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Background Paper Series

PROVIDE PROJECT
The Provincial Decision-making Enabling Project

Background Paper 2006:1

The Economic Contribution of Home Production for Home Consumption in South African Agriculture

Elsenburg
November 2006

PROVIDE PROJECT

The Provincial Decision-making Enabling Project

Overview

The Provincial Decision-Making Enabling (PROVIDE) Project aims to facilitate policy design by supplying policymakers with provincial and national level quantitative policy information. The project entails the development of a series of databases (in the format of Social Accounting Matrices) for use in Computable General Equilibrium models.

The National and Provincial Departments of Agriculture are the stakeholders and funders of the PROVIDE Project. The research team is located at Elsenburg in the Western Cape.

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The Economic Contribution of Home Production for Home Consumption in South African Agriculture [1]

[1] The author of this paper is Benedict Mandlenkosi Gilimani. This paper presents the Master's thesis of Mr Gilimani, presented in partial fulfilment of the requirements for the degree of Master of Science in Agricultural Economics at the University of Stellenbosch, submitted December 2005. No alterations have been made to the text.

ABSTRACT

This study discusses the importance of home production for home consumption (HPHC) and its economic contribution to South African Agriculture. The Income and Expenditure survey 2000 (IES 2000) dataset is used to draw conclusions in this study. IES 2000 contains a section on HPHC. HPHC aims to capture information on the quantities and values of home produce consumed and sold to the market. Home production often forms an important part of the livelihood strategies of rural households in developing countries. The study focuses on rural households of two provinces, namely the Eastern Cape and KwaZulu-Natal. Although HPHC is also practiced by many households in the Limpopo province a decision was taken to only focus on KwaZulu-Natal and Eastern Cape since these two provinces jointly form the East Coast region in the PROVIDE Project databases. As such the study is useful as it feeds directly into the mentioned projects, regional outputs.

The software used during data analysis was Stata. Some calculations were not possible with Stata due to inconsistencies in the IES 2000 dataset. Therefore, the study firstly discusses inconsistencies in the dataset and the way they were corrected to make calculations in Stata possible. The data on HPHC also contain statistics from large producers who are seen as commercial farmers and, as such, are not supposed to be part of this study. Therefore, an effort was made to remove them from the dataset on home production for home consumption.

Valuing produce and livestock consumed at home is also difficult. The method followed in this study, in an attempt to value HPHC, is the calculation of implicit price using the median market prices of the value of sales. This method was used in an attempt to gauge how much produce and livestock consumed at home contribute in monetary value.

Literature about small-scale farming and its contribution to home consumption was reviewed. However, the main findings of this thesis are based on the IES 2000 HPHC database. In summary, the study assesses the economic value of produce and livestock in terms of their contribution to consumption and income. The findings reveal that there is very little contribution in terms of income made by HPHC. It was found that in Eastern Cape households HPHC contributes 12.0 percent of the total income, and in KwaZulu-Natal households it contributes 6.7 percent of the total income.

In this study it was found that in terms of the types of produce that rural households produce, maize is by far the most important. Many (46.1 percent) of South African households are engaged in maize production, even though, in terms of consumption value, it contributes little (R256.65 per annum) when converted to a monetary value. Milk production was found to contribute more than any other kind of produce in Eastern Cape households in terms of monetary value per annum (R1112.51) even though the number of households involved account for only 6.3 percent. The consumption value of vegetables on average is R237.18 per annum and 24.1 percent of South Africa households are involved in its production.

The value of cattle and sheep consumed at home by Eastern Cape households found to be R806.50 and R800.33 per annum per household, respectively; although, it is very rare for an African household to slaughter cattle at home just for food. Pigs which are more likely to be consumed merely as food, only contribute (R141.47) per annum, and poultry contributes R78.99 on average per annum.

UITTREKSEL

In hierdie verhandeling word eie produksie vir huishoudelike gebruik (*home production for home consumption*) bestudeer in ’n poging om die ekonomiese bydrae van sulke aktiwiteite te kwantifiseer. Die *Income and Expenditure Survey* van 2000 (IES 2000, Statistiek Suid-Afrika) is gebruik as basis vir die studie. Hierdie statistiese opname bevat ’n onderafdeling wat handel oor eie produksie vir huishoudelike gebruik, en rapporteer onder meer oor hoeveelhede en waardes van landbouprodukte wat gedurende ’n bepaalde tydperk geproduseer, verbruik en verkoop is deur huishoudings. Eie produksie is dikwels ’n baie belangrike bron van voedsel en inkomste vir landelike huishoudings in ontwikkelende lande. In Suid-Afrika kom sulke aktiwiteite veral voor in KwaZulu-Natal en die Oos-Kaap, en dus fokus die studie op dié twee provinsies. KwaZulu-Natal en die Oos-Kaap vorm ook gesamentlik een van die streke wat in die PROVIDE Projek se databasisse opgeneem is. Dit het bygedra tot die besluit om slegs hierdie twee provinsies te bestudeer.

Die statistiese sagteware pakket Stata® is gebruik vir die data analise. Verskeie aanpassings aan die databasis was nodig om veral konsekwentheid in die data te verseker alvorens met statistiese analiese begin kon word. Verskeie kommersiële boere het byvoorbeeld foutiewelike

inligting verskaf oor hul landbou produksie bedrywighede in die ‘eie produksie vir huishoudelike gebruik’ afdeling van die IES opname, en gevolglik moes hierdie inligting verwyder word ten einde te verseker dat die inligting slegs betrekking het op nie-kommersiële kleinboere en bestaansboere.

Die waardasie van produkte wat self geproduseer is is nog ’n struikelblok wat oorkom moes word. Inligting oor die totale inkomste en hoeveelhede van elke huishouding se verkope is gebruik om ’n statistierse verdeling van implisiete prys te verkry. Die mediaan van die verdeling van implisiete pryse vir elke produk is gebruik as maatstaf om verbruikswaardes te bepaal waarvolgens eie gebruik, wat slegs in hoeveelhede gerapporteer is, se waarde te bepaal.

Die verhandeling sluit ook ‘n literatuur-oorsig in oor kleinboerdery en die bydrae wat dit lewer tot die betrokke huishoudings. Alle gevolgtrekkings is egter gebaseer op die data analiese van die IES 2000. Die slotsom is dat eie produksie slegs ’n klein bydrae lewer tot die verbruik en inkomste van die betrokke huishoudings. Hierdie aktiwiteite dra ongeveer 12.0 persent by tot die inkomste van Oos-Kaapse huishoudings, terwyl dit slegs 6.7 persent bydra tot die inkomste van huishoudings in KwaZulu-Natal.

Die produksie van mielies is verreweg die belangrikste aktiwiteit, met ongeveer 46.1 persent van die huishoudings wat hierby betrokke is. Die geldwaarde van mielieverbruik beloop egter slegs R256.65 per huishouding per jaar. Melk dra aansienlik meer by tot huishoudings se totale verbruik (R1112.51 per jaar) in die Oos-Kaap, maar slegs 6.3 persent van huishoudings produseer melk. Ongeveer 24.1 persent van die huishoudings produseer groente en die verbruikswaarde hiervan is bereken as R237.18 per jaar.

Die waarde van bees- en skaapvleis verbruik beloop ongeveer R806.50 en R800.33 per huishouding per jaar onderskeidelik. Dit gebeur egter selde dat swart huishoudings beeste of skape sal slag slegs vir voedsel. Varkvleis is ’n meer algemene vleistipe vir daaglikse verbruik, maar ten spyte hiervan beloop dié se verbruikswaarde slegs R141.47 per huishouding per jaar. Pluimveë verbruik beloop R78.99 per huishouding per jaar.

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Table of contents

List of figures

List of tables

CHAPTER ONE

1. INTRODUCTION

1.1. Background

The South African Government is focusing anew to bridge the gap of dualism in agriculture that is, emerging farmers versus commercial farmers. The ultimate aim is to have a sense of togetherness and end this division (NDA, 2001). De Klerk (1996) argues that in the newly democratic South Africa, it is in agriculture's interest to show that it wants to bridge gaps to greater involvement by disadvantaged South Africans with a credible programme with, among other mechanisms, to induct smaller farmers into commercial production. Hemson *et al.* (2004) also echo what has been outlined in the South African Agricultural Policy, namely that the rural areas of South Africa are awaiting an initiative to bring the rural poor into modern services through new forms of non-farm activities and the revival of agriculture. Hemson *et al.* (2004) discovered that one of the curiosities of South Africa is that the rural poor do not see agriculture as an answer to their difficulties; only four percent of the income of the poorest comes from this source.

Past policies, including the Land Acts of 1913 and 1936 and the Administration Act of 1927 which favoured white farmers, prevented people in the former homelands from becoming economically independent. White commercial farmers became established and were given subsidies to pursue production and there was no equitable distribution of land between black and whites. White farmers were given large amounts of land than black farmers. There were no subsidies given to black farmers and very few received any kind of support. They became subsistence farmers, with no access to markets and with no proper equipment to carry on production. Hence, they were forced to produce mainly for home consumption and not for the market. As a result, their activities are low yielding, and according to Catling and Saaiman (1996), it was insinuated that a small farmer working to provide for family needs and not producing for the market was a failure. The reality that subsistence farming contributes to household food security but produces little for the market was ignored. Few see subsistence farming as a step in progressing towards commercial farming (Catling and Saaiman, 1996).

The reality that South Africa's rural poor do not see agriculture as an answer to their problems needs to be investigated and measured. Home products are an important source of food; for example, maize can be consumed or fed to animals, and it can provide calories needed for the body's energy, but it is low in other nutrients, while home-grown vegetables have very high nutritive value. This means that, irrespective of low yields, home production has some level of importance and this needs to be explored and theory of a small-scale farmer investigated.

1.2. Research problem

Most people are familiar with headlines describing how fast or slow the country's economic growth is, and many measures of growth are based on government statistics that gauge the total value of output produced in the economy. A substantial amount of output captured by these statistics is devoted to goods and services used by households. However, some output, such as that produced and consumed by households, is not counted in the official measures of economic activity (Wrase, 2001). But in South Africa, the Reserve Bank has always made an adjustment to the Growth Domestic Product (GDP) to account for "subsistence" agriculture. The problem there as well is that the value is normally estimated without doing thorough investigation.

The central question to be addressed by this study is, therefore, to determine the economic contribution of home production for home consumption in South African agriculture.

1.3. Objectives of the study

The purpose of this study is to investigate the importance of home production of produce and livestock in terms of contribution to rural livelihoods. The production of non-market produce by household members does make an economic contribution to the welfare of society. Considering that home production for home consumption (HPHC) is not subject to sales tax, like products that are sold through markets, the objective of this study is to investigate how much a household would have to pay had it purchased the goods in the market? This can be measured by giving a monetary value to goods consumed at home.

In this thesis, an alternative way of valuing consumption is presented, as opposed to the method followed by Hoogeneveen and Özler (2004) where they only investigated the value of

maize using actual market prices. Here, the analysis is extended to embrace all types of produce consumed by households, including livestock products.

1.4. Research method

With regard to HPHC, households produce and consume at home, and the labour involved in production is unpaid since it is supplied by the household. Goods that are produced by the household are directly consumed within the household without monetary transaction. Yet, there should be some way of measuring household production: in terms of either the time taken to produce or the number of workers, the value of inputs (where attempts are made to compute the wages of substitutes in the market place) or outputs (using either producer prices or retail prices, as the case may be).

According to Wrase (2001) home production can be gauged in two ways. One way involves looking at the amount of time people devote to unpaid work at home. Another way to gauge home production involves looking at inputs and outputs. The study by Gronau (1979) focused on the labour inputs going into home production. His emphasis was on the measurement of productivity and total home output. This study attempts to allot a value to the portion of agricultural products that is produced and consumed at home.

This analysis is based on the Income and Expenditure Survey 2000 (Statistics South Africa, 2000) data on about 26 265 households in all nine provinces of South Africa. The survey was conducted by Statistics South Africa. Detailed information was collected on the types and quantities of livestock and produce produced by the households for their own consumption. This information is translated into money value by calculating the value of consumption.

1.5. Outline of the study

The study is structured as follows: Chapter 2 is a review of literature on small-scale subsistence farming in a South African context and also from an international point of view. In Chapter 3 there is an explanation of how the data were modified and adjusted (where necessary), given the problems associated with multiple entries, missing values, reporting inconsistencies and the presence of statistics regarding commercial farmers in the dataset. Chapter 3 gives also an explanation of the valuation of home produce and livestock. In

Chapter 4 findings concerning the importance of home production for home consumption are presented. In the final chapter the study is discussed and conclusions are drawn.

1.6. Limitations of the study

There are two important limitations to this study. The first is the use of real sales to calculate implicit prices as a proxy for the prices that farmers or households would pay if they were to buy the home-grown product on the market. These recommended implicit prices may represent poorly the actual prices charged by the market to households. Data availability, unfortunately, does not permit a complete documentation of these prices. The second limitation of the study was the non-specification in the dataset of ‘other livestock‘ and ‘other products‘ grown at home.

CHAPTER TWO

2. LITERATURE REVIEW ON THE THEORY OF SMALL-SCALE FARMING IN SOUTH AFRICA

2.1. Introduction

Home production for home consumption often makes up a non-trivial share of rural poor household budgets in developing countries. Deaton and Zaidi (2002) cited in Hoogeveen and Özler, (2004) report budget shares of 6.7 percent in Brazil and 16.8 percent in Vietnam. However, the importance of this item seems to be small in South Africa. Using data from the South Africa Integrated Household Survey (1993), Deaton and Zaidi (2002) estimated that the budget share of HPHC was 2.2 percent in this country. Hoogeveen and Özler, however, present evidence from the Income and Expenditure Surveys (IES) of 1995 and 2000 that seems to indicate a rise in the importance of HPHC for the poor in rural areas.[2]

The principal objective of this study is to investigate the economic contribution of home production for home consumption in two provinces of South Africa - The Eastern Cape and KwaZulu-Natal. The reason why the study focuses on these two provinces is that the data shows that this is where most households practice home production for home consumption and it is also believed that this is where much information can be obtained regarding agricultural livelihood strategies. It is acknowledged that African households in Limpopo province are also actively involved in HPHC but it was excluded because this thesis is written based on the project that the author was involved with during the time he was working for the Provincial Decision-Making Enabling Project (PROVIDE). His project was to look at the HPHC of the East Coast region which entails Eastern Cape and KwaZulu-Natal and based on this project the author wrote a thesis. That is why Limpopo is not part of these findings.

