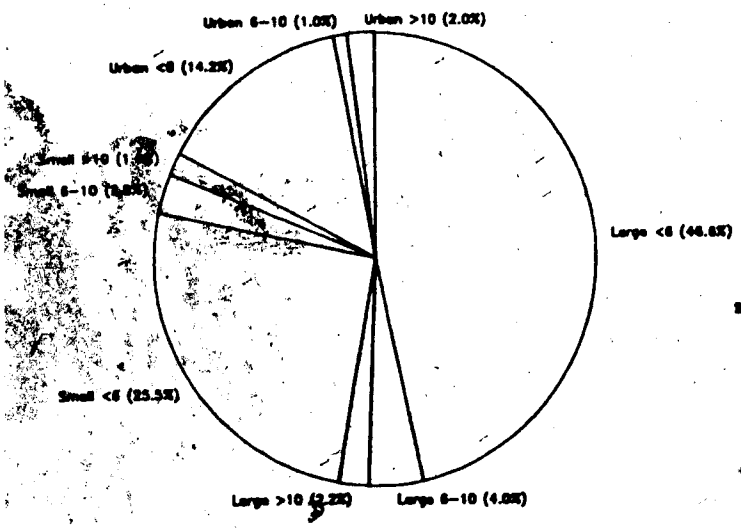


Source: from data collected by the author.

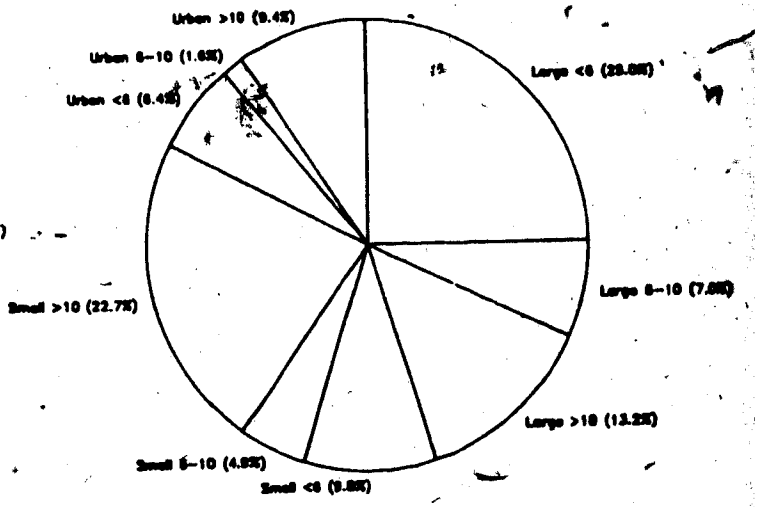
Figure A.3
Distribution of Population and Payments According to Number of Cattle Sold Annually and the Residence of the Producer For Cattle Agents - 1984 ***(in % of Totals)***



Percentage of Total Producers In Each Group According To No. Sold and Residence

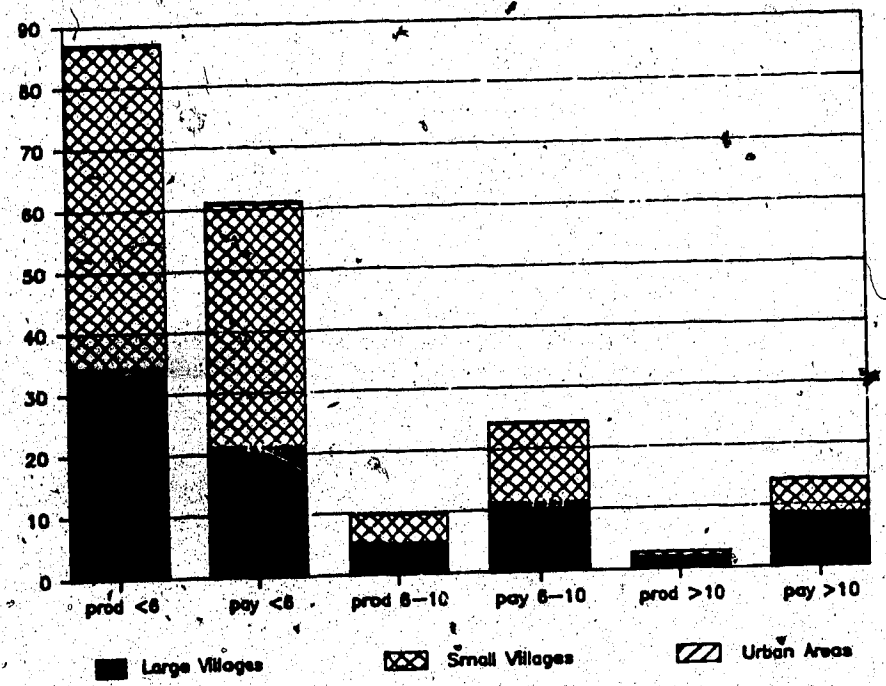


Percentage of Total Payments Made to Each Group According To No. Sold and Residence

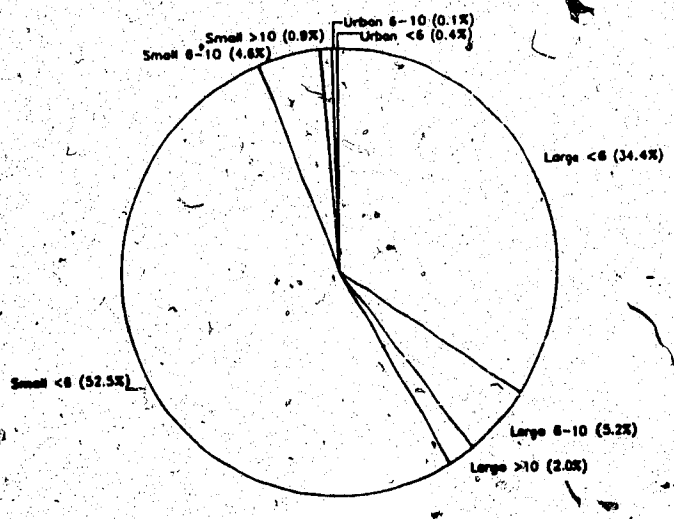


Source: from data collected by the author.

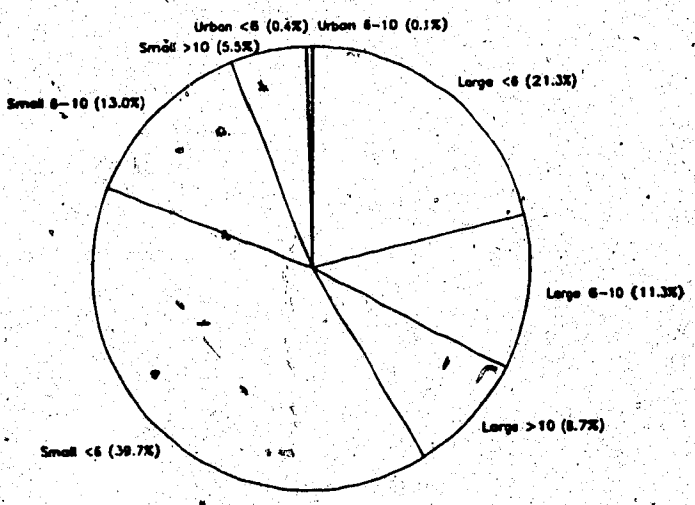
Figure A.4
Distribution of Population and Payments According to Number of Cattle Sold Annually and the Residence of the Producer For Cattle Marketing Co-operatives - 1984 *(in % of Totals)*