The study firstly reports on the extensive work that is needed to modify the data so that it can be used to explore issues surrounding the importance of HPHC in South Africa. HPHC largely been ignored for a number of years due to problems associated with obtaining this kind of data. Both IES 1995 and 2000 contain sections on HPHC, but there are some problems that have to be solved before the data becomes usable.

These problems range from inconsistencies in the way data are reported to problems associated with the valuation of home consumption. As a result, many researchers working with IES data have chosen to pass over this part of the data by simply aggregating HPHC figures into total household income and expenditure figures. To make matters worse, it appears as if Statistics South Africa has always treated the value of consumption of home produce incorrectly. Section 3.1 elaborates on this aspect.

Secondly, the study presents an alternative way of valuing consumption of home produced goods. IES 2000 only reported on quantities consumed. It did not ask respondents to attach some notional value to the goods consumed, and as a result, these values had to be estimated. Hoogeveen and Özler, for example, use actual market prices of maize to estimate the value of maize consumption. However, it is quite reasonable to assume that the price of maize produced by small subsistence farmers in rural areas is different from the formal market price. Furthermore, since the analysis here also looks at consumption and production of other types of produce and livestock, it is necessary to develop an alternative way of valuing goods, particularly due to the limited information about prices of produce and livestock in rural areas. The approach proposed here (see section 3.3) makes use of implicit prices, calculated given information on values and quantities of sales of produce and livestock.

Thirdly, the study explores the data in order to get some indication of the importance of HPHC in South Africa. Data on HPHC can potentially provide valuable information about rural livelihood strategies and the importance of small-scale farming in South African rural areas. In particular, the study focuses on African households farming in the Eastern Cape and KwaZulu-Natal provinces. This was decided because data revealed that home production for home consumption is mainly practised by African households residing in the former homeland areas of the Eastern Cape and KwaZulu-Natal.

2.2. Overview of small-scale agriculture in South Africa

South Africa is divided into two economies, that of the rich and that of poor people. A Gini coefficient of 0.593 shows that there is a vast gulf between rich and poor in the country (Vink and D'Haese, 2003). South Africa also has high unemployment in the rural population of the former homelands and these areas also have a high poverty rate relative to the rest of South

[2] This evidence is based on the consumption of home-produced maize, using province-specific market prices of

Africa (Vink and D'Haese, 2003). There is a large rural population and a poorly educated and largely unskilled workforce (Lipton *et al.*, 1996). These factors indicate that agriculture could play a key role in uplifting people. According to Rockefeller (1969), agriculture can play a role in uplifting the standard of living of the people in the former homelands. The majority of people who migrated to urban areas originally resided in rural areas. Most of the young rural men and women left their home districts in search of employment in the mines and factories (Vink and D'Haese, 2003).

Active participation in agriculture could reduce the level of migration to the cities by young rural people, who might otherwise migrate to urban areas in search of jobs that are not available in rural areas. Agriculture can play a role through the use of natural resources like land that are available to the rural population. Ashley and Maxwell (2001) as quoted by Vink and D'Haese (2003) argue that land is often not the most limiting resource on small farms. The scarce resources are cash to purchase inputs and limited seasonal labour. Lipton *et al.* (1996) found that small-scale farming has helped employ and generate income in many other developing countries. In middle-income countries with economic and labour profiles similar to those of South Africa, agriculture accounts for 15 percent of the GDP and employs 25 percent of the labour force (Lipton *et al.*, 1996).

However, according to Lipton *et al.* (1996), in South Africa agriculture is only a marginal force in the economy, accounting for 5 percent[3] of the GDP and employing only 14 percent of labour. One of the surveys done discovered that, of the 70 countries on which data is available, South Africa is one of the lowest in its reliance on agriculture as a source of employment. Some experts say this is because South Africa is a dry country, but other dry countries have large agricultural sectors. Lipton's (1996) main concern is that by 2025 the working age population in South Africa will more than double and with agriculture only contributing to the livelihood of a few, many could face unemployment. An important question, according to him, is why are people abandoning away from Agriculture? Is there a lack of interest in agriculture, and are people more interested in urban employment? Or was the movement away from agriculture caused because Black South Africans were denied access to land, irrigation and technology (Lipton, 1996)?

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maize to value the consumption.

In an attempt to answer Lipton's concerns Aliber (2005) alluded that the reason why youth in rural areas is abandoning away from agriculture is based on their observations from their parents, young people have concluded that agriculture is an unpromising avenue to self-advancement. Aliber's argument is that even youth that is raised on commercial farms show disinterest in inheriting parent's farms. The difference between this story and the one that appears to apply to former homeland areas is that, in the commercial farms the disinterest of the youth contributes to land being left unutilized rather than being taken over by others with commercial aspirations but contribution of land tenure remains a question particularly because there is low demand for productive land. According to Aliber (2005) agriculture in former homelands is declining because people have diverted to off-farm employment because of economic reasons. If off-farm employment provides better earnings rural households readily leave agriculture.

It is well known that access to farming was denied to Black South Africans through unequal distribution of land, water and technology. One of the most challenging socio-economic problems currently facing South Africa is how the large number of rural African residents can be assisted in establishing viable livelihoods. From an international perspective, small-scale agriculture has been proven to generate employment and income opportunities in rural areas. According to Kirsten and Van Zyl (1998) small-scale farmers are potentially competitive in certain activities and, with proactive policy support, these opportunities could be developed into viable niches for the future smallholder sector. The challenge in South Africa is to remove the structural constraints that inhibit the growth of a vibrant commercial smallholder sector.

Small-scale agriculture is often the sector of developing economies that presents the most difficult development problems. These include piped water, land redistribution and access to credit.

There are two types of agriculture in South Africa: subsistence farming in the former homelands and large-scale commercial farming. White farmers dominate the large-scale commercial sector. This is not only the case in South Africa. In the rest of the world farmers also range from subsistence farmers to agribusiness farmers (Kirsten and Van Zyl, 1998).

[3] Although the low contribution of agriculture to GDP may create the impression that agriculture is not important to the economy as a whole, the true value lies in its backward and forward linkages (Fényes and Meyer,

There are different views on the way people differentiate between subsistence and commercial farming. Wikipedia (2001) defined subsistence farming as 'the mode of agriculture in which a plot of land produces only enough food to feed the family working on it'.

In the literature review the author begins by describing different criteria people follow to describe and understand subsistence farming. Then the author explains small-scale farming in the context of South Africa, and highlights crop and livestock farming as the main small-scale farming practices in South Africa. The obstacles faced by small-scale farmers is highlighted and the economics of subsistence farming is described. Small-scale farming in an international context is looked at. Lastly, some conclusions are drawn.

2.3. General definition of subsistence farmers

In 1969, Clifton and Wharton admitted that there was confusion in defining subsistence farming. They admitted that a farmer that is characterised by pure subsistence production is rarely found in the real world. According to them the more common cases are farmers whose average production may be characterised by varying degrees of subsistence production and commercial production. Clifton and Wharton (1969) argued that a subsistence farmer's goal is the production of household food rather than products for commercial sale. However, they further argued that there is a close relationship between production and consumption. The goal of productive activity in cultivating is family survival. Such farmers are, therefore, subsistence farmers working for a subsistence living (Clifton and Wharton, 1969).

Clifton and Wharton (1969) indicated that this definition is not sufficient because it concentrates merely on the characteristics of subsistence farm households. According to them, any definition of subsistence farmers which is based predominantly on meeting the household's needs through their own farm production includes a heterogeneous group of agriculturists whose ecological, social, political and economic settings are quite varied. Some farmers would be classified as commercial because they sell 99 percent of their produce. Following are some criteria used to define subsistence farming. It is however argued that it does not matter which criteria one uses, there is a strong tendency to end up with the same basic set of similar characteristics of subsistence farming as would be selected by any of the

2003).

other criteria. The critical issue lies in determining the cut-off points. Therefore, ultimately it is up to the writer to decide how to define subsistence farming (Clifton and Wharton, 1969).

2.3.1. Economic criterion

According to this criterion, subsistence farmers are best described as those who consume the bulk of their production. The ratio of production sold to the total production can be used to determine their degree of subsistence orientation. This method makes these households dual, where decisions must simultaneously take account of both farm and home considerations. Consumption and production decisions are interdependent, and the degree of interdependence makes consumption or survival considerations overrule or dominate the commercial ones, thereby affecting decision-making and economic behaviour (Clifton and Wharton, 1969).

2.3.2. Purchased factor input ratio

Another criterion suggested is the ratio of purchased factor inputs to all inputs used in production, for example, fertilisers versus manure. This was considered to be a useful index of the farmer's involvement, since modernisation of agriculture requires increased purchase of factor inputs produced outside the farm. In the same manner as on the sale or consumption side, factor input ratio would be a measure of involvement on the production side (Clifton and Wharton, 1969).

2.3.3. Level of technology

Clifton and Wharton (1969) pointed out that technology could also be used as one of the criteria to distinguish subsistence farmers from established commercial farmers, the logic being that the former use less productive or simpler techniques in production. These would include using a hoe to cultivate versus a tractor and some other intensive production implements.

2.3.4. Income and levels of living

Clifton and Wharton (1969) argue that, according to this criterion, subsistence farmers are cultivators who are poor. But to employ such a criterion requires the determination of some absolute minimum income standard or minimum level of living which is difficult to specify in either absolute or in relative terms.

2.3.5. Decision-making criteria

Clifton and Wharton (1969) also argue that some feel an important distinguishing characteristic of subsistence farmers is their limited decision-making scope. In their argument they identify the subsistence farmer as one who has a more limited number of choices. His degrees of freedom both on the farm and in the home are severely restricted. They argue that a limited number of alternative opportunities are faced by the farmer and his family.

Table 1 shows characteristics of subsistence farmers in crop production according to Ninez (1985). Table 1 shows that subsistence farmers are characterised by household gardens and the species type they grow are staples, vegetables and fruit. The harvest can be daily or seasonal and cropping patterns can be irregular or in a row. As for production, subsistence farmers grow crops for home consumption and they only sell the surplus and the technology used is simple hand tools. The input cost incurred by subsistence farmers are very low and they none of the economic support. Their labour is family based and needed on part-time basis. Their spatial distribution is in the rural and urban areas.

Table 1: Characteristics of subsistence farmers in crop production

Characteristics	Household garden
Planting and harvesting	
Species type	Staples, vegetables, fruit
Harvest frequency Cropping patterns	Daily, seasonal Irregular, row
Production and economic role	
Production objective Economic role Technology needed	Home consumption Supplementary Simple hand tools
Input costs	Low
Economic assistance needed	None or minor
Labour	
Labour source Labour requirements Skills required	Family (female, elderly, children) Part-time Garden-horticultural
Spatial	
Distribution	Rural and urban

Source: Ninez (1985)

According to Miracle (2001), in defining subsistence farmers, the literature lists, in varying combinations, the level of consumption, the proportion of production marketed, the motivation that prompts farmers to produce output to be marketed, and the rate of change of production techniques. Mabusela and Fraser (1999), for example, understand subsistence farming as production for consumption, with the surplus sold to the market for cash income. In discussions on problems of economic development, one of the concepts related to the nature of production - frequently simply the proportion of production marketed - is usually raised. The least ambiguous and analytically most useful concept is subsistence defined purely as complete self-sufficiency by the individual or household.

Once farmers begin to sell or barter output, distinguishing between these farmers becomes difficult conceptually and often impossible empirically. Hence, it is not surprising that there is no common scale for measuring degrees of subsistence and that, in practice, all small farmers with any produce that is retained for own consumption tend to be called subsistence farmers.

The definition to be followed in this thesis is the one that describe subsistence farming as production for consumption, with the surplus sold to the market for cash income (Mabusela and Fraser, 1999).

2.4. Small-scale farmers in a South African Context

Subsistence agriculture developed in South Africa as a result of government policies in the past. These were the policies that excluded black people from owning or renting land outside the 13 percent of the country that was originally marked out as reserves (Vink and D'Haese, 2003). Moreover, apartheid gave White large-scale farmers privileged access to natural resources, financial and agribusiness facilities and rural infrastructures, while homeland areas still suffer severe backlogs in all these respects.

This has affected both the crop production and the livestock farming of the Black people. Livestock farming was the tool for survival for Black people before the colonial era. But because of the policies that favoured White farmers in terms of support, their livestock suffered from diseases, theft and death (Andrew *et al.* 2003). They argue that subsistence farming has been viewed as wasteful and economically unproductive if one compares it with commercial production systems. According to them, commercial and subsistence agriculture combine factors of production in very different ways in order to achieve different objectives.

These are cash profit in commercial production and the supply of food to the household in subsistence production. But the other view according to Andrew *et al*. (2003) is that many small-scale farmers are involved in production for the market as well as for their own subsistence needs. Andrew *et al.* consider subsistence farming as not wasteful and economically unproductive. According to them, there is considerable evidence that land-based livelihood has been undervalued. But they admit that there is room for improvement.

As a result, South Africa has a dual agricultural economy. There is a well-developed commercial sector in the traditionally settled rural areas. In the former homelands areas, agricultural production is largely non-commercial, and consists mostly of small amounts of different staple food crops produced principally for subsistence purposes. Families grow maize and vegetables for own consumption, although food security is never achieved (Perret, 2003). The small-scale or subsistence farming sector has been exposed to several constraints which have subjected potential producers to unfavourable production conditions. Perret (2003) noted that some households have managed to produce all-year-round, even though they were faced with constraints like drought and lack of fencing. The small-scale farmer and his family find themselves in the rural areas of South Africa which can be very remote, without efficient infrastructure, including communication systems, such as the telephone. In contrast to his counterpart, the commercial farmer, the small-scale farmer and his family are usually illiterate to semi-literate (Burger, 1995).

2.4.1. Crop or vegetable production

Food crop production is an important livelihood activity for African households in South Africa's former homelands especially in areas where climate is conducive to rainfed cultivation. The majority of households in these areas are involved in crop production with other livelihood activities. The main crop grown is maize, together with other food crops like beans and vegetables. They are grown on small plots, mostly for home consumption. The vegetables most often grown are cabbage, spinach, tomatoes, potatoes, carrots, watermelons and pumpkin. Some households are also involved in horticultural production (Andrew *et al.*, 2003).

Production of these crops by the poor and ultra-poor is a very important coping strategy. It is argued that some households cultivate gardens to reduce household expenditure through food exchange. For example, one household might cultivate potatoes and be short of sugar or tea.

Therefore, in order for that household to acquire sugar, potatoes will be given to another household in exchange. These households explain that the reason they do this is that the money they might get if they sell the product might match its exchange value. And their other argument is that people in rural areas do not always have cash. Therefore, this is a best coping strategy for poor households (Fraser *et al.*, 2003).

Andrew *et al*. (2003) argue that levels of production are not sufficient to meet the subsistence needs of rural households and this leads to the purchase of maize and other basic foods.

Andrew *et al*. (2003) in their study found that the sale of crops amounted to less than 10 percent of household income. Later in their studies they found that the contribution of agriculture to rural livelihoods had been underestimated and indicated a further contribution of 15-28 percent. Makhura *et al.* (1998) also argues that even the figures estimated (15-28 percent) could be too low thereby leading to the underestimation of the importance of crop production as a livelihood option in most rural households, especially those which are very poor. But the figures they estimated do not include the value of produce consumed by the household.

A study done by Fraser *et al.* (2003) in the former homeland of Ciskei indicates that there is a difference in the level of involvement in crop production between the ultra-poor, poor and non-poor households. They argue that ultra-poor households lack even the equipment to work in the garden. They rely on neighbours for equipment to work in the garden, and sometimes, if the neighbours are busy with the equipment, they must wait. By that time it could already be dry again and they may have to wait for another rainy season to cultivate. Those households that are not poor have access to a variety of implements that they can use in their fields or gardens.

2.4.2. Livestock production

Livestock production is also common in the rural areas of South Africa. Livestock categories include cattle, goats, sheep, horses, donkeys, pigs, chickens, geese, and ducks. Andrew *et al*. (2003) noted that large forms of livestock like cattle, sheep, goats, horses and donkeys are usually cared for by the men and receive more attention than the small stock, such as poultry which is looked after by women.

According to Andrew *et al*. (2003) rural households have a wide range of reasons for keeping livestock. Cattle are necessary to pay for a bride, are used for draught purposes or are slaughtered for funerals and feasts, and they can be sold for cash. Hides can be sold and the milk can be drunk. In the research done in the former Transkei by Perret (2003), it was found that households own cattle, sheep and goats and that sheep and goats are slaughtered for own consumption. Some lambs are sold locally and the sheeps' wool is sold to speculators, while chicken and pigs are kept for own consumption. Furthermore, Fraser *et al.* (2003) states that pigs are also raised to be slaughtered and the meat is sold by poor households in order to buy some other food.

Cattle production plays a major role in rural livelihood. Randela (2003) noted that in most developing countries animal draught power represents a major output from the livestock sector. He found that 90 percent of ploughing in Africa is done using animals, mostly oxen. Randela (2003) also argued that there are about 40-80 percent of rural households that use animal power in South Africa for cultivation and for transport purposes. However he agrees that animals are gradually being replaced by mechanized transport.

Randela (2003) argues that when researchers value cattle they tend to focus on the value of sales only, thereby underrating their importance. He states that livestock are valuable in many ways. Manure can be used as fertilizer or as a form of polish for decoration, and milk is a valuable form of nutrition. According to Randela (2003), cattle slaughtering for home consumption is rare. The decision to slaughter cattle is influenced by the need to satisfy ceremonial demand. The ceremony may be a funeral, a wedding or another traditional ceremony, (see tables, 2-5).

Table 2: The value of cattle sales

Area	Respondents selling cattle (%)	Average number of cattle sold/year	Farmers selling oxen	Farmers selling bulls	Farmers selling heifers	Farmers selling cows	Farmers who slaughtered	Offtake	Price per animal R		Average value of sales per cow (A)	Meat value for home consumption per cow (B) R	Total value per cow (A+B)
			%						Auction	Other			
Vyeboom	71	2	53	6	6	29	18	13	_	1640	207	128	335
Malongana	59	3	61	13	4	17	4	15	1900	2105	318	128	446
Guyuni	61	2	17	22	9	41	26	15	_	1650	248	128	376
Matshena	61	3	52	9	_	22	4	14	1900	1785	246	128	374
Dzanani	59	2	41	9	5	27	14	11	_	1710	188	128	316
Tshifundi	52	1	24	12	2	29	12	8	_	1811	145	128	273
Average	60	2	42	12	4	27	13	13	950	1784	225	128	353

Source: Randela (2003)

Notes: The average value of sales per animal (R) was calculated as follows: average price x offtake. Using the second row as an example, (1900 x 29) + (2105 x 71)/100 x 0.15 = 318. Livestock markets were grouped into two categories (auction and others) in such a way that percentages of other markets were added together. The value of beef for home consumption was calculated based on the 1997 figures for national per capita beef consumption due to a lack of data in rural areas. Such a value amounts to 12,82 kg and it was multiplied by the beef price of 10/kg.

Table 3: The value of milk production

Area	Average consumption (litres/day/farmer)	Average production (litres/day/farmer)	Average number of cows milked/day	Percentage of farmers who sold the milk (%)	Average price (R/litre)	Value of milk production/cow/year R
Vyeboom	3.0	4.0	5	14	7.00	1022
Malongana	4.0	5.0	5	50	4.35	793
Guyuni	2.0	2.0	3	_	3.00	365
Matshena	4.0	5.0	6	21	3.50	532
Dzanani	3.0	1.5	4	20	3.50	240
Tshifundi	2.0	1.5	4	_	3.00	205
Average	3.1	3.2	4.5	18	4.00	526

Source: Randela (2003)

Table 4: The use of manure

Area	Respondents using manure for decoration (e.g. floor preparation %	Manure for land fertilisation %	Farmers selling manure for decoration %	Selling price for manure decoration R/tin	Farmers selling manure for crop fertilisation %	Selling price for soil fertilisation R/ton	Average quantity used Decoration Kg/animal	Fertilisation	Value Decoration R/animal	Land fertilisation	Aggregate value of manure (R/animal) R
Vyeboom	100	65	_	_	_	_	11	44	1	9	10
Malongana	100	4	_	_	_	_	13	53	1	11	12
Guyuni	100	83	_	_	_	_	18	67	1	13	15
Matshena	100	39	17	1.00	9	265	16	63	1	13	14
Dzanani	100	77	_	_	_	_	19	77	2	15	17
Tshifundi	100	82	_	_	_	_	19	77	2	15	17
Average	100	58	17	1	9	265	16	63	1	13	14

Source: Randela (2003)

Table 5: The value of work done by cattle

Area	Use of cattle (days/year) for ploughing	Cost (R/animal/day)	Probability of using draught power	Value of ploughing activity (R/animal)
Guyuni	50	28	0.13	182
Tshifudi	50	28	0.24	336
Average	50	28	0.32	259

Source: Randela (2003)

2.5. Obstacles facing small-scale agriculture

Small-scale farmers are confronted by many constraints that hamper their success in production (Burger, 1995). Firstly, much of the technology of smallholders is inadequate, largely because researchers are not informed of the problems actually experienced by smallholders in their daily activities. This is compounded by poor technology transfer due to limited access to production assets (machinery, capital, seeds etc.), poor information transfer, and the uncoordinated efforts of differing agencies.

Secondly, there is a low level of productivity; too many farmers are attempting to make a living on land that is degraded, of poor fertility, and where land tenure policies work against investment in agriculture.

Thirdly, smallholder farmers depend on erratic rain-fed agriculture, and are therefore severely affected by water shortages. Water storage and reticulation is important in supporting various aspects of farming, including crop irrigation and agriculture livestock support.

Fourthly, smallholders are typically served by ineffective support institutions which do not understand, or take seriously the critical role of a vigorous smallholder sector in development. This results in an institutional framework that is unfriendly to smallholders. Public sector agricultural support institutions have limited experience with smallholder agriculture, inadequately trained professionals, poor financial and human resources, and are backed by limited research capacity in universities.

Fifthly, some smallholders show lack of entrepreneurship, and do not regard farming as a business. They fail to use group power in getting resources and infrastructure. Development

agencies show absence of management skills and often assume that smallholder agriculture means inevitable social and economic decline.

Although land-based livelihood makes a very valuable and important contribution to rural livelihoods, in most cases these livelihoods are survivalist in nature. These households remain exposed to crop failure due to drought and rarely floods of rain, and their animals die from diseases (Andrew *et al*., 2003; Perret, 2003).

2.5.1. Obstacles to dry-land cultivation

The fact that landless households are able to gain access to the fields of landholding households indicates that many landholding households are either unwilling or unable to cultivate all of their own fields. It is argued here that a number of factors combine in a negative and cumulative fashion so as to impede the full and effective cultivation of arable land. Until these factors are countered, small-scale agriculture cannot provide any significant source of income, and as a consequence cannot lessen the dependence of rural black villagers on sources of cash coming from outside the village, i.e., migrant remittances and pension grants (Crookes, 2003). These factors include: (a) shortage of labour, (b) shortage of draught power, (c) shortage of cash and equipment, (d) inefficient agricultural extension service, (e) lack of market outlets, (f) lack of co-ordinated decision-making, (g) shortage of rain and (h) lack of motivation (de Wet, 1985).

2.5.2. Shortage of labour

Access to the labour necessary to cultivate is affected by the absence of many active adults (mainly males) working as migrant labourers. This mainly affects the ploughing aspect of agriculture which is the work of men. It seems rural dwellers are not dealing with an absolute shortage of labour, but rather with a shortage of effective and motivated labour. Ploughing involves the plough being held and the oxen being led and coaxed along with a stick or whip. The only physically demanding labour involved is the holding of the plough, as little boys of six to ten years often lead and coax the oxen. A teenage boy of sixteen years is quite capable of holding the plough steady so that it opens a straight and sufficiently deep furrow. These teenagers are, however, usually at school during the week, and during the weekends, agriculture must compete with their ceremonial, social and sporting activities. According to de Wet (1985), the effective shortage of male ploughing power is a consequence not only of

absent male migrants, but also of the relatively low value that is placed upon agriculture in relation to other activities by those who remain at home.

Hoeing and reaping is largely the work of women. There are usually women at home, but much of their day is taken up with such time consuming tasks as fetching water and wood, and cooking and keeping house. Again, school children have time over weekends to hoe, but then they must forego the weekend social life of the village.

Effectively, there seems to be a shortage of labour at the level of the cultivating household, which may lack either labour itself, or the means needed to obtain labour. Additional labour may be obtained by soliciting help from neighbours and kinsmen, by sharecropping land, by two households pooling their labour resources, or by hiring labour.

Belete (1998) contends that one of the most important inputs in small-scale farming is labour, which is the main source of energy. Belete (1998) also agrees that more than two-thirds of cultivated land belongs to old people who lack labour for ploughing and weeding, particularly in villages under trust, quitrent and freehold tenure systems where land reallocation has been frozen. This shortage of labour at critical periods in peasant farming activities is attributed to the practice of migrant labour which deprives rural villages of young adult males.

2.5.3. Shortage of draught power

The main form of draught power used for ploughing in rural areas is cattle. Although some households own cattle, they do not necessarily own enough cattle or enough sufficiently strong cattle to plough. The shortage of cattle may be overcome by a few households pooling their cattle or by hiring tractors. However, the availability of tractors depends on their state of repair, and upon having the necessary funds. Moreover, some fields are partly or totally inaccessible to tractors, because either the fields are too steeply sloped or are too stony for tractors.

Because of the past government mechanization programme in the former Ciskei and Transkei (FCT), most small-scale farmers did not have draught animals. In the past, tractors were seen as a replacement instead of being seen as supplement to animal draught power. Therefore, a shortage of draught animals, coupled with a shortage of ox-drawn cultivators, has been a

major cause of poor weed control and, hence, low crop yields (O'Neil, *et al.,* 1999; Taylor, 1999; Israel, 1999).

2.5.4. Shortage of cash and equipment

According to de Wet (1985), inaccessibility of equipment constrains a household's ability to cultivate. Rural households that cannot afford the high prices of seeds, fertilizers, fencing and other agricultural equipment usually plant without fertilizers and fencing. People are not aware of the agricultural loan or credit schemes that are now available to them.

Belete (1998) contends that small-scale farmers in the FCT lack capital for buying agricultural inputs such as seeds, pesticides, and fertilizers and for obtaining services. According to Simphiwe (1995) as quoted by Belete (1998) arable land in rural villages, remains idle because the purchase of the necessary inputs competes within income constraints with other activities aimed at increasing future income flows and standard of living. Obviously financial resources influence the quality and size of cultivated land, the ability to hire additional labour and the farm household's capacity to acquire inputs such as fertilizers, seed, machinery and equipment (Bembridge, 1987; Chikanda and Kirsten, 1998).

2.5.5. Inefficient agricultural extension services

Extension officers do not go to smallholders. They do not visit households on a regular basis and are, therefore, unable to provide an effective link between the smallholders and the Department of Agriculture. Accordingly, they are unable to fulfil their intended role of providing smallholders with advice, encouragement and incentives as well as more effective access to equipment and tractors.

2.5.6. Lack of market outlets

It is important to ensure that all farmers in South Africa have equitable access to opportunities to compete in the market as this helps to promote the optimal utilization of agricultural resources and also generates income and employment linkages in the market. Despite this fact, rural producers in the Former Ciskei and Transkei do not have proper access to cash crops and factor markets. Access to cash crop markets, from the rural producer's point of view, is hindered by policies with regard to financing. Financiers are not prepared to finance risky

products such as cash crops, even if producers have identified an existing market for these crops (Anon, 1997).

The lack of either sufficient or sufficiently regular household income aggravates the situation caused by the above problems. People are often unable to hire labour or draught power or to pay for available equipment and services. This lack of income is again aggravated by the lack of any effective outside market link-up, which might provide households with an outlet for their product, with an income from their agriculture and with the incentive to commit their labour and resources less to migration and more to agriculture.