Percentage of Total Producers In Each Group According To No. Sold and Residence

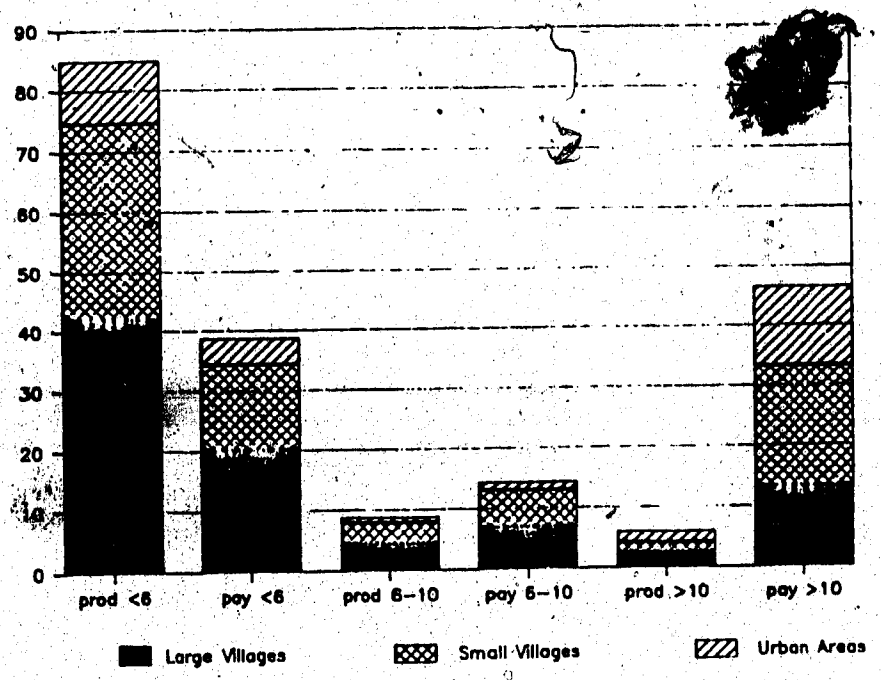


Percentage of Total Payments Made to Each Group According To No. Sold and Residence

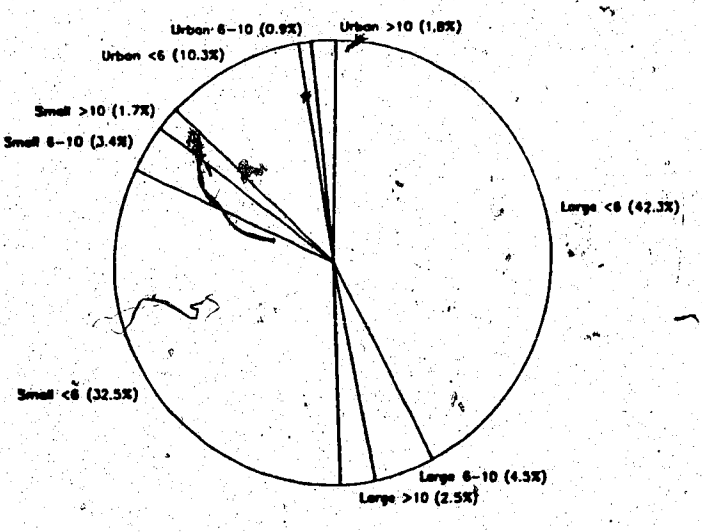


Source: from data collected by the author.

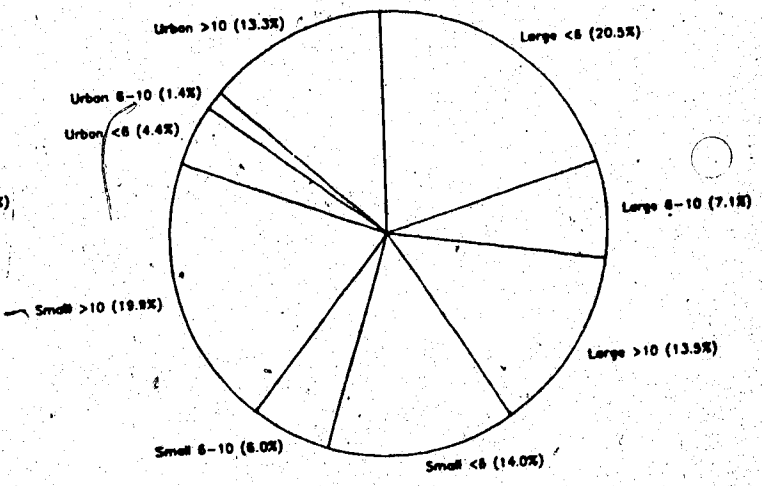
Figure A.5
Distribution of Population and Payments According to Number of Cattle Sold Annually For All Three Marketing Channels Combined - 1984 *(in % of Totals)*



Percentage of Total Producers In Each Group According To No. Sold and Residence



Percentage of Total Payments Made to Each Group According To No. Sold and Residence



Source: from data collected by the author.

Appendix B: Items of Expenditure and Inputs Used as the Basis of Forming Linkages

The Grouping of Items According to Linkage

All the economic activity in the rural areas was categorized under a list of 33 items. The following gives Hirschman's four linkages and categorizes each of these items as to which type of linkage they are:

Forward Linkage - The Botswana Meat Commission is the forward linkage but since the BMC is entirely located in urban areas except in Maun, there is no forward linkage in the rural areas other than the Maun abattoir.

Backward Linkage - consists of all inputs used for the production of cattle:

1. Borehole Depreciation
2. Borehole Owner
3. Cattle Purchase
4. Diesel
5. Government & Co-op Feed
6. Government & Co-op Veterinary
7. Government Borehole Service
8. Local Labour
9. Oil
10. Repairs

Consumer Linkage - consists of all consumer spending:

1. Bricks
2. Building Contractor
3. Buses
4. Cement
5. Clothing Store
6. Food Store
7. Furniture Store
8. Government Health
9. Government Secondary School
10. Local Builder
11. Machinery Purchase
12. Meat Store
13. Other Building Materials
14. Purchase from a Neighbour
15. Purchase from a Neighbour (formal)
16. Repairs

Fiscal Linkage - consists of all investments on business and arable agriculture which originated as cattle income. It should be noted that spending in this linkage was done entirely by private farmers without any involvement by the government:

1. Diesel
2. Fencing Purchase
3. Government & Co-op Agric
4. Local Builder
5. Local Labour
6. Machinery Purchase
7. Oil
8. Repairs
9. Taxes
10. Tools
11. Tractor Owners

List of 33 Items of Expenditure

1. Borehole Depreciation
2. Borehole Owner
3. Bricks
4. Building Contractor
5. Bukes
6. Cattle Purchase
7. Cement
8. Clothing Store
9. Depreciation
10. Diesel
11. Fencing Purchases
12. Food Store
13. Furniture Store
14. Government & Co-op Agric
15. Government & Co-op Feed
16. Government & Co-op Veterinary
17. Government Borehole Service
18. Government Health
19. Government Secondary School
20. Local Builder
21. Local Labour
22. Local Profit
23. Machinery Purchases
24. Meat Store
25. No Rural Spending
26. Oil
27. Other Building Materials
28. Purchase from a Neighbour
29. Purchases from Neighbours (formal)
30. Repairs
31. Taxes
32. Tools
33. Tractor Owners

Appendix C: The Collection of Data Using Surveys and Other Methods

Part One: Surveying Cattle Producers

The Population

The population was defined as all cattle producers selected according to the following criteria;

1. Residence in a communal area.
2. Residence in an area eligible to sell cattle to the E.E.C. during 1984.
3. Sale of cattle through one of the cattle marketing societies.
4. A stratified sample was taken which grouped producers according to the number of cattle sold annually and the size of their village.