2.5.7. Lack of coordinated decision-making

Most effective heads of household in rural areas are women, and they make most of the important agricultural decisions, e.g., when and whether to plough, plant, hoe and reap. However, they are dependent on men's remittances in order to carry out these decisions, and these remittances may not always be forthcoming at the time they are needed. Accordingly, a female household head may find herself unable to start or complete the agricultural cycle for lack of funds, or she may find herself in potential conflict with her husband who sends money home with the instruction to cultivate in a bad year, when she can see that crops will fail. The husband comes home to find his field uncultivated, and his wife answerable is to him.

2.5.8. Shortage of rain

The unpredictability of rain also increases the negative effect of all the above factors. It plays havoc with yields and, accordingly, undermines people's willingness to commit already scarce resources to agriculture, even after it has rained. According to de Wet (1985) a drought of several years hardens the soil while weakening or killing necessary draught animals, and a household with limited labour and stock may not be able to recover from the effects of a drought.

2.5.9. Lack of motivation

All of this raises the question as to whether the average rural family really wants to cultivate badly enough to try to overcome these obstacles. Many probably do not, because their experience of agriculture does not help them to see that it is worthwhile to pursue. Yields are low, work is hard, services are often sporadic, and there is little, if any, hard cash in return. In

these circumstances, many households commit themselves to the apparently more secure and predictable income derived from working in the cities. Remittances and energy are used to meet more immediate needs first and are risked on cultivation second, if at all.

Several of these factors inhibiting cultivation arise out of the rural areas' position in the wider South African political economy. Rural dwellers need to work in the cities because their own areas cannot support them, resulting in shortage of labour, funds (as a result of low wages which must support the worker in town and his family in the country), draught power (for lack of funds) and coordinated decision-making. Other factors, such as shortages of equipment and services, are to a large extent, the outcome of the differential access to funds and services enjoyed by black and white agriculture in South Africa over a long period.

Despite these challenges, small-scale agriculture in South Africa cannot be ignored as it has the potential to become a major source of employment and political stability (Delgado, 1999). Lyne (1996) further states that small-scale agriculture has limited access to factors of production, credit and information, and markets are often constrained by inadequate property rights and high transaction costs.

2.6. Economics of subsistence agriculture

In commercial farming, economic value is normally assessed mainly in terms of profit and loss. But in subsistence farming operations in Africa both cash income and food security are important. Hecht and de Moor (1997) highlighted the following characteristics when assessing the economic viability of subsistence farming:

- Part of the produce is bartered or used for household consumption.
- In cases where labourers are unskilled and have virtually no opportunity to find a wage-earning job, the market value of their labour is effectively zero in terms of money. In this case the comparative labour costs can be evaluated in terms of man-hours spent on different farming activities.
- The cost of inputs from on-farm products may be difficult to determine especially if they are waste products, which may have other uses such as for livestock feeding or as fertilisers.

- When the farmer or his family consumes goods, the value of the final product should be determined according to market prices and not cost prices. (For example, the farmer would have to pay the retail or "farm gate" price for the goods if he were to choose to buy them himself, so their value to him must be assessed in terms of price, not in terms of cost of production).

- Where produce is consumed by the farmer rather than sold, the household has value in terms of "insurance against starvation". It is for this reason that instances have been reported where subsistence farmers have continued to operate subsistence farming which appears to be running at a loss.

In spite of the above difficulties, it is important to make some kind of evaluation of the profitability of subsistence farming, especially as a means of comparing it with other activities which are available to subsistence farmers.

2.7. Small-scale farming in international context

International empirical evidence illustrates that small-scale farmers in developing countries are considered to be more efficient given enough land than large-scale farmers. This has been established empirically in Asia, Latin America and Africa. These studies on small-scale farming have taken the farm-size/productivity relationship and the issue of economies of scale, as the underlying theme (Kirsten and Van Zyl, 1998; Fan and Chan-Kang, 2003).

Hazell (2003) argues that one must care about the future of small farms because they form an important part of rural livelihood. According to him, this type of agricultural practise must never be ignored because it the most dominating in rural households and it forms an integral part of their livelihood.

In the rural areas of South Africa, small family farms are not regarded as efficient, given that they do not have the ability to expand their ground, appropriate technology and proper infrastructure (Vink, 2001). Furthermore, Sender and Johnston (2003) argue that the view that small farms are more efficient than large farms in Sub-Saharan Africa is not well supported by references to detailed, micro-economic comparisons of the performance of different sizes of farms. They argue that in Africa there is no evidence on trends in the relative productivity of different size categories of farms cited and they argue that International Fund for Agricultural

Development (IFAD) (2001) only devotes a half-page to the statistics on small farms in developing areas.

IFAD (2001) presents a solid argument based on the evidence found that there is a positive relationship between size and productivity. They explain that this relationship arises because poor or smaller farmers do not have the capital to make agricultural investments, or the working capital to buy inputs and, importantly, have to engage in wage labour and are therefore unable to devote sufficient time to their farms. In addition, van Rooyen *et al.* (1987) argue that the hypothesis of poor but efficient has been subject to critique in subsequent years. Their argument is that small-scale farmers in traditional agriculture remain poor chiefly because there are limited technical and economic opportunities to which they can respond, but they are capable of making rational decisions if these constraints are removed.

Ngqangweni (1999) as quoted by Vink (2001) has a different point of view regarding the efficiency of small-scale farmers. He regards a small farm's agriculture as efficient even though it contributes little to the livelihood of rural people. International literature suggests that small family farms are efficient due to greater labour abundance per hectare farmed. Hazell (2003) argues that family farm labourers are more dedicated and motivated than hired labour, which is found in large-scale agriculture.

It is demonstrated in the literature that a systematic relationship between farm size and productivity is the result of market imperfections, and then only when more than a single market is imperfect. For example, if credit is rational relative to farm size, but all other markets are perfect, land and labour market transactions will produce a farm structure that equalises yields across farms of different operational sizes. But, if there are imperfections in two markets - land rental and insurance, or credit and labour – a systematic (positive) relationship can arise between farm size and productivity (Kirsten and Van Zyl, 1998). Hazell (2003) also argues that land size does not necessarily matter. What matters is its ability to produce and create a viable livelihood. In his view this depends on the type of farming that is most viable in that area and the possibility of finding other sources of income to finance these farms.

Lipton (1996) argues that, from an international point of view, the principal obstacle for the rural poor is access to credit when it is most needed. And there has been evidence that the major source of income for South African rural households is remittances.

2.8. Nutritional gains in agricultural-led growth

Hendriks (2003) argues that nutritional gains from agriculture are only possible if households produce beyond levels of subsistence. He further argues that household gardens do not guarantee better nutritional benefit for households. His argument is that the vegetables grown by households are not sufficient to overcome the desperate need for energy for the high incidence of stunting among South African children. Another study done by Makhotla and Hendriks (2004) that investigated the contribution of home gardens to the nutritional status of rural children under five years of age in five Lesotho districts, their findings were that pre-schoolers in households with or without home gardens was poor. The overall impression in that study is that many Lesotho households have home gardens but these do not provide sufficient vegetables to impact positively on the nutritional status of pre-schoolers.

Makhotla and Hendriks (2004) do not run away from the fact that presence of home gardens somewhat reduces the incidence of stunting and underweight but the percentage of stunted and underweight is still high. They argue that vegetable production alone is not sufficient to improve malnutrition of children, poor sanitation, low production of staples, unprotected water sources and low incomes play a significant role in nutrition and health. Hendriks (2003) suggests an intake of foods such as fruits, vegetables, meat and legumes.

Agriculture therefore, could lead to improved nutrition at household level through improved dietary diversity and increased macronutrients intake and through income replacement behaviour. Hendriks argues that income replacement leads to increased purchases of energy dense foods such as fats, oils and meat. Therefore it is clear that it is the scale of agricultural production that determines the magnitude of these nutritional levels (Hendriks, 2003). Findings suggest that only once agricultural production progress to commercial farming do household members gain nutritionally from increased production at household level.

To ensure that nutritional gains from agricultural production, it is necessary to ensure that markets are there for the sale of households produce. For this to happen, there is a strong need for infrastructure such as transport, access to inputs, information and technology, and the reduction of transaction costs. Household producers also need access to good profits, efficient markets and adequate storage to minimize losses (Hendriks, 2003).

2.9. Concluding Remarks

People in rural areas rely on different types of income sources for their living, and these include remittances, pensions, own consumption of agricultural produce, sales of farm surplus, and informal labour activities. There is, however, no doubt that land-based livelihood is important for rural households. But it must be agreed that agriculture is less important as a source of income than as a source of food. It must also be admitted that rural households face a lot of obstacles in production. Although many of them have access to land, they remain vulnerable to other constraints due to a lack of resources. Nutritional gains from agriculture are evident or accrue if households engage in agriculture beyond subsistence levels.

CHAPTER THREE

3. DATA TREATMENT

3.1. Introduction

The data on HPHC give information on quantity produced, quantity consumed, quantity sold, and value of sales. These and other variables are listed in

Table 7. The data are divided into three sections. There are produce, livestock and inputs section. On the produce section there is information about the quantity produced, quantity consumed, quantity sold and value of sales. Initial exploration of the data revealed a number of problems. Various entries appear to have been duplicated in the database due to what was explained following an enquiry to Statistics South Africa as incorrect data capturing. The data also appear to contain a large number of missing values. These missing values occurred when respondents indicated that they did not produce any goods for home consumption or did not keep any livestock: rather than coding non-responses with zeroes, Statistics South Africa coded them as missing. Statistics South Africa made it clear that these are not missing values in the true sense of the word, i.e., respondents refusing to co-operate by withholding information, but rather values that are 'uncoded'. The reasons why missing values are problematic are discussed in detail in section 3.2.3. Inconsistent reporting is another common problem. A specific example is when a household reported an expense when no response was expected. Other inconsistencies relate to the duplication of entries (multiple entries). Data inconsistencies encountered and the way in which they were adjusted is discussed in section 3.2.4.

Another issue that is discussed is the way that high production and consumption levels have been treated (section 3.2.5). Per capita consumption was calculated, and it was found that the numbers are too high for some households and that such high production levels are only possible on a commercial scale. Since this data is for HPHC, and as there is a need to be logically consistent, high consumption and production levels are not acceptable in this dataset although they were in fact found. HPHC is undertaken just to survive and therefore it is believed that there will never be high quantity levels of production and consumption associated with it. High production and consumption are only possible to commercial farmers. Section 3.2.5 discusses the way these high consumption and production levels have been

treated. The presence of high consumption and production levels is a problem because they bias the data. According to the definition of the System of National Accounts (SNA, 1993) HPHC commodities are within the SNA production boundary, but the commodities are not marketed, and hence, the implied producer prices are equal to the implied purchaser prices, i.e., purchases do not incur commodity taxes such as transport and trade margins (Goldschmidt-Clermont, 2000).

3.2. Developing household level dataset

This section of the thesis shows how do-files were set up and used to create household level dataset that contains all the steps necessary to create consumption and sales of livestock and produce. Steps below (3.2.1-3.3) explain the do-file attached in Appendix I.

3.2.1. Opening database

The command *set more off* allows Stata to run without any interruptions. If this command is not set Stata runs and after a while stops and one has to press the space bar to continue. The *cd* command allows for one to change the directory to where your files are able to run the do-file. The *use home-grown.dta, clear* command tells Stata to use that data for the run of the do-file.

3.2.2. Separating out multi-product households

By hhid, sort:gen hhnum = _n command sorts and separates out multi-product households so that the sub-matrices can be calculated without any problem of mixed observations.

3.2.3. Missing values

Many of the variables in IES 2000, which fortunately are only on the expenditure category, contain large numbers of missing values. The HPHC database was compiled and adjusted using Stata software (StataCorp, 2001). Missing values in a Stata dataset create various problems. Any mathematical calculation on a missing value yields a missing value, which becomes problematic if, for example, total expenditure is to be calculated. Closer inspection revealed that large numbers of missing values only occurred in those variables that relate to optional questions. This led to the suspicion that these are not true missing values, but rather a result of incorrect coding by Statistics South Africa. The following definitions from PROVIDE (2004) are defined to clarify matters. Observations that are coded with a full stop in IES 2000 can fall into one of the following three categories:

Uncoded – Some questions in the IES 2000 questionnaire were optional. Optional sections are preceded by a question that asks the respondent whether the expenses relating to that section are relevant to the household. If they answer "no" they may skip the section. In many instances Statistics South Africa coded expenses in these optional sections with missing values when the section was skipped. These are defined as uncoded observations and can be changed to zeroes (PROVIDE, 2004).

Miscoded – In some instances the preceding question to the optional section was answered in the negative, but positive expenses were nevertheless reported in the optional section following the question. In these instances it is assumed that the original question was miscoded and should have been coded as 'yes'. Consequently the information content in the section is left as is (PROVIDE, 2004).

(True) missing values – The remaining missing values relate to respondents who should have answered a section, given their response to the preceding question, but failed to do so. These are therefore true missing values. It can be argued that some of these missing values are a result of miscoding, i.e., that the preceding question should have been coded as 'no'. However, there is no basis on which such an assumption can be made, and consequently these values have to be treated as missing (PROVIDE, 2004).

To adjust for this problem, all the missing values had to be changed to zero to make calculations in Stata possible. Consequently, missing values may be interpreted as zero expenditure.

This paragraph shows what was done in the do-file to get rid of the missing values. The *for var P2202Q02 P2202Q03 P2202Q04 P2202Q05: sum X if P2202Q01 ~= 9 & X ==* command tells Stata to search the database using all the specified variables and finds the missing values. .The *for var P*: replace X = 0 if X ==*command replaces all the missed values found from number nine. Missing values are replaced with zero because it is impossible to do calculations when they are present.

3.2.4. Checking consistency in reporting

It was discovered that there was a problem of inconsistency in the data. For example, some respondents indicated livestock type as "*not applicable*", but nevertheless reported positive stock/sales/consumption. For inexplicable reasons, many entries are clearly duplicate entries –

the same expenses appear twice or more under the same *hhid* and produce or livestock code. These entries were identified and corrected by changing their expenses to zero. Closer inspection revealed that many of these entries were duplicate entries under the same household identification number (*hhid).* The only way in which the duplicate entries could be eliminated was to sift through the entire database (over 2500 data entries) manually.

In this section the do-file first checks to whether produce variables are 0 when question 1 is equal to 9. The command that Stata uses to check this is *gen flagprod = 1 if P2202Q01 == 9 & (P2202Q02 > 0 | P2202Q03 > 0 | P2202Q04 > 0 | P2202Q05 > 0)* Regarding the produce data, no instances were found when this check was done. The same command, *gen flaglive = 1 if P2204Q01 == 9 & (P2204Q04 > 0 | P2204Q05 > 0 | P2204Q06 > 0),* was applied to the livestock data and many inconsistencies were found.

The other data inconsistencies that were found were double-counting of many entries and duplication of some of the entries. The following commands are given in Stata to search and replace these variables. *gen flagprod = 1 if (hhid[_n] == hhid[_n-1]) & (P2202Q01[_n] == P2202Q01[_n-1]***)**.These reporting inconsistencies are found particularly in the livestock data. To list and identify these inconsistencies the *list hhid hhnum P2202Q01 P2202Q02 P2202Q03 P2202Q04 P2202Q05 flagprod sumflagprod if P2202Q01~=9 & sumflagprod >= 1* command was given.

Table 6 shows what these variables look like. The content of this table is extracted from Stata, where *hhnum* refers to the *household number*. If Stata counts from 1up to 3, for example, it shows that a household owns more than one kind of livestock. *P2204Q01* refers to the kind of livestock the household owns: 1 is *cattle*, 2 is *sheep*, 3 is *pigs*, 4 is *goats*, 5 is *poultry*, and 6 is *other livestock*. *P2204Q04* refers to the quantity slaughtered, while *P2204Q05* refers to the number sold. *P2204Q06* refers to the value of sales, and *flaglive* gives 1 whenever there is data under number 9. The first row of Table 6 shows that the *flaglive* is 1 meaning that there have been data reported even though *P2204Q01* is 9 (*not applicable*). Therefore 9 needs to be replaced with 6, which means *other livestock.*

In order to effect the aforementioned, the observation number is marked with an X, to ensure that it is kept. In the second row the same *flaglive* is found but it is not marked with an X because instead of the other data on livestock, it looks like a duplicate of the already mentioned variable.

Therefore, what is required here is to drop all the duplicated variables and keep only 1 of them. In this instance, the household ID (hhid) counted the same variable 4 times (*look at the hhnum down the column*), duplicating the information. The last 2 rows show that the household ID duplicated *P2204Q01*, but in this situation, one of the two has to be kept because they are all 9s. They cannot both be kept because they are duplicating information. There are about 494 cases where positive livestock slaughters and sales are reported despite *P2204Q01* = 9.

The way this problem is treated is to give a separate code number 6, which refers to '*other livestock*', for all those who report data under number 9. This is done in order not to lose data that might be necessary. Most of these livestock are found in number 9, are duplicates of the data that have already been captured somewhere. In order to avoid double-counting, this kind of data is thrown out of the dataset.

Table 6: A sample showing what the variables looked like before being replaced with 6

Observation	hhid	hhnum	P2204Q01	P2204Q04	P2204Q05	P2204Q06	flaglive
12718x	5.02E+12	1	9	11	1560	54985	1
12943	5.03E+12	1	9	4	0	0	1
12944	5.03E+12	2	5	4	0	0	0
12945	5.03E+12	3	5	4	0	0	0
12946	5.03E+12	4	5	4	0	0	0
13307x	5.05E+12	1	9	6	0	0	1
13308	5.05E+12	2	9	6	0	0	1

Data Source: IES 2000

3.2.5. Dealing with excessive consumption and production

In an attempt to curb the distorting effect of unrealistically high consumption and production levels, some of the consumption values were truncated, while households with excessive production levels were removed from the database. The idea here was to determine which levels of consumption or production were realistic. As far as consumption is concerned, it was necessary to estimate the quantities of food that an average household with five members can possibly consume in a year. In order to determine maximum production levels, experts in small-scale farming were consulted to get an idea of the production levels that can be expected from farmers with limited production capabilities, bearing in mind that most respondents in the HPHC section of the IES 2000 are assumed to produce mainly for themselves and on a small scale. Unfortunately, the IES 2000 questionnaire does not ask information about the

land area occupied or cultivated by the household, and hence, certain assumptions had to be made regarding average land holdings.

Table 8 lists the production levels that were considered realistic, given that these households are small farmers producing mainly for own consumption. For each type of produce some basic assumptions were made that would determine the maximum level of output per year. According to the Agricultural Policy in South Africa (1998), the average rural farming household cultivates about 2.2 hectares of land. Using this as a guideline, it is assumed that the 'large' small-scale farmers cultivated three hectares of land for production of maize and other grains. Milk production is based on ownership of eight cows, while egg production is based on ownership of 150 hens. Fruit and vegetable output levels are based on the output achieved on one hectare of land. No limit was set for sorghum beer.

Commercial farmers, i.e., farmers operating in the formal sector, were not supposed to report under this section since information on their production should, in theory, be captured under industry output data. This justifies dropping these observations from the sample.[4]

Not only was the quantity produced high, but the consumption levels were also high in some cases. Those high consumption levels were truncated to reasonable levels. Table 10 shows the maximum consumption levels that were agreed upon and those that were found to exceed those levels.

This problem occurred not only in the produce category but also in the livestock category. As on the produce category, these large livestock holders had to be identified and replaced with zeros. It was agreed that anything higher than the maximum levels given in table 3 is considered high for a small-scale livestock holder. The right column of table 3 shows the number of livestock found which is higher than those levels.

Table 11 shows high consumption on the livestock category, and likewise these were truncated to reasonable levels. The high consumption levels were calculated in terms of considering the average adult equivalent household size of 3.4 in rural areas.[5]

[4] Rather than physically removing the observation from the sample, we simply replaced the reported production levels with zeros. This ensures that other information that may be needed is not lost.

[5] Adult equivalent scale considers the fact that children do not eat or consume the same amount of food as adults.

Table 7: Variable labeling

VARIABLE	LABEL
P2202Q01	Item (maize, other grain, milk, eggs, fruit, vegetables, sorghum beer, not applicable)
P2202Q02	Quantity produced (maize, other grain, milk, eggs, fruit, vegetables, sorghum beer, not applicable)
P2202Q03	Quantity consumed (maize, other grain, milk, eggs, fruit, vegetables, sorghum beer, not applicable)
P2202Q04	Quantity sold (maize, other grain, milk, eggs, fruit, vegetables, sorghum beer, not applicable)
P2202Q05	Value of sales (maize, other grain, milk, eggs, fruit, vegetables, sorghum beer, not applicable)
P2204Q01	Item (cattle, sheep, pigs, goats, other, not applicable)
P2204Q02	Number last year
P2204Q03	Number today
P2204Q04	Number slaughtered
P2204Q05	Number sold
P2204Q06	Value of sales

Data Source: IES 2000

Table 8: Large producers in the home-grown dataset (commercial farmers)

Type of produce	Maximum production p.a.	Explanation/ Justification	Number of observations found to exceed limits
Maize	>10000 kg	3 ha of land	10
Other grain	>5000 kg	3 ha of land	9
Milk	>12600 litres	8 cows per annum	2
Eggs	>4375 dozen	150 hen per annum	0
Fruit	>45000 kg	1 ha per annum	4
Vegetables	>60000 kg	1 ha per annum	3
Sorghum beer/ homebrewed	no limit		0
Total			28

Data Source: IES 2000

Table 9: Large livestock holders in the home-grown dataset

Type of livestock	Maximum livestock holding p.a.	Number of observations found to exceed limits
Cattle	Greater or equal to 100	31
Sheep	Greater or equal to 400	26
Pigs	Greater or equal to 20	11
Goats	Greater or equal to 200	10
Poultry	Greater or equal to 200	14
Total		92

Data Source: IES 2000

Table 10: Unrealistically large consumption levels (produce)

Produce type	Maximum consumption levels	Number of observations found and replaced
Maize	680 kg per household	102
Other grain	680 kg per household	3
Milk	1241 litres per household	36
Eggs	306 dozen per household	6
Fruit	1241 kg per household	1
Vegetables	1241 kg per household	4
Sorghum beer/ homebrewed	1241 litres per household	6
Total		158

Data Source: IES 2000

Table 11: Unrealistically large consumption levels (Livestock)

Livestock type	Maximum consumption levels p.a.	Number of observations found and replaced
Cattle	12 per household	7
Sheep	24 per household	18
Goats	24 per household	2
Poultry	150 per household	3
Total		30

Data Source: IES 2000

The next step with the do-file was to identify commercial farmers. Because the data is about home-grown food for home consumption it would not make sense to have the big producers on the dataset as they would escalate households sales. However, the portion relating to home consumption is needed for these households. Hence, for this section of the do-file, time is spent identifying the large commercial farmers and replacing the inputs and the value of sales with zero and retaining the amount consumed.

Truncating consumption levels;
```
replace P2202Q03 = 680 if P2202Q01 == 1 & P2202Q03 > 680;
replace P2202Q03 = 680 if P2202Q01 == 2 & P2202Q03 > 680;
replace P2202Q03 = 1241 if P2202Q01 == 3 & P2202Q03 > 1241;
replace P2202Q03 = 306 if P2202Q01 == 4 & P2202Q03 > 306;
replace P2202Q03 = 1241 if P2202Q01 == 5 & P2202Q03 > 1241;
replace P2202Q03 = 1241 if P2202Q01 == 6 & P2202Q03 > 1241;
replace P2202Q03 = 1241 if P2202Q01 == 7 & P2202Q03 > 1241;
```

However, if the amount consumed is found to be unrealistically high, it is truncated to a reasonable consumption level using the average 3.4 adult equivalent scale for households.

3.3. Valuing home produce and livestock

IES 2000 does not include any information about the actual or perceived value of home produce and livestock consumed. Knowing these values is imperative in order to understand the economic importance of home produce. This valuation gives an indication of how much the household would probably have had to pay had it purchased the goods on the market (Gronau, 1979). There are various approaches to measuring home production. Bertail *et al*. (1999) measured the value of home produced goods as equal to the marginal value or opportunity cost of time used to produce the goods (i.e., some measure of the labour cost involved) plus the value of market inputs. An approach such as this would certainly be feasible in the South African context. Since IES 2000 does not contain any information about time use or labour activities, this information will have to be sourced from the twice-yearly Labour Force Survey (LFS). Merging these surveys is possible in theory, but various researchers have had problems with matching households and/or individuals and also with the survey weights attached to households and individuals. Consequently this approach is not very appealing, given the possible alternatives.

A recent study done by Hoogeveen and Özler (2004) based on IES 2000 also calculated the value of home-produced goods using market prices. Market prices mean the price a farmer receives for his/her produce when it is sold on the market. Hoogeveen and Özler (2004) calculated the share of maize consumption from home production using IES 1995 and IES 2000. They used market prices to attach a value to home consumption. Even though they were using this approach, they realized that there are price differentials between rural and urban households, and they noticed that data on rural prices is poor in South Africa and especially that the IES data do not contain such prices. Therefore, in order to cater for such differentials they used South Africa Integrated Household Survey (SAIHS) of 1993 to draw price differentials. They constructed a food bundle representing urban and rural food consumption using the mean national urban and rural prices of these items.

The approach followed by Clark and Haswell (1970) was to estimate the value of output, given leisure time spent by labourers. According to their approach a rural labourer will not do a day's work for less than the equivalent of 3 kilograms of grain, and this gives an approximate but interesting measure of the value which the very poor put on leisure. Raj as quoted by Clark and Haswell (1970) estimated that an unemployed Indian countryman will be maintained at subsistence level by his family at the cost of about 1.8 kilograms of grain per day. To induce him to start work, even in his own village, he will have to be offered a wage of 3 kilograms per day (according to region); to induce him to take work outside his own village, he will have to be offered 5 kilograms of grain per day or more.

Fortunately, IES 2000 reports on both the quantity and value of sales of home produce and livestock. Using this information, one can calculate the implicit prices of produce and livestock sold by the household by dividing the value of sales by the quantity.

The implicit price of each product is multiplied by the quantity consumed by each household to obtain the value of home consumption. This section of the do-file calculates implicit prices. For those households that reported no value of sales or no number sold, the number of sales and the value of sales are calculated in order to be able to calculate the implicit prices. Replace *P2202Q04 = P2202Q05/medpprod1 if P2202Q01 == 1 & P2202Q04 == 0 & P2202Q05 > 0.*

The database contains data for quantity of livestock and value of sales. Implicit price is the value divided by quantity. Since the price is calculated for each observation, the implicit price is a stochastic variable with a certain distribution. Finally, household-level variables were

created for value of produce and livestock sold and consumed (*valprodcons, valprodsale, vallivecons*, *valliveprod*). These values, together with the household level input costs (P2205TOT) are saved as *home-grownh*.dta.

Median prices had to be used to calculate implicit prices. This was necessitated because close inspection revealed that median prices seemed more plausible than mean prices. The mean was pushed too high by the high producers (outliers) and this tended to skew the data. Hence, the mean was too high to represent a reasonable value of each product.

Implicit prices were calculated before dropping the high producers. This was necessary even though high producers were not supposed to be in the dataset. Main sellers are typically commercial, which is why it was possible to obtain reasonable prices while the statistics of these high producers were still in the dataset.

After dropping the high producers, a lot of data on them was changed to zero and only a few observations remained. Unfortunately, no conclusion can be based on only a few observations. Appendix B shows the median prices, mean prices, the range, and the skewness of produce and livestock. This appendix shows these figures before and after dropping the commercial farmers (large producers). From this it can clearly be seen that one cannot use median prices before dropping the commercial farmers cannot be used as too few observations giving information remain.