The majority of Botswana's population live in the communal areas. According to the 1981 census, 82.3% of Botswana's population lived in the rural areas. In 1986, it is estimated that 79.4% lived in the rural areas with 20.6% living in the urban areas. The Ministry of Agriculture classified 99.4% of cattle producers as being "traditional" and 0.6% as being "commercial". Since it is estimated that about half of all rural families own cattle this survey of cattle producers only touches half the rural population.

Since this research gives prominence to the Lome Convention agreement, the population sampled was limited to those cattle producers living in districts eligible to sell cattle to the EEC market. Foot and Mouth disease has been a recurrent problem in Botswana and the EEC prohibits the import of any cattle from an area where this disease has been reported. In 1984, the districts allowed to export to the EEC were Kgatleng, Southern, South-East, Kweneng, the southern portion of Central, Ghanzi and Kgalagadi Districts. Together, these areas account for 50.9% of Botswana's cattle producers and 51.4% of Botswana's national herd.

How the Sample of Cattle Producers Was Chosen

The Districts Sampled

The survey was limited to the five districts of Southern, Kgatleng, Kweneng, South-East and the southern part of Central District. Ngamiland, North-East, Chobe and the northern part of Central District were ineligible to export to the EEC because of Foot and Mouth disease. The northern Kgalagadi and Ghanzi districts were excluded from this survey because of the distances and difficult travelling conditions involved. Further, the marketing co-operatives in Kgalagadi and Ghanzi did not provide a large enough population since they sold less than 700 cattle per year each and Ghanzi is dominated by commercial cattle producers raising their cattle on freehold land.

South-East District was chosen to be a testing area for the questionnaire. It was later decided to include South-East into the survey because its proximity to Gaborone was no more an influence on it than the other districts surveyed. Further surveying was done in this district around the Ramotswa area after producers in other districts had been surveyed.

The Co-operative Societies Sampled

The sampling frame consisted of producers marketing cattle through the Botswana Co-operative Union (BCU). The marketing channel used to market cattle was not believed to influence a cattle producer's patterns provided that the number of cattle marketed per producer remained constant. Therefore, it was assumed that the spending patterns exhibited by co-op producers would be representative of the spending patterns of producers who sold cattle through agents, speculators and directly to the BMC.

The BCU was enthusiastic and supportive of the research and provided invaluable co-operation and assistance. Because of this support from the BCU, co-op members were expected to be much more responsive to this survey than other non-co-op cattle producers. The Botswana Co-operative Union support resulted in the co-operation of local co-op managers and the provision of certain BCU employees to help in translation and interviews.

This provision of BCU personnel was a significant factor in gaining the trust of the people who were interviewed.

Any cattle marketing co-operative which sold less than 700 cattle annually was excluded because it was thought that such co-ops would not contain enough producers to adequately conduct a survey. Out of 40 co-ops eligible to market to the EEC, only 14 marketed more than 700 cattle annually. It was found later that even co-ops handling more than 700 cattle annually often did not provide an adequate number of producers to sample.

The following co-op societies; one per district, were originally selected at random:

1. Mahalapye Marketing Co-operative
2. Kgatleng Marketing Co-operative
3. Metsemetlhabe Multi-Purpose Co-operative
4. Moshopa Marketing Co-operative
5. Bamalete-Mogobane Co-operative

Unfortunately, there were not enough producers in the above societies to provide a large enough sample in each of the categories desired. In particular, there were not enough large producers and producers residing in small villages. Consequently, six more co-op societies were added to enlarge the sampling frame.

The Moshopa and Bangwaketse co-op societies were the only two from Southern selling more than 700 cattle. Moshopa was originally chosen but Bangwaketse was added to it when it was found that the Moshopa society served only producers from small villages. The Bangwaketse co-op handled 41% of all the cattle from Southern marketed through co-operatives and was the only society in Southern District located in a large village. The Molepolole co-op was chosen because it was the only co-op from Kweneng serving a large village. The other four societies were chosen at random. These societies were:

1. Ootse Multi-Purpose Co-operative
2. Macha Multi-Purpose Co-operative
3. Ranaka Multi-Purpose Co-operative

4. Bangwaketse Marketing Co-operative
5. Molepolole Marketing Co-operative
6. Letlhakeng Multi-Purpose Co-operative

The Stratification and Sampling of the Population of Cattle Producers

The sample was stratified according to two criteria; size of the village of residence and the number of cattle marketed annually. It was hypothesized that cattle producers' spending patterns were influenced by the size of the producer's village and the number of cattle he sold. If spending patterns between producers grouped according to these two criteria showed distinctiveness, this hypothesis would be supported.

The purpose of specifying the size of a village was to measure the relative development of that village on the assumption that a village's size and its level of development are related. No other simple measurements of village development other than population were available so village population was used. A large village was defined as having a population greater than 10,000 and small village as having a population of less than 10,000. A population of over 10,000 was expected to be representative of a district capital or a village of similar importance and providing the same range of public services as a district capital.

Three types of cattle producers were specified according to the number of cattle marketed each year; small producers selling less than 6 cattle annually, medium producers selling between 6 and 10 cattle and large producers selling more than 10 cattle annually. The number of cattle was used as a measurement of a producer's income and wealth since the sampling frame obtained from the co-operatives stated the number of cattle sold but not producers' income levels. It was assumed that a change in the number of cattle sold would have the same influence on spending patterns as a change in the level of income.

Fifteen producers were sampled from each district and stratified into five groups of three producers each; three small producers from a small village and three from a large

village, three medium producers from a small village and three from a large village and three large producers from either a large or small village. It was originally decided to sample four producers from each group but this was reduced to three because of a perceived lack of resources for a larger sample.

There were so few large producers particularly in the small villages, that it was not possible to divide this group into a large and small village sample. Eighty-seven percent of all producers were small producers. Nine percent were medium and only 4% sold were large producers. The distribution was so skewed that with some co-op societies every producer in a category was needed to fulfill the number needed for the sample. Several societies had no large producers at all so other societies had to be included to obtain the desired sample.

Selecting the Producers to be Interviewed

Producers to be interviewed were selected at random from all of the producers who sold cattle through each cattle marketing society during 1985. Using the 1985 list caused a problem since the survey took place in August and September 1985 before this fiscal year ended in September 31, 1985. For this reason 1984, the year just completed would have been preferrable. However, it would be impossible for cattle producers to remember how they spent money in 1984, a year after it was spent. Therefore 1985 was chosen since there was less to be lost from sampling from producers who had a possibility of selling one or two more cattle than from lack of memory caused by sampling from a 1984 list. August and September are the off-season for selling cattle, so the number of cattle sold during these two months is negligible.

The lists of producers were compiled from the daily kill sheets printed by the BMC. A list was compiled for each co-operative society showing the name of each producer, the number of cattle sold, the number of sales and the net payment made for each sale. A list of producers during 1985 was compiled for the purposes of the sample.

During 1985, the BMC altered its fiscal year from January to December to October to September. The 1985 fiscal year was the transition year and covered nine months from January to September, 1985. Therefore, a list for 1984 was compiled to determine the relative distribution of payments and population among small, medium and large producers from small and large villages since 1985 data would be inappropriate for such purposes.

Six weeks were required to compile these lists for the twelve co-op societies and to process the data. The processing of the data consisted of adding all the sales made by each individual producer to determine the total number of cattle sold and payments earned. The 1984 list of producers consisted of 2,746 names and the 1985 list consisted of 1,743 names each stating the number of sales, cattle sold and the net payment earned.

Finding people was difficult. Villages in Botswana do not have street addresses and telephones are rare. Finding someone in a large village, then, was comparable to finding someone in a settlement the size of Spruce Grove or St. Albert with only a name and no address or telephone number and by going door to door asking if anyone knew their name. Often a producer used a different name when marketing his cattle from that by which his neighbours knew him. Further, since people also keep a residence at their lands, they would often not be home once their residence was located.

Because of the difficulties involved and the time necessary to find a producer to be interviewed, eight names rather than the three needed were randomly chosen for each of the five categories. The first three names chosen in each category were to be searched for first and the next five names were alternates to be interviewed only after the first three could not be found. If the first three producers chosen could not be found, then the first three producers of the entire group of eight which could be found were interviewed. Given existing field conditions, no possible reason was identified which would bias the sample by using this method.

An average of two hours was required to find each producer and another hour to conduct an interview. This time did not include the time spent travelling to the village, making

arragements to sleep over night if necessary and the time spent in dealing with the local cattle marketing co-operative.

The Questionnaires Used and the Survey Procedures

Four topics were covered by the survey of cattle producers and their families; 1. expenditures, 2. composition of income, 3. characteristics of producers and 4. probable factors influencing spending patterns. Refer to Appendix D for a copy of the questionnaire used to interview cattle owners and their wives.

1. *Composition of Income*

The total income of the producer and its composition was determined. These included:

a. Sale of Cattle
b. Sale of crops
c. Wage income
d. Remittances
e. Income from businesses
f. Pensions
g. Other sources (eg. ploughing fields or sale of homemade beer)

2. *Expenditures*

The goal in determining expenditures was to get a total picture of beef producers' expenditures. The following areas of expenditures were considered to comprise a beef producers' total expenditures:

a. Arable agricultural inputs
b. Input costs of raising cattle

c. Consumer spending which included:

1) Food

2) Clothing

3) Furniture

4) Housing

5) Transport

6) Education

Whether money was spent in a village in the communal areas or in an urban area in Botswana or South Africa was determined for each of the above expenditures.

3. *Characteristics of Producers*

Questions were asked to determine the factors which influenced the behaviour of producers. These questions were:

a. Relationship to arable agriculture

b. Demographic; age, size of family, etc.,

c. Number of cattle owned

d. Attitudes toward cattle production and sale

e. Number of cattle marketed

f. Annual cash income

The above variables answer several questions such as;

a. A determination of the influences on the expenditure patterns of the producer and his family.

b. An explanation of the rationale that the producer is using in raising and marketing his cattle.

c. How the producer will react to certain events such as how drought or good rains will influence a producer to sell cattle or build up his herd.

4. *Other Probable Factors Influencing Spending Patterns*

The following is a list of the factors which were considered as probable variables influencing spending patterns:

a. The number of cattle sold to the marketing co-operatives in 1985.

b. Total number of cattle sold in 1985.

c. The number of cattle sold to the marketing co-operatives in 1984.

d. Total number of cattle sold in 1984.

e. Total income earned in 1984.

f. Number of cattle looked after.

g. Number of cattle owned.

h. Residence in a large or small village.

Translating the Questionnaire

After translating the questionnaire into Setswana and testing it, it was decided to use a questionnaire written in English only. It is often difficult to accurately translate from English into Setswana and a Setswana questionnaire allowed a greater chance of the interviewer misunderstanding the original intent of a question. Rather, the intent of the question was conveyed to the interviewer in English and was then translated into Setswana. Also, when the questionnaire was written in Setswana, the interviewer had a tendency to recite the question in Setswana rather than focussing on specific pieces of information needed. By keeping the questions in English, the author was more involved in the interview since answers were monitored as they were written down especially during the early days of the survey. It is often normal procedure to have a questionnaire in the language of the interviewee but for this situation, a questionnaire in English only was the most effective approach.

Some Strategies Used in Putting Together the Questionnaire

1. **Developing rapport with the respondent**

At the beginning of the interview, the development of rapport and trust between the interviewer and the respondent was important. The initial questions in the questionnaire were general and inoffensive, meant to "loosen up" the respondent. Demographic questions were asked first, followed by general questions about the respondent's farming and his cattle. The more specific and sensitive questions were asked toward the end of the questionnaire. It was assumed that more accurate and thoughtful answers to these sensitive questions would result after the interviewer had developed a trusting relationship with the respondent.

2. **Checking for accuracy of the answers**

According to the culture of Botswana, it is considered rude to refuse to answer a question. Instead of refusing to answer sensitive questions, false or misleading answers would be given. This proved to be a more difficult problem to deal with than an outright refusal. Therefore, it was necessary to develop some means to assess whether answers were evasions or sincerely given. Hence, some preliminary questions were asked which would indicate to the interviewer the type of response to be expected for the more sensitive questions which the respondent would be reluctant to answer.

Some examples of this cross-referencing of questions are:

a. Whether the producer ploughs with cattle and if so, whether he uses a team composed only of oxen or one with females mixed indicates the minimum size of herd the producer owns. This was would indicate the approximate size of a producer's herd since a herd larger than 20 beasts should be able to provide an all-oxen plough team.

b. Asking the composition of the respondent's herd as to the number of cows,

heifers, etc. This question also would help the interviewer assess the accuracy of the number of cattle owned if the two questions didn't add up. The answers to this question often caused a false estimate of the size of the respondent's herd to unravel.

c. Asking whether a respondent purchased such items as farm implements early in the questionnaire without asking the amount spent and then asking the amounts spent later on in the interview.

3. **Splitting questionnaires between the husband and the wife**

During the field-testing of questionnaires, it was found that husbands knew very little about household expenditures. Therefore, the questionnaire was divided into two sections; one for the husband and one for the wife. The husband was asked all the questions regarding family income and expenditures on arable agriculture, cattle expenses and other related expenses. The wife was asked questions about expenditures on food, clothing and furniture.

4. **Field-testing the questionnaire**

Three versions of the questionnaire were written. Each time a questionnaire was written, it was field-tested. The results were then used in revising the questionnaire and the new revision was in turn field-tested itself until a final questionnaire was arrived at. Field-testing was done by using the draft questionnaire in an interview in the same manner anticipated for the final questionnaire and recording the results.

The main benefits from field-testing were in refining the approach to asking certain questions and developing a framework which would be most easily understood by the respondents. In asking wives what they spent on food, the list of items purchased was based upon household expenditures which commonly reoccurred during test interviews.

How the Interviews Were Conducted

Hiring an Interviewer/Translator

An interviewer/translator was hired who was experienced and who knew the language and culture intimately. The author's knowledge of Setswana (the local language) was inadequate to conduct interviews. To determine when a respondent was evading questions or giving erroneous answers to questions he preferred not to answer, a good understanding of the local culture was essential. Further, the involvement of a local person helped to make the respondents feel at ease. For many rural Batswana, it is intimidating to have a foreigner, especially a caucasian come looking for them to ask questions.

The qualities needed for the translator/interviewer were not easy to find. The questionnaire was long and requested information that was sensitive. Someone with perseverence was needed who would probe to get accurate and complete information when a respondent didn't want to give it or was getting bored with the length of the questionnaire. This person also had to be shrewd to evaluate when a respondent was being evasive by giving erroneous information.

Translation and interviewing were only part of this person's duties. Finding the people chosen to be interviewed was equally important and as difficult a job as conducting interviews. Finding people actually proved to be much more time-consuming than conducting the interviews themselves.