The example below is taken from Appendix II. An example of price of cattle is used from livestock side and maize price is shown as an example on the produce side. Below is the detailed summary statistics of variable *plive1*, defined as price of a cow or a bull after dropping commercial farmers dataset. Variable *plive1* after dropping commercial farmers ranges from R4.00 to R27.00 which is totally impossible and meaningless. The mean price is R16.17 and the median (50^{th} percentile) is R17.50. Graphically the distribution of *plive1* after dropping commercial farmers looks fairly asymmetrical (see Figure 1). The distribution is skewed to the left. Skewness characterizes the degree of symmetry of a distribution around the mean. Positive skewness indicates a distribution with an asymmetric tail extending toward more positive values. Negative skewness indicates a distribution with an asymmetric tail extending toward more negative values. If the skewness is clearly different from zero, then that distribution is asymmetrical , while normal distributions are perfectly symmetrical (Gujarati, 2003). The distribution of this graph is skewed to the left.

As much as sales figures of commercial farmers should not have been included in the database but it was impossible to get the meaningful implicit prices after dropping commercial farmers. Perhaps the contributing factor is that there were few observations left that could provide meaningful prices. Commercial farmers represent a more accurate valuation of produce and livestock in rural areas where general market prices seldom prevail due to separation from formal markets.

Hence, it was decided these median prices are going to be calculated before dropping commercial farmers. *plive1* before dropping commercial farmers is then calculated. It ranges from R1.00 to R25000.00. The mean price per cow is R1547.53 and the median (50th percentile) is R1400.00 the variable is also highly skewed to the left (see Figure 2).

```
->  sum plive1, detail

                          plive1 (price of cattle per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%             4             4
 5%             4          17.5
10%             4            27       Obs                   3
25%             4             .       Sum of Wgt.           3

50%          17.5                     Mean           16.16667
                        Largest       Std. Dev.      11.55783
75%            27             .
90%            27             4       Variance       133.5833
95%            27          17.5       Skewness      -.2091129
99%            27            27       Kurtosis            1.5
```

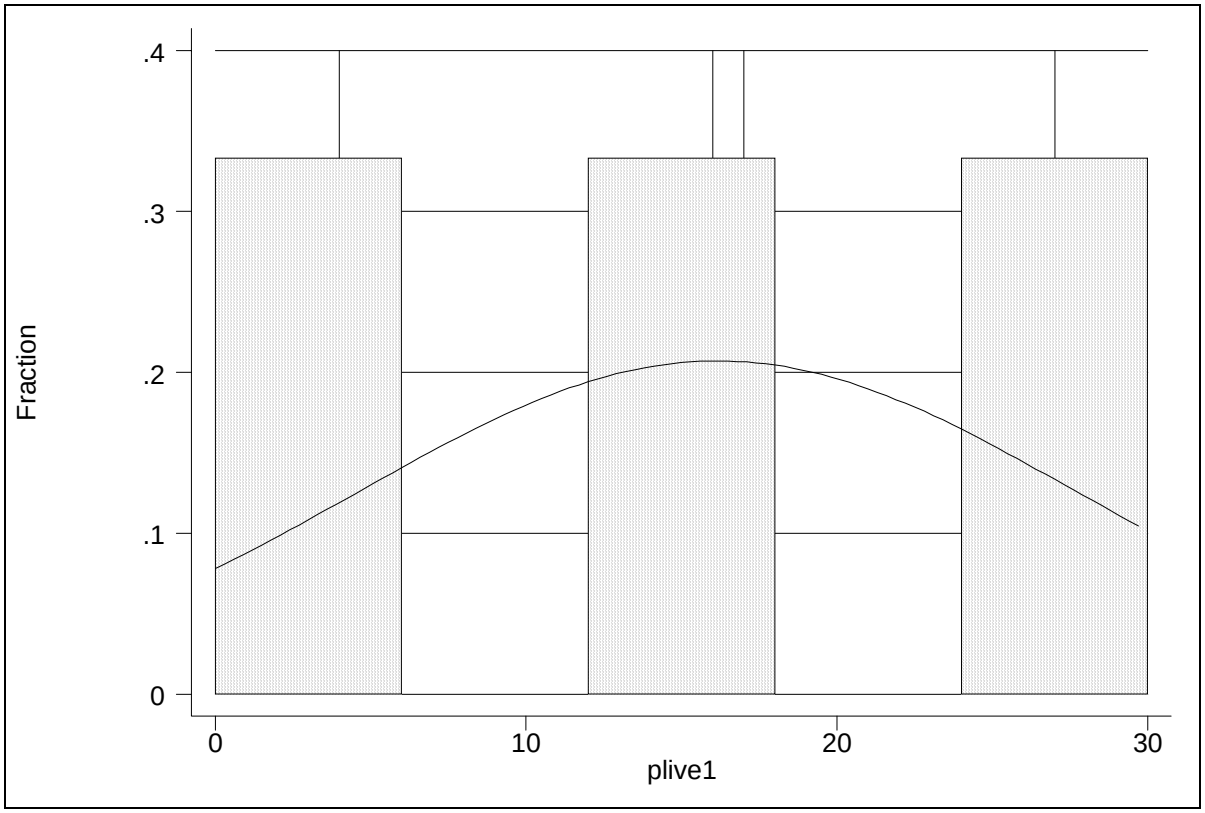

Figure 1 Distribution of cattle prices after dropping commercial farmers

Data Source: IES2000

Note: Only values between 4 and 27 included in the graph. The vertical lines represent (from left to right) the 10^{th}, 25^{th}, 50^{th}, 75^{th} and 90^{th} percentiles of variable *plive1*

```
->  sum plive1, detail

                          plive1 (price of cattle per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           10             1
 5%          200             4
10%          800            10       Obs                 264
25%         1000          17.5       Sum of Wgt.         264

50%         1400                     Mean           1547.534
                        Largest      Std. Dev.      1804.196
75%         1775          4500
90%         2000          5000       Variance        3255122
95%         2500         15000       Skewness       9.980956
99%         5000         25000       Kurtosis        120.922
```

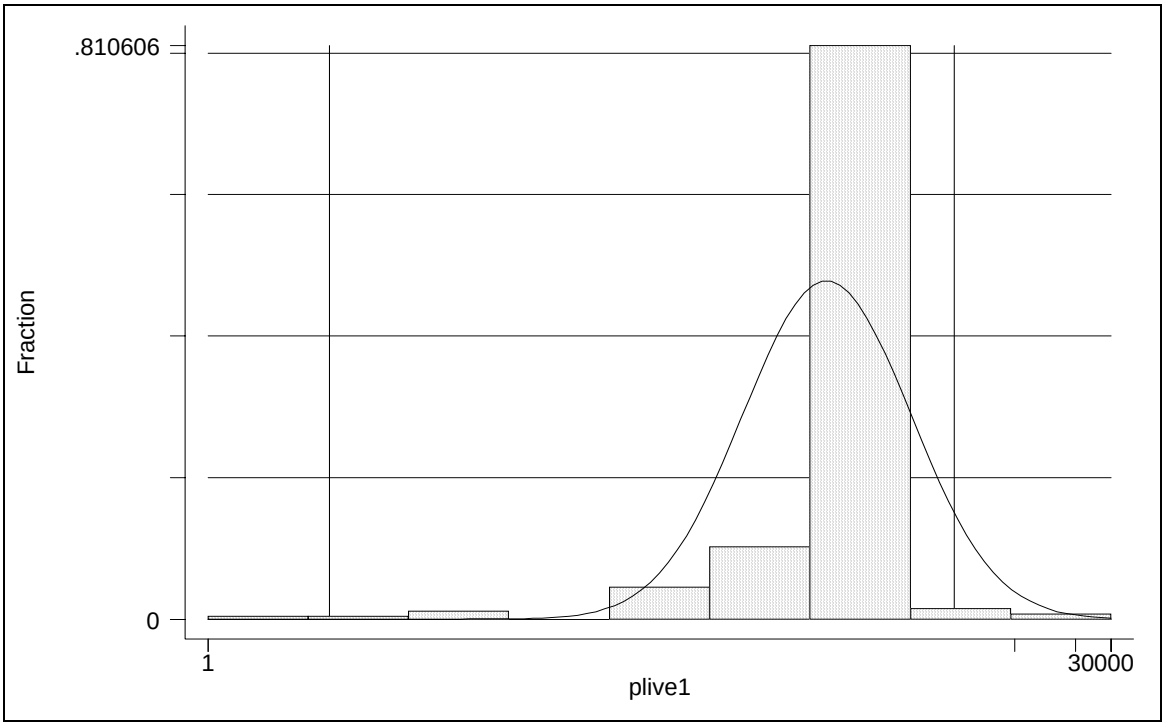

Figure 2 Distribution of cattle prices before dropping commercial farmers

Data Source: IES2000

Note: Only values between 1 and 25000 included in the graph. The vertical lines represent (from left to right) the 10^{th}, 25^{th}, 50^{th}, 75^{th} and 90^{th} percentiles of variable *plive1*

On the production side, maize price (*pprod1*) is chosen as an example of calculating the median prices. After dropping the commercial farmers the price data range from R0.33 to R201.00 a kg of maize, the mean price is R7.41 and the median price is R1.50. The data is skewed to the right (see Figure 3).

Before dropping commercial farmers price of maize (pprod1) range from R0.04 to R540.84 and the mean price is R22.10 a kg and the median price that is more reasonable for a kg of maize is R1.50. The data here is also skewed to the right (see Figure 4). That is why in this thesis median prices were used instead of mean prices, it is mainly because mean prices were misleading as they were pushed too high by outliers in the dataset.

-> sum pprod1, detail

```
                        pprod1 (price of maize in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           .35       .3333333
 5%     .5555556            .35
10%            .6       .3513174       Obs                 124
25%            1           .375       Sum of Wgt.         124

50%          1.5                      Mean           7.410474
                        Largest       Std. Dev.      23.57568
75%            3             80
90%     11.36364             96       Variance       555.8127
95%           26             98       Skewness       5.847137
99%           98            201       Kurtosis        41.9894
```

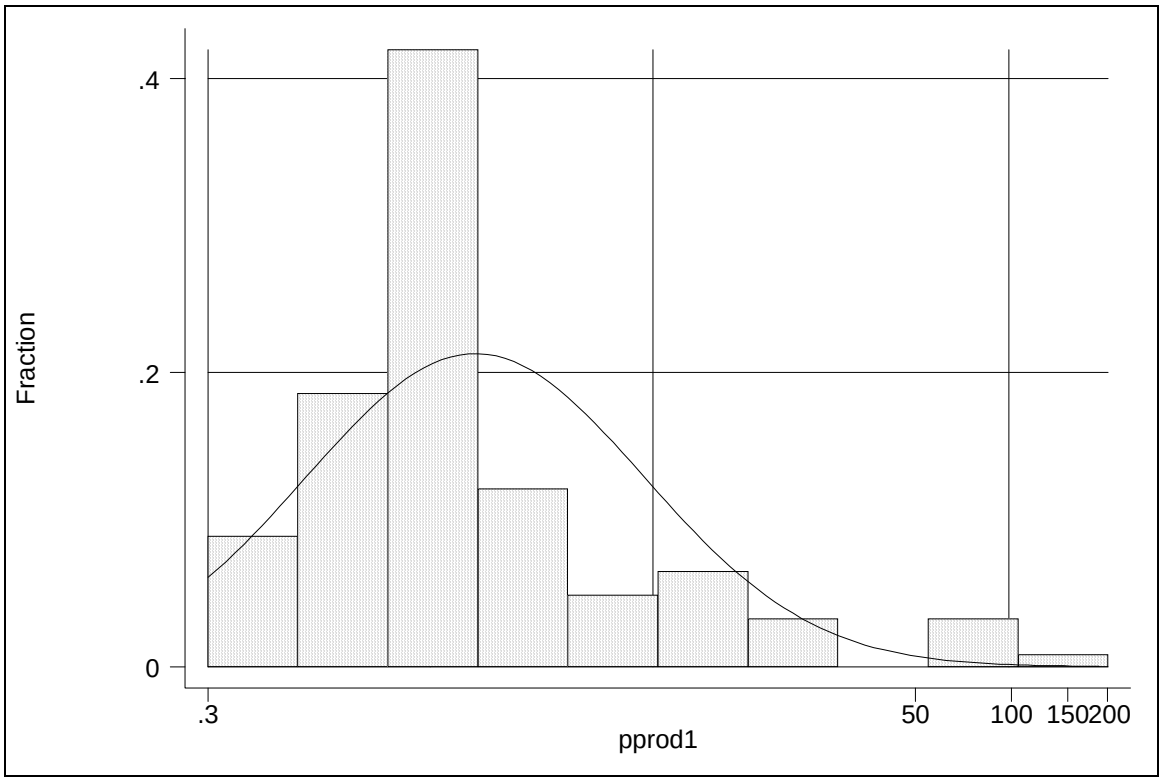

Figure 3 Distribution of maize prices after dropping commercial farmers

Data Source: IES2000

Note: Only values between 0.33 and 201 included in the graph. The vertical lines represent (from left to right) the 10^{th}, 25^{th}, 50^{th}, 75^{th} and 90^{th} percentiles of variable *pprod1*

```
->  sum pprod1, detail
                          pprod1 (price of maize in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .1565558           .038
 5%     .4210526       .1565558
10%        .5625       .3333333       Obs                 143
25%           1            .35       Sum of Wgt.         143

50%         1.5                      Mean           22.09975
                       Largest       Std. Dev.      81.53002
75%         3.6             405
90%          25             440       Variance       6647.144
95%          98             500       Skewness       5.036927
99%         500        540.8436       Kurtosis       28.56318
```