The person hired for the first two months of the survey worked well. However, she left after two months to return to university and the person expected to replace her could not work because of medical problems. Therefore, the remainder of the survey was conducted using co-op employees to assist with the interviews. Although they all were very co-operative, none had any previous experience and had to be trained on the job. Further, it was not possible to have the same person assisting, so a number of people, one after another were assigned to assist. This factor delayed interviews by about a month.

The Process of Conducting Interviews

The process of conducting an interview began with finding the person to be interviewed. This usually started with finding out from the local co-op manager in what wards of the village the people lived who were selected to be interviewed and the names by which they were likely to be known by their neighbours. Occasionally, the co-op manager would even accompany the survey team to the person's house and stay for the duration of the interview. If the person selected was at his lands, a child was often borrowed as a guide and the interview would be conducted there.

The translator conducted the interview while the author watched the results that were being written, interrupting when necessary to draw attention to answers that were unsatisfactory. However, because this practise interrupted the flow of the interview it was done as seldom as possible. The author conducted interviews with those people who were fluent in English.

When two assistants were available; the one hired and one from the co-op, both the husband and the wife could be interviewed simultaneously. With only one person to assist, it was impossible to tell the husband that he couldn't hear what his wife was telling us and so interviews could not be conducted separately.

Making a person feel at ease was important and so we took our time. Interviewers were given the freedom to develop a rapport with the respondent and to probe for answers as they saw fit. The researcher tried to stay in the background.

Some interviews had to be declared invalid. This happened when the respondent was drunk and giving ridiculous responses, when the interview became ammunition in a marital fight which was underway when we arrived or when the person thought to live in a particular settlement, in fact, did not live there but only maintained a plough lands in that area.

In total, over 90 producers were contacted, over 84 interviews were conducted and 69 interviews were considered as useful.

Part Two: The Collection of Data Needed to Determine Secondary Rounds of Expenditure

Survey of Tractor Owners

The purpose of this survey was to determine the proportion of income spent locally by tractor owners on inputs. This was to be done by determining the cost break-down of operating a tractor and determining the profits gained by the tractor owner. The information sought was a breakdown of profits, the costs of each input and the proportion of each which was spent in the rural areas.

The population for this survey was defined as tractor owners registered with each District Agricultural Office to be hired under the Arable Lands Development Policy (ALDEP) to plough local farmers' fields. Under ALDEP, the Ministry of Agriculture pays 85% of the costs incurred by a local farmer when hiring a tractor to plough his fields. This group was chosen because:

1. The cost breakdown of operating a tractor would not be influenced because a tractor owner was being paid under ALDEP.
2. The ALDEP list was the only means available of identifying tractor owners.
3. Tractor owners were easily found at the District Agricultural Office during days when tractor owners were being paid. This ease of access was considered important because the time needed to find tractor owners in a village would have been exhorbitant.

The sample consisted of interviews of three tractor owners from each district providing a total of 15 interviews. Cost breakdowns of operating a tractor are relatively simple so a larger sample was not considered to be necessary. Of the 15 interviews conducted, 14 were considered to be useful.

The interviews were conducted at the offices of the District Agricultural Office in each of the districts. The first three tractor owners who showed up to collect a payment were interviewed. No possible bias was seen to result from following this procedure as opposed to selecting a random sample taken from a complete list of ALDEP tractor owners and searching in the village for them.

Translation when necessary was provided by a local officer of the District Agricultural Office.

Refer to Appendix E for a copy of the questionnaire used to interview tractor owners.

The results of the questionnaires were compiled and the average cost and average propensity to spend locally was calculated for each item. The average cost and proportion spent locally for each item was used to calculate the spending patterns for tractor owners who received money from cattle producers for ploughing their fields. The tractor owners interviewed had a good knowledge of their expenses and the sample results are considered to be unbiased representatives of the true values.

Table C.1
Break-down of Costs Incurred in Operating a Trac[illegible] Profit and The Percentage of Inputs Purchased in the Rural Areas

Item	Expenditure in Pula p/a	[illegible]	% Spent on Item Spent Locally
Machinery Purchase	P1,000	18	18
Loc[illegible]fit	P568	10	100
Rep[illegible]	P1,800	32	34
Oil	P333	6	48
Diesel	P1,867	34	72
Total	P5,568	100	52

Source: from data collected by the author.
* note: Tractor owners actually spent more money than they took in for ploughing. However, they ploughed their own fields free of charge and this ploughing was costed at the rates charged under ALDEP and accounted for as a profit for the tractor owner.

The Survey of Local Brick Manufacturers

The purpose of this survey was to determine the structure of inputs for locally-made bricks and the propensity for brick manufacturers to purchase these inputs locally.

No information was available listing local brick manufacturers or giving the size of their operation. Therefore, the sampling frame consisted of all the local brick manufacturers who could be found by driving around a village or from conversation with local residents.

The sample consisted of three brick manufacturers from each district for a total of 15 interviews. Altogether, 13 interviews were conducted and 10 interviews were considered to be useful. These 13 were not chosen randomly but mostly on the basis of which brick yard owner could be found first. No bias was seen to result from this procedure and the results were considered to be the same as if a random sample was taken. Several brick yards had to be found for every interview obtained from since it was common for an owner to be absent, leaving his workers in charge. To determine the structure of inputs for brick manufacturing was relatively straight forward so a larger sample and a more rigorous sampling procedure was not considered necessary. Interviews were conducted at the brick yards.

Refer to Appendix F for a copy of the questionnaire used to interview brick manufacturers.

The results of the questionnaires were compiled and the average cost of each input and the average proportion of each input purchased locally was calculated. Certain inputs were accounted for differently by different owners. For example some would account for sand and gravel under labour and transport since sand and gravel were dug up near the site while others accounted for them as separate items. Some manufacturers owned their own vehicle while others hired one. It was decided that to take the average cost of each input as it was accounted for would accurately represent a cross-section of the input costs of local brick manufacturers.

Table C.2
Structure of Inputs for Cement Bricks Manufacturing Including Propensity to Purchase Locally in Real and Percentage Terms.

Item	Expenditure in Pula p/m	% of Total Revenue	% Spent on Item Spent Locally
Cement	P1233	12.1	20
Local Labour	P1519	14.9	100
Diesel	P673	6.6	66.7
No Rural Spending	P755	7.4	0
Repairs	P248	2.4	80
Local Profit	P5,405	53	100
Building Co[illegible]or	P59	0.58	97.2
Tools	P306	3.0	7.0
Total	P10,198	100	77.4

Source: data collected by the author.
note: The heading "No Rural Spending" includes purchases of inputs which are purchased entirely outside of the rural areas.

The Survey of Local Building Contractors

The purpose of this survey was to determine the input structure of constructing a house or similar building and the propensity to purchase these inputs locally.

The sample consisted of 3 building contractors from each district which gave a total of 15 interviews. Altogether, 9 interviews were conducted and 6 interviews were considered to be useful. As with brick manufacturers, there was no list of building contractors from which a random sample could be taken. Therefore, the population sampled consisted of all the local building contractors who could be found by driving around a village and from questioning local residents and the District Council Works Officer.

Considerable problems were involved in collecting data from building contractors. It was common for local contractors not to know the cost breakdown of the houses they built. Their practise would be to buy materials as needed and to charge a fee which from experience proved to cover their costs and provide a profit. Contractors proved to be more difficult to find than any other group interviewed. They were either out on site or buying materials but never in their offices. The quality of costings varied greatly. Some were approximations while others were very detailed.

Refer to Appendix G for a copy of the questioniare used to interview building contractors.

The results of the questionnaires were compiled and the costs for each input were ordered from the smallest to the largest. The smallest and the largest readings were then eliminated and the average cost and average proportion of local spending was then calculated for each input. This was done because some of the answers were suspect and this procedure eliminated outliers resulting from bad responses.

Table C.3
Break-down of Input Costs In Building Construction Including Profit and The Percentage of Inputs Purchased in the Rural Areas

Item	Expenditure in Pula p/m	% of Total Revenue	% Spent on Item Spent Locally
Local Labour	P3,846	21.4	100
Local Profit	P1,841	10.3	100
Bricks	P2,368	13.2	100
Other Materials	P8,313	46.5	59.1
Repairs	P143	0.8	34.2
Diesel	P536	3.0	71.7
Oil	P89	0.5	48.3
Machinery Purchase	P769	4.3	18.6
Total	P17,877	100	75.8

Source: from data collected by the author.

The Survey of Rural Retail Stores

The purpose of this survey was to determine the structure of inputs for rural retail stores and the propensity to purchase these inputs locally. Four types of retail stores were considered; groceries, meat, clothing and furniture.

There are numerous retail grocery stores in Botswana's rural areas, most of which are owned by local Batswana. There are fewer butchery stores, usually run as part of a retail grocery operation. The clothing and furniture stores located in the rural areas operate in district capitals or similar large villages. Very few of these merchants keep accurate books and of those who do keep books, very few would allow strangers to peruse them. Further, the

owners of these stores are often difficult to find since many prefer to leave the operation of their stores to an employee while they pursue other interests.

For stores retailing groceries and meat a survey of the store's accounts was taken. A government officer who had been conducting courses on proper accounting procedures for rural retailers offered her assistance in this survey. Because she had gained their trust, she was able to persuade retailers who had taken her course to give access to their accounts for this research. These accounts gave as accurate a picture as possible of the breakdown of inputs and profits for rural retail stores. A price survey was originally planned to determine mark-ups and profits but was discontinued once shop keepers' accounts were available.

The owners of furniture and clothing stores did not allow access to their accounts, so only interviews were possible. Therefore, a simpler format was used for these stores which was limited to wages, mark-ups, profit and purchases.

It was decided to survey 3 stores in each district for a total of 15 stores in total. However, there existed no list of stores from which a random sample could be taken and records were taken from whichever store was available. The practise of taking records from the accounts of a maximum of 3 retailers in each district was followed. Records from the accounts of 12 grocery stores and 2 meat retailers were taken all of which were useful. Interviews were conducted with the owners of 3 clothing stores and 3 furniture stores.

For all stores, the results for each item were compiled and the average cost and average proportion of local spending was calculated for each input. These averages were used to calculate the spending patterns. There was a problem of certain inputs being accounted for differently by different grocery retailers. Considerable work was needed to develop a scheme of accounting under which the data from all retailers would fit.

Table C.4
Break-down of Input Costs For Rural Grocery Retailers Including Profit and The Percentage of Inputs Purchased in the Rural Areas.

Item	Expenditure in Pula	% of Total Revenue	% Spent on Item Spent Locally
Local Labour	P27,598	4.4	100
Local Profit	P38,087	6.0	100
Taxes	P536	0.1	100
Machinery Purchase	P14,573	2.3	18.6
Repairs	P3,168	0.5	34.3
Diesel	P3,168	0.5	71.7
Oil	P507	0.08	48.0
No Rural Spending	P545,536	86.1	0
Total	P633,617	99.98	11.5

* note: The heading "No Rural Spending" includes purchases of stock and all other inputs which are purchased entirely outside of the rural areas.

Table C.5
Break-down of Input Costs For Rural Meat Retailers Including Profit and The Percentage of Inputs Purchased in the Rural Areas.

Item	Expenditure in Pula	% of Total Revenue	% Spent Spent L[redacted]
Taxes	P31	0.1	100
Repairs	P40	0.13	34.3
Diesel	P31	0.1	71.7
Oil	P6	0.02	48.0
Local Labour	P1,198	3.9	100
Local Profit	P7,406	24.1	100
Cattle Purchase	P19,052	62.0	77.0
No Rural Spending	P2,950	9.6	0
Total	P30,729.30	100	75.9

* note: The heading "No Rural Spending" includes purchases of stock and all other inputs which are purchased entirely outside of the rural areas.

Table C.6
Break-down of Input Costs For Rural Clothing Retailers Including Profit and The Percentage of Inputs Purchased in the Rural Areas.

Item	% of Total Revenue	% Spent on Item Spent Locally
Local Labour	5	100
Local Profit	20	100
No Rural Spending	75	0
Total	100	25

* note: The heading "No Rural Spending" includes purchases of stock and all other inputs which are purchased entirely outside of the rural areas.

Table C.7
Break-down of Input Costs For Rural Furniture Retailers Including Profit and The Percentage of Inputs Purchased in the Rural Areas.

Item	% of Total Income	% Spent on Item Spent Locally
Local Labour	5	100
Local Profit	20	100
No Rural Spending	75	0
Total	100	25

* note: The heading "No Rural Spending" includes purchases of stock and all other inputs which are purchased entirely outside of the rural areas.

Data from Other Sources

1. National Development Bank

Data was collected from the National Development Bank from the records of loans made for the drilling and equipping of boreholes for 1984. Altogether, the data for 33 loans was collected which represented all loans made for this purpose during 1984. The purpose of this information was to determine the annual capital cost of owning a borehole and the propensity to purchase these capital goods in the rural areas.

The data was compiled and the average costs of equipping and drilling were calculated. The residence of the borehole driller was was determined so that two averages for

drilling and equipping costs were calculated; for all boreholes and for those drilled by rural drillers. The average costs of drilling and equipping used are based on the fee structures of rural drillers only. The propensity to spend in the rural areas was the ratio of the total paid to rural drillers divided by the total paid to all borehole drillers.

From an interview with a drilling company, the lifespan of a borehole was estimated to be 15 years and equipment to last 6 years. Therefore, the average annual capital cost was 1/15 of the average drilling cost plus 1/6 of the average equipment cost. Forty-eight percent of the total spent on boreholes during 1984 was paid to drillers located in the rural areas.

Table C.8
Average Annual Capital Cost of Owning a Borehole Including Propensity to Purchase from Rural Drillers 1984 *(in Botswana Pula).*

Item of Expenditure	Total Cost and Weighting Factor	Annual Expenditure
Drilling Costs:	P13,470.63 / 15 years	= P898.04
Equipping:	P11,724.03 / 6 years	= P1954.01
Annual Capital Cost:	.....	= P2852.05
Spent in Rural Area	P2852.05 x 48.4%	= P1380.39

Source: the author from data collected from the National Development Bank

2. District Agriculture Offices

Data was collected from the District Agricultural Offices in each of the five districts for purchases of fencing materials under ALDEP. The purpose of collecting this data was to determine the proportion of fencing materials which were purchased in the rural areas. Subsidies to purchase fencing material for arable agriculture are a part of the ALDEP program and records of these subsidies were used. Altogether the records for 603 purchases of fencing material were used which represented all purchases of fencing materials made under the ALDEP program during 1984.

The propensity to purchase fencing materials in the rural areas was based on the ratio of total purchases from rural-based suppliers divided by the total purchases of fencing materials from all suppliers. Seventy-four point five percent of all fencing materials was

purchased from suppliers located in the rural areas. Therefore, the propensity to purchase fencing materials in the rural areas was estimated to be 74.5%.