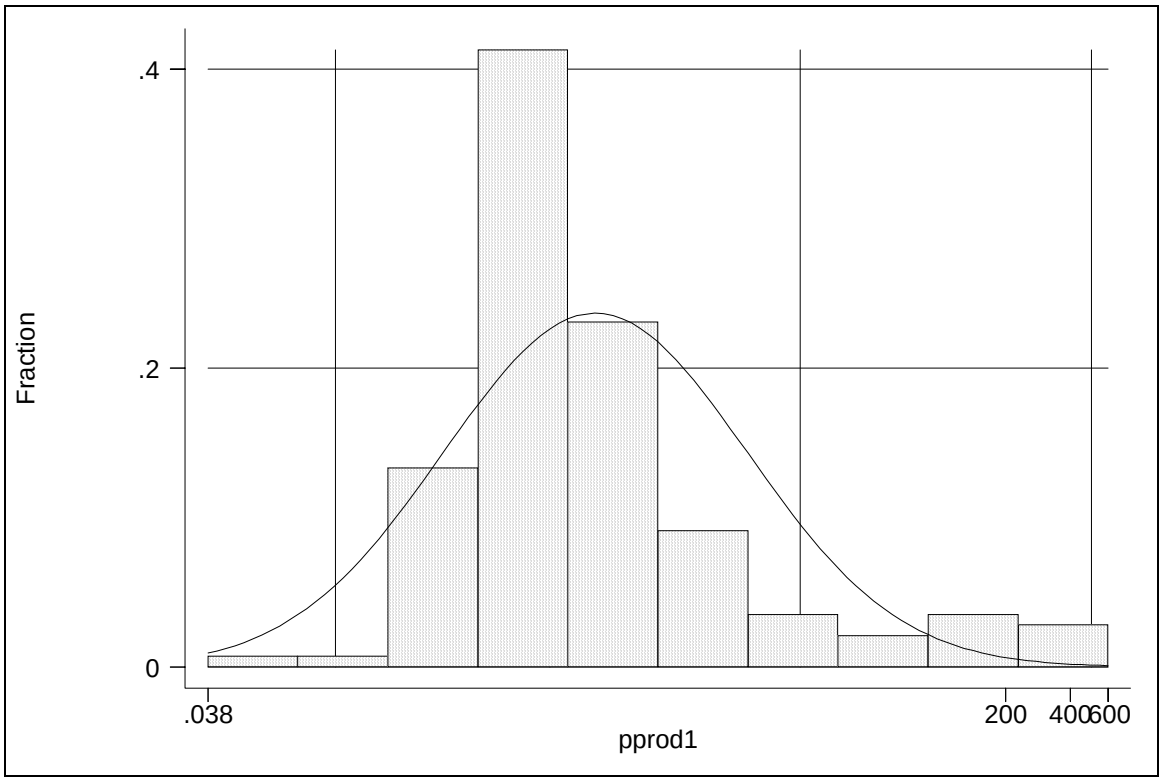

Figure 4 Distribution of maize prices before dropping commercial farmers

Data Source: IES2000

Note: Only values between 0.04 and 540.84 included in the graph. The vertical lines represent (from left to right) the 10th, 25th, 50th, 75th and 90th percentiles of variable *pprod1*

3.4. Concluding remarks

This chapter gave an insight into the difficulty of including home production for home consumption in the dataset. But the importance of HPHC should not be undermined. A need exists to consider the undeniably large amount of time and resource that goes into home production. Modern models are required to measure the importance of HPHC irrespective of the problems.

In this study an effort was tried to measure HPHC by sorting out the data and correcting all inconsistencies found in the database. Then an effort was made to give value to the consumption of home produce and livestock by calculating implicit prices of produce and livestock sold by households.

CHAPTER FOUR

4. ANALYSIS AND IMPORTANCE OF HPHC

4.1. Introduction

The preceding chapters set the scene for this analysis. The objective of this chapter is to determine who is involved in HPHC and the extent of their contribution to household consumption and income. This will make it possible to gain an insight into the economic contribution of home production for home consumption in South African agriculture.

4.2. Who is involved in HPHC?

The sample consists of about 26265 unique household IDs. Because the sample results might not make sense if one tries to interpret them, the data has been weighted to give an overall impression of the whole population. Therefore, all the data descriptions will be based on the whole population, not the sample.

Table 12 presents the number of households which are involved in HPHC. Column 2 of

Table 12 shows those households that are involved in crop farming only. Crop farming in this instance does not refer to crops only but includes all home-grown items, e.g., maize, other grain, milk, eggs, fruit, vegetables and sorghum beer. Column 3 shows the population groups that are involved in livestock farming (cattle, sheep goats, pigs, poultry, and other livestock) only, and the last column shows the number of households that are involved in both crop farming and livestock farming.

From

Table 12 it can be seen that a lot of households are involved in only crop farming, but there are also a lot of them that are involved in both crop and livestock farming. The results of the analysis show that a lot of those households that are involved in HPHC are Africans, with 787,801 in crop farming, 516,783 in livestock farming, and 798,520 in both crop farming and livestock farming. Because so many more Africans than other race groups are involved in HPHC, it has been decided that HPHC is important to them and not to the other population groups. For this reason, the HPHC analysis will concentrate only on Africans.

Table 12: Number of households involved in HPHC in South Africa

Population group	Crop farmers	Livestock farmers	Both crops & livestock
African	787801	516783	798520
Coloured	11889	13383	6132
Asian	858	0	685
White	20987	15190	13420
Total	821535	545356	818757

Data Source: IES 2000

The level of importance of HPHC differs from province to province. For instance, few people in the Western Cape, Northern Cape, North West and Gauteng are involved in HPHC. Furthermore, not many people in the Free State and Mpumalanga are involved.

HPHC is more important in the Eastern Cape, KwaZulu-Natal and Limpopo. Because of this, the analysis will focus on these 3 provinces, particularly on the East Coast region. This is so because KwaZulu-Natal and the Eastern Cape have some common features, that is, they both have a majority of Africans who are actively involved in HPHC. Figure 5 shows the number of households in HPHC by province. The results are divided into the 3 categories used in

Table 12.

There are no overlaps between categories, meaning that those that are involved in livestock farming only are not counted when considering those involved in both livestock and crop farming. From the statistical description results given in

Table 12 it is clear that there are a lot of households that are involved in crop farming only in Limpopo province (248,976) followed by KwaZulu-Natal (217,781), and lastly, the Eastern Cape (129,474).

When the focus was changed to livestock households, it was found that the majority of households involved in this type of farming are in the Eastern Cape (170,560), followed by KwaZulu-Natal (91,261), and lastly, Limpopo (80,492).

Focusing on those households that are involved both in livestock and produce farming shows that the Eastern Cape has the majority (286,497) followed by Limpopo (234,613), and lastly, KwaZulu-Natal (187,003).

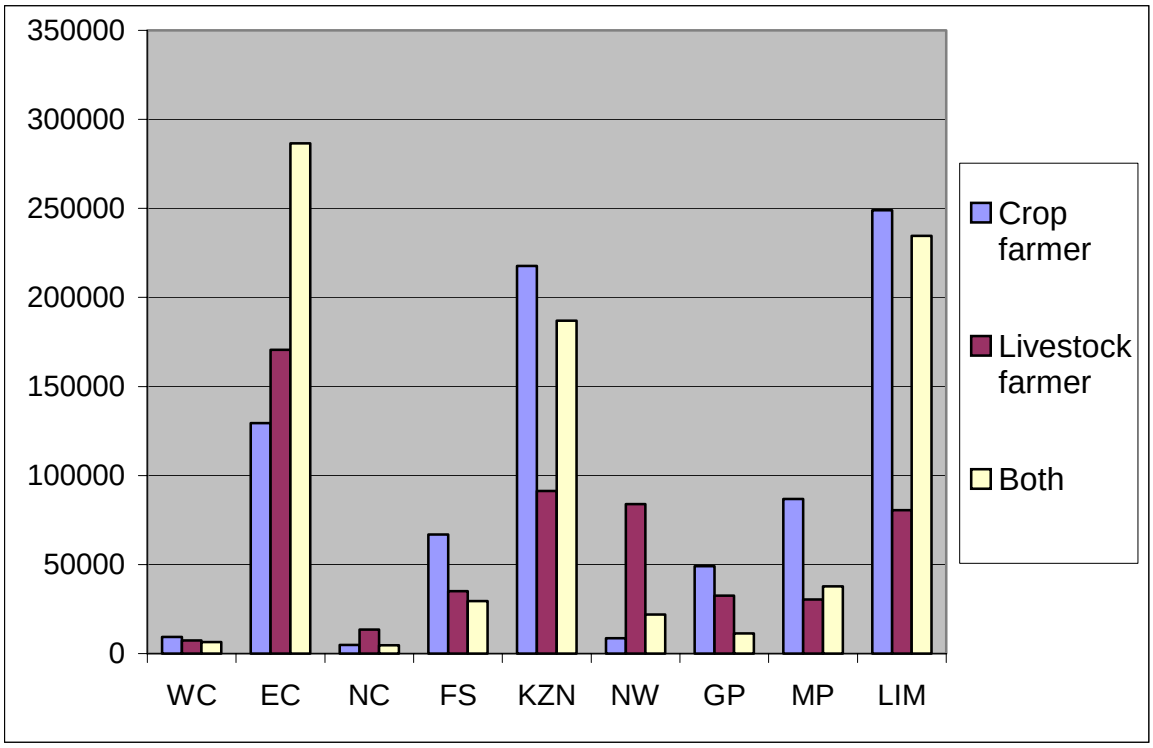

Figure 5 Number of households involved in HPHC by province

Data Source: IES 2000

19.87 percent of households are involved in home production for home consumption of livestock and produce, meaning that 80.13 percent of households all over South Africa are not involved in HPHC. On the percentage of involvement between types of produce, the results show that those involved in home-grown produce, produce mainly maize (46.1 percent), followed by vegetables (24.1 percent), other grain (7.6 percent), home-brewed Sorghum (6.4 percent), eggs (6.3 percent), fruit (6.1 percent) and milk (3.4 percent) - see Figure 6.

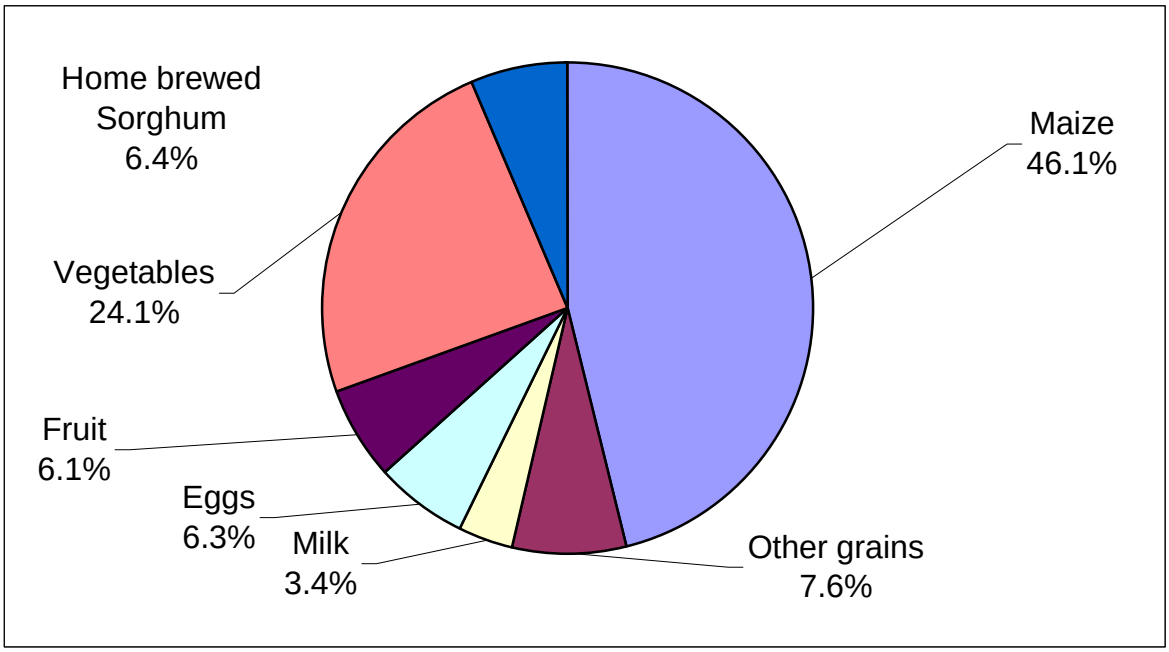

Figure 6 Percentage of home-grown produce

Data Source: IES 2000

Of those households that are involved in livestock farming, a large percentage keeps poultry (37.6 percent), followed by cattle (20.9 percent), goats (17.8 percent), pigs (10.6 percent), sheep (6.9 percent), and other livestock (6.1 percent) - see Figure 7.

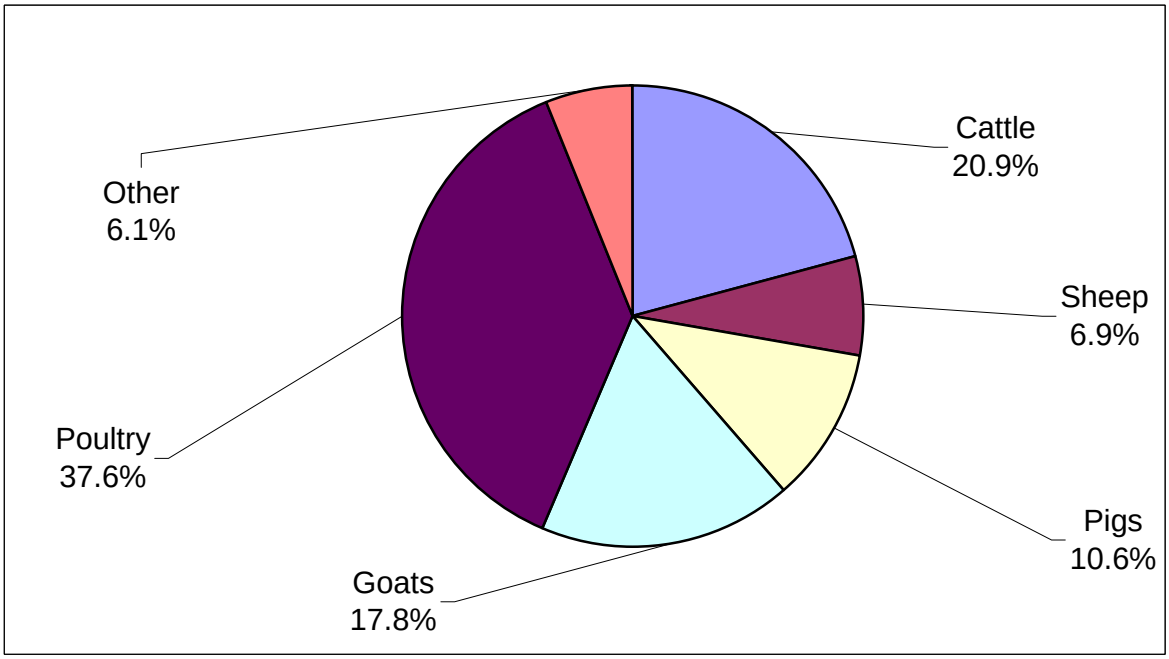

Figure 7 Percentage of home-grown livestock

Data Source: IES 2000

4.3. Contribution to household consumption and income

According to the discussion document of the South African Agricultural Policy (1998), over one third of rural households continue to engage in agricultural production, making it the third most significant livelihood approach used in rural areas after remittances and wages from low-skilled jobs. The agricultural policy document concedes that agricultural production makes a small contribution to household income.