3. The Ministry of Education

The questionnaire used in interviewing cattle producers included a question on the number of children attending primary school, secondary school, university and other institutions. Figures on the cost of school fees were obtained from the Ministry of Education along with the enrollments at each level and the number of students who paid boarding fees. Combined with the data from the questionnaire showing the number of children attending school the amounts spent by cattle producers on education costs were obtained.

4. Combie Owner and Operator

A list of all the registered bus and combie operators was obtained from the government. It was originally planned to take a random sample from this list and to survey them. However, one large owner was found who provided a complete financial statement of his year's operations. It was decided to use this statement rather than a random survey because it was not anticipated that such a financial statement would be obtained from other owners. It was expected that the cost structure of operating a bus did not vary greatly between owners and that a financial statement would give a more accurate cost structure than a random survey of operators not based on such financial statements.

Table C.9
Break-down of Input Costs For Bus Owners Including Profit and The Percentage of Inputs Purchased in the Rural Areas.

Item	Expenditure in Pula p/a	% of Total Revenue	% Spent on Item Spent Locally
Diesel	P80,589	.23	71.7
No Rural Spending	P111,423	31.8	0
Oil	P946	0.27	48.3
Repairs	P34,338	9.8	34.3
Food Store	P5,957	1.7	92.6
Machinery Purchase	P67,624	19.3	18.6
Local Labour	P29,783	8.5	100
Local Profit	P19,622	5.6	100
Total	P350,386	99.97	39.2

* note: The heading "No Rural Spending" includes purchases of inputs which are purchased entirely outside of the rural areas.

Data Obtained Through Interviews

1. District Veterinary Officers

The Veterinary Departments in each district were surveyed regarding vaccinations, supplementary feeding of cattle and the purchase of cattle for breeding purposes. Five veterinary officers were interviewed; one from each of the five districts under study.

Most vaccinations such as Foot-and-Mouth are provided free by the government through the District Veterinary Office. Other vaccinations are administered free so long as the farmer pays for the vaccine. This information corroborated the small amounts producers reported spending for vaccines and innoculations. One hundred percent of all monies spent on vaccines is considered to return to the rural economy as income to vet employees because of the large government subsidies and the high number of Veterinary Department employees living in the rural areas.

Nearly all supplementary feeding material is provided by the government by means of Livestock Advisory Centres located in the rural areas. The prices charged producers are highly subsidized by the government so no private businesses sell these materials. A large proportion of the supplementary feed provided to producers originates from Botswana's rural areas.

Further, because the government pays large subsidies and stations a large number of veterinary employees in the rural areas, it is believed that 100% of the money producers paid to the government on supplementary feeding materials returns to the rural areas in the form of income to vet employees or income to farmers selling feed materials to the government.

Information on the local sales of cattle is difficult to obtain because of the lack of records. According to District Veterinary Officers, it is highly unusual for stock to be imported from outside of Botswana for breeding purposes. Therefore, it was concluded that all the cattle purchased for breeding purposes by the producers interviewed were raised and purchased in Botswana. Because 77% of all cattle sold in Botswana originate from the communal areas, it was considered that 77% of all monies spent on cattle for breeding purposes return to the communal areas.

2. District Agricultural Officers

The District Agricultural Officer in each of the five districts was surveyed. According to these interviews, insignificant amounts of money are spent on agricultural inputs outside of ploughing and fencing. Most farmers use seed they have grown themselves and most never use purchased fertilizers. This confirmed the findings from the survey of cattle producers that small amounts of money were spent on such inputs such as fertilizer and seeds.

Appendix D: Questionnaire Asked of Beef Producers and Their Wives Regarding Spending, Sources of Income and Other Background Information.

To Be Answered by the Husband of the Family

1. Date _____
2. Place of interview _____
3. Interview number _____

Demographic Information:

4. Village of residence _____
5. Age _____
6. Number of Dependents:
   a. Children _____
   b. Other (eg. Parents) _____
   c. Total _____
7. Location where the herd is grazed _____
8. Is it a:
   a. Lands area _____
   b. Grazing area _____
   c. Cattle post _____
9. How many months per year do you reside there? _____

Arable Agriculture:

10. Do you Plough? _____
11. If so, how many hectares to you plough? _____
12. Do you plough with:
    a. Donkeys _____
    b. Tractor you own _____
    c. Tractor hired _____

d. At what cost per hectare _____

e. Cattle _____

f. Other _____

13. if you plough with cattle, do you use only exen or do you also use females and young animals? _____

14. What proportion of your family's food came from the lands this past year? _____

15. If there were good rains, what proportion of your food would come from the lands? _____

16. Did you purchase or pay for a loan for:

a. Tractor _____

b. Farm implements _____

c. Fencing for your lands _____

d. Fertilizers _____

e. Repair of equipment _____

f. Finance any other business _____

g. Other _____

17. Do you use Kraal manure as fertilizer on your fields? _____

18. If so, how many truck loads? _____

19. Do you use crop residues from the fields to graze your cattle? _____

20. If so, does this practise add to the condition of your cattle? _____

21. How many cattle do you look after? _____

22. How many belong to your relatives? _____

23. How many cattle did you sell for your relatives under your name? _____

24. How many cattle do you own? _____

25. How many:

a. Bulls _____

b. Oxen _____

c. Tollies _____

d. Cows _____

e. Heifers _____

f. Calves _____

Sale of Cattle

26. Which approach do you prefer:

a. To sell cattle to gain money _____

b. To build up your herd rather than sell _____

27. For what purpose do you keep cattle:

a. Ploughing _____

b. Food - meat? - milk? _____

c. Haulage and transport _____

d. As a business or an investment _____

e. A form of savings _____

f. Contingency for emergencies only _____

g. Status as a cattle owner _____

h. Other _____

28. For what purposes do you sell cattle?

a. Regularly for cash income _____

b. For special purposes only _____

c. Only to meet unexpected emergencies _____

d. For investment _____

e. Drought (sell cattle before they die) _____

29. Marketing outlet _____

30. Which outlet do you prefer to sell cattle through? _____

31. Why? _____

32. Do BMC quotas prevent you from selling all the cattle you want to? _____

33. Do you sell cattle outside the co-op? _____

34. Total cattle sold in 1985 _____

35. Were these cattle sold for any special purposes such as:

a. Food _____

b. Clothing _____

c. Furniture _____

d. Housing _____

e. Education (eg. school fees or uniform) _____

f. For the lands (eg. ploughing, fencing, etc.) _____

g. Investment in any business _____

h. Loans to be paid off _____

i. Health (including traditional doctors) _____

j. Ceremonies _____

k. To purchase a vehicle _____

36. Were there any other purposes for selling cattle? _____

Income and Composition of Income

37. What cash income was received from:

a. Sale of cattle _____

b. Sale of crops _____

c. Wage employment _____

d. Remittances by members of the family _____

e. Other business _____

f. Other sources _____

38. What is your annual income? _____

Input Costs of Cattle

39. Do you water your cattle at:

a. Privately owned borehole _____

1) If so, do you own the borehole yourself? _____

2) If so, what fees do you sell water to other for? _____

3) Do you own the borehole as part of a syndicate? _____

4) If so, what fees do you pay? _____

b. Do you water your cattle at a relative's borehole? _____

c. If so, what fees do you pay? _____

d. Do you purchase water from another cattle owner's borehole? _____

e. If so, what fees does he charge? _____

40. Do you water your cattle at a:

a. River or pan _____

b. Well _____

c. Dam of haffir _____

d. Government-provided water source _____

e. If so, what are the fees? _____

41. How many months each year do you water your cattle at each source? _____

42. Do you pay fees to the Land Board? _____

43. If so, how much are they? _____

44. What other taxes do you pay? _____

45. Do you:

a. De-horn - Cost _____

b. Vaccinate - Cost _____

c. Supplementary feed - Cost _____

d. Spray or dip - Cost _____

46. Did the drought cause you extra expenses, if so what were they? _____

47. Who herds your cattle? _____

48. How many do you hire? _____

49. What do you pay them? _____

50. Did you purchase fencing and/or kraals? _____

a. If so, what was the cost? _____

b. Was money borrowed for this purpose? _____

c. If so, how much? _____

d. Were cattle sold for this? _____

51. Did you purchase any cattle? _____

a. How many? _____

b. What type? _____

c. At what price? _____

d. For what purpose (eg. breeding)? _____

52. Where do you load your cattle? _____

53. How far is this from your cattle post? _____

54. What is the cost of this transport, if any? _____

Housing

55. Do you live in a:

a. Rondovel _____

b. Cement block house _____

56. When was it built? _____

57. Did you pay someone to build it? _____

58. If so, who built it? _____

59. From which village? _____

60. If built by the owner, which brickyard and store supplied the materials? _____

61. What were the costs of these supplies? _____

62. How many rooms and/or what are the dimensions? _____

63. What was the cost? _____

64. Was it paid for by:

a. Selling cattle _____

b. With a loan _____

c. Was the loan paid for an/or secured by cattle _____

Transport

65. Do you own a moter vehicle? _____

a. Make _____

b. Year _____

c. Number of kilometres travelled in the last month _____

66. How often did you and your family take a bus or combie during the last month? _____

67. which places did you go? _____

68. What do you pay in a month on such transportation? _____

69. Is this a female-headed household? _____

To Be Answered by the Wife of the Family

70. How many of your children attend:

a. Primary school? _____

b. Secondary school? _____

Household Expenditures:

71. Which of the following items were purchased during the last month and how much:

a. Meat - from a store / from a neighbour _____

b. Sorghum - from a store / from a neighbour _____

c. Maize - from a store / from a neighbour _____

d. Rice _____

e. Beans _____

f. Samp _____

g. Vegetables - from a store / from a neighbour _____

h. Milk - powdered _____

i. Milk - other _____

j. Sugar _____

k. Tea _____

l. Cooking Oil _____

m. Paraffin _____

n. Wood _____

o. Other _____

p. Canned Goods _____

q. Alcoholic beverages - from a store / from a neighbour _____

r. Soap _____

s. Bread flour _____

t. Other food items _____

72. In which village were they purchased? _____

73. At which store? _____

74. What proportion of your food is purchased in the village / in town? _____

75. Which food purchases would not be made if there were good rains? _____

76. What proportion of your food needs are being met through drought relief? _____

77. Are you a participant in a drought relief project? _____

78. What items of clothing were purchased in the last month for your family and at what price? _____

79. In which village were they purchased? _____

80. At which store? _____

81. What proportion of your clothing was purchased in the village / in town? _____

82. What items of furniture were purchased during the last year? _____

83. What proportion of your furniture was purchased in the village / in town? _____

Appendix E: Questionnaire Asked of Tractor Owners Regarding Input Costs of Operating a Tractor.

1. What is your tractor now worth? _____
2. Where did you buy it? _____
3. Repairs and Maintenance:
   a. Cost of Repairs during the last year _____
   b. Where were these done? _____
4. Recurrent costs:
   a. Cost of diesel for last year _____
   b. Where was this purchased? _____
   c. Cost of oil for last year _____
   d. Where was this purchased? _____
5. Total number of hectares ploughed for others _____
6. Total income earned for this ploughing _____
7. Total number of hectares ploughed for one's self _____
8. Do you supply the plough? _____
   a. If so, what is its value? _____
   b. Annual cost of maintenance of this equipment _____
   c. Where was it purchased? _____
9. In which village do you live? _____
10. Annual income earned from:
    a. Sale of cattle _____
    b. Sale of crops _____
    c. Wage employment _____
    d. Remittances _____
    e. From ploughing _____
    f. Other sources (eg. ploughing) _____

g. Total _____

Appendix F: Questionnaire Asked of Brick Manufacturers Regarding Structure of Input Costs Involved in Manufacturing Bricks.

1. Total sales during the last month _____
2. Total amount spent on cement durng the last month _____
3. Where was this purchased? _____
4. Total amount spent on labour during the last month _____
5. Total amount spent on sand during the last month _____
6. Total amount spent on diesel during the last month _____
7. Where was this purchased? _____
8. Total amount spent on maintenance of vehicles during the last month _____
9. Where was this purchased? _____
10. What is the value of capital assets:
    a. Buildings _____
    b. Vehicles _____
    c. Tools and equipment _____
    d. Where were these purchased? _____
11. Total amount spent on profits and overheads during the last month _____

Appendix G: Questionnaire Asked of Building Contractors Regarding the Input Cost Structure of Building Housing.

1. Cost per square meter of constructing a house _____
2. Cost per room of constructing a house _____
3. Cost of cement blocks/stock bricks _____
4. Where were these bought? _____
5. Cost of window and door frames _____
6. Where were these bought? _____
7. Cost of doors _____
8. Where were these bought? _____
9. Cost of glass for windows _____
10. Where were these bought? _____
11. Cost of sand (is this only a cost of labour and transport?) _____
12. Cost of stones (is this only a cost of labour and transport?) _____
13. Cost of cement - number of bags and cost per bag _____
14. Where were these bought? _____
15. Cost of roof timbers _____
16. Where were these bought? _____
17. Cost of tin for roof _____
18. Where were these bought? _____
19. Cost of paint _____
20. Where were this bought? _____
21. Cost of labour _____
22. Cost of transport:
    a. Where do you purchase diesel and oil? _____
    b. Where do you repair your vehicles? _____
    c. Where did you purchase your vehicles?

23. Overhead _____

24. Profit _____

25. Other costs _____

26. Where were these purchased? _____

27. Total selling price of house. _____

Appendix H: Total Induced Economic Activity According to Size of Village and Number of Cattle Sold

Table H.1
Total Induced Economic Activity in the Rural Economy Resulting from All Income to Beef Producers for All Rounds of Expenditure ***(in Botswana Pula).***

	Small Village			Large Village		
# Cattle Sold	<6	6-10	>10	<6	6-10	>10
Income	943.54	1622.07	1905.38	1222.83	2102.70	3050.61
Consumers	1767.64	1692.66	2374.53	2298.12	3005.72	3989.97
Durables	169.34	974.12	1166.07	173.37	1003.32	1485.15
Inputs	282.37	736.15	654.03	657.46	810.31	1271.55
Personal	219.21	226.43	383.24	285.85	469.27	548.93
Total	3382.10	5251.44	6483.25	4637.63	7391.32	10346.21

Source: from data collected by the author

Table H.2
Total Induced Economic Activity in the Rural Economy Resulting from All Income to Beef Producers for Round Two to Final Round of Expenditure ***(in Botswana Pula).***

	Small Village			Large Village		
# Cattle Sold	<6	6-10	>10	<6	6-10	>10
Income	770.15	1160.16	1699.10	1139.32	1788.62	2418.20
Consumers	472.22	735.57	847.81	605.00	1013.80	1446.54
Durables	102.87	190.63	228.93	160.46	344.90	452.53
Inputs	151.04	308.63	299.42	211.27	332.16	486.63
Personal	55.28	88.11	102.11	70.87	119.56	171.20
Total	1551.56	2483.11	3177.37	2186.92	3599.04	4975.10

Source: from data collected by the author