IES 2000 survey shows that, out of the 3,735,522 rural households that are found in South Africa, 1,839,436 of them are involved in home production for home consumption. This means that about 49 percent of households are involved in HPHC. Because this analysis is based on two provinces that comprise a majority of Africans who are involved in HPHC, the discussion in this study will concentrate on African households. The description will not differentiate between rural and urban African households because there is no real competition between the two (see Figure 8 and Figure 9).

According to Bertail *et al*. (1999), rural households are expected to have higher home produced food consumption than urban households, given their easier access to the means of production, such as gardens. The majority of people involved in HPHC are indeed from rural areas (see Figure 8 and Figure 9). From these results it can be seen that there is no logic in comparing urban African households with rural African households because there are few urban African households involved in HPHC, hence the analysis does not differentiate between urban and rural African households. Instead, it incorporates both urban and rural African households.

From Figure 8 it can be seen that a lot of rural African households in the Eastern Cape farm both crops and livestock (278,308 households). But Figure 9 shows that although those households that are involved in both crop and livestock farming are in the majority (174,306 households), there are still many households (164,028) that produce only crops.

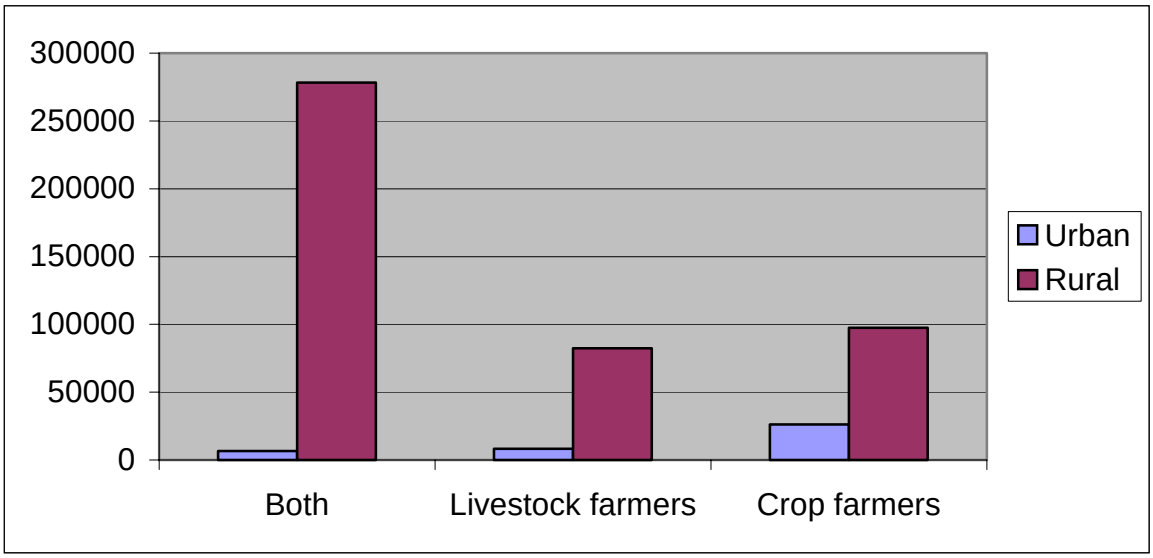

Figure 8 Number of African households involved in HPHC in the Eastern Cape by location

Data Source: IES 2000

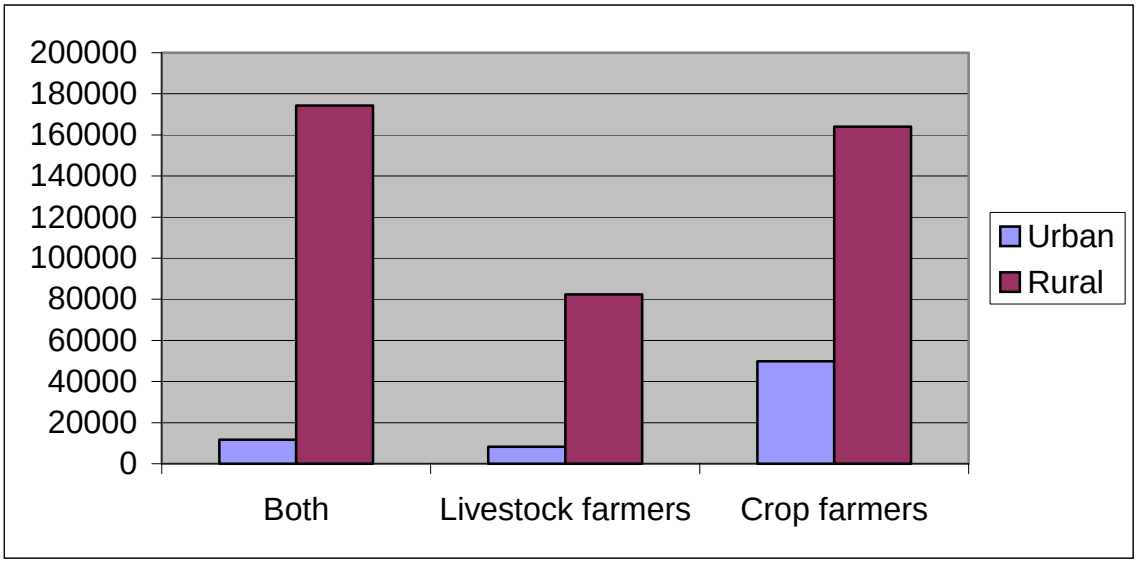

Figure 9 Number of African households involved in HPHC in KwaZulu-Natal by location

Data Source: IES 2000

Figure 6 show that a lot of households in South Africa produce more maize than any other crop. Although maize is by far the most important item grown and consumed by households, its monetary value, on average per annum (R256.65), has been found to be lower than that of milk (R1112.51). Maize is followed by vegetables (R237.18), fruit (R159.93), home-brewed sorghum(R123.91), other grain (R93.47), and eggs (R81.51) - see Figure 10.

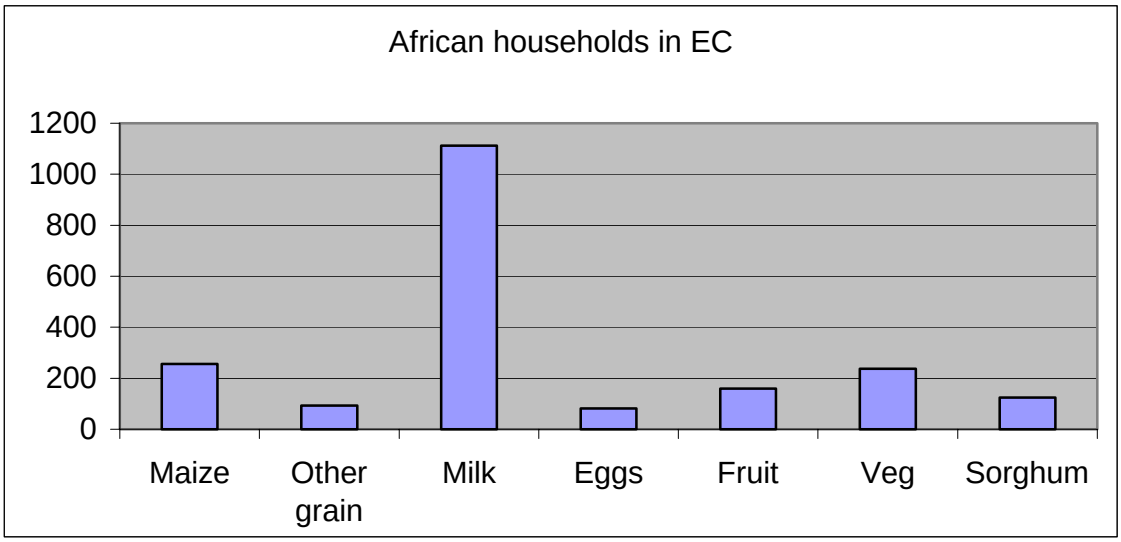

Figure 10 Comparison of the average monetary value of produce consumed by Africans in Rands

Data Source: IES 2000

When the focus is changed to the KwaZulu-Natal African households (Figure 11) findings show that milk consumption at home still contributes more value on average per annum (R665.57) than any other kind of produce followed by fruit (R266.09), other grain (R255.26), vegetables (R202.97), home-brewed sorghum (R156.16), maize (R149.42) and eggs (R35.21). This shows that even though maize is the most cultivated crop it does not contribute much when it is converted into monetary value, if one compares it with other home-grown products.

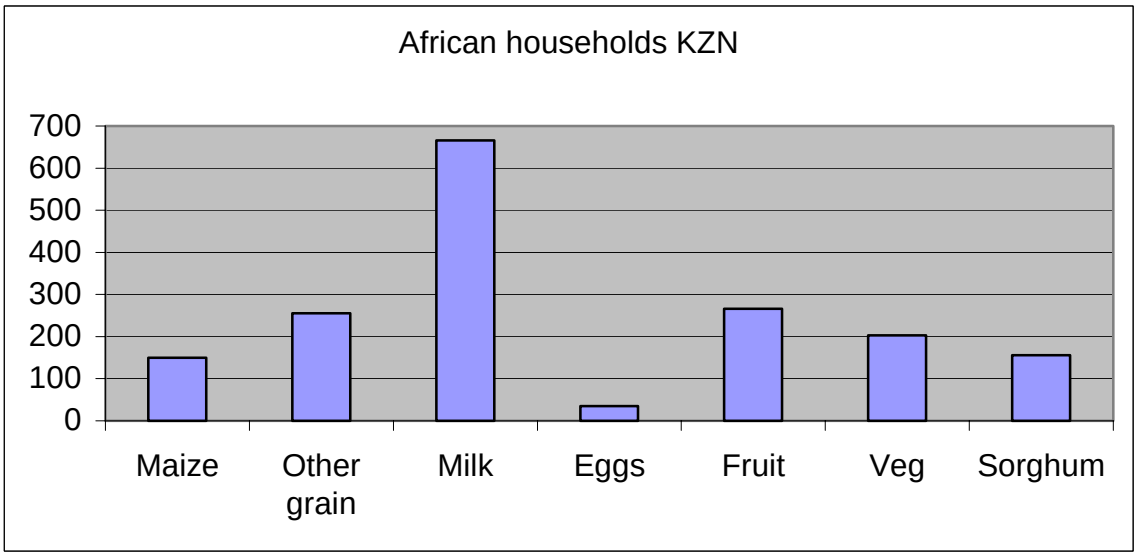

Figure 11 Comparison of the average monetary value of produce consumed by Africans in Rands

Data Source: IES 2000

Cattle and sheep consumption of home-grown livestock in the Eastern Cape on average contributes almost the same value per annum which are R806.50 and R800.33, respectively, followed by other livestock with R208.16, goats (R183.07), pigs (R141.47) and poultry with R78.99 on average per annum.

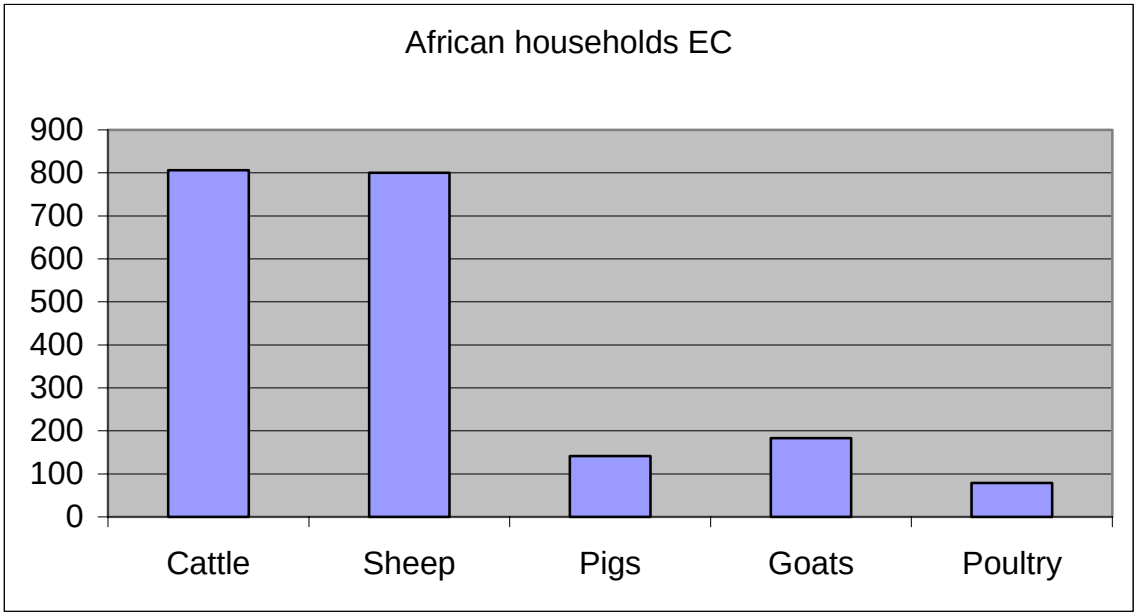

Figure 12 Comparison of the average monetary value of livestock consumed by Africans in the Eastern Cape in Rands

Data Source: IES 2000

The KwaZulu-Natal results of home consumption of livestock show that cattle contribute an outstanding value (R555.49), compared with other types of livestock: goats (R189.77), poultry (R126.86), pigs (R108.13), and sheep (R59.37).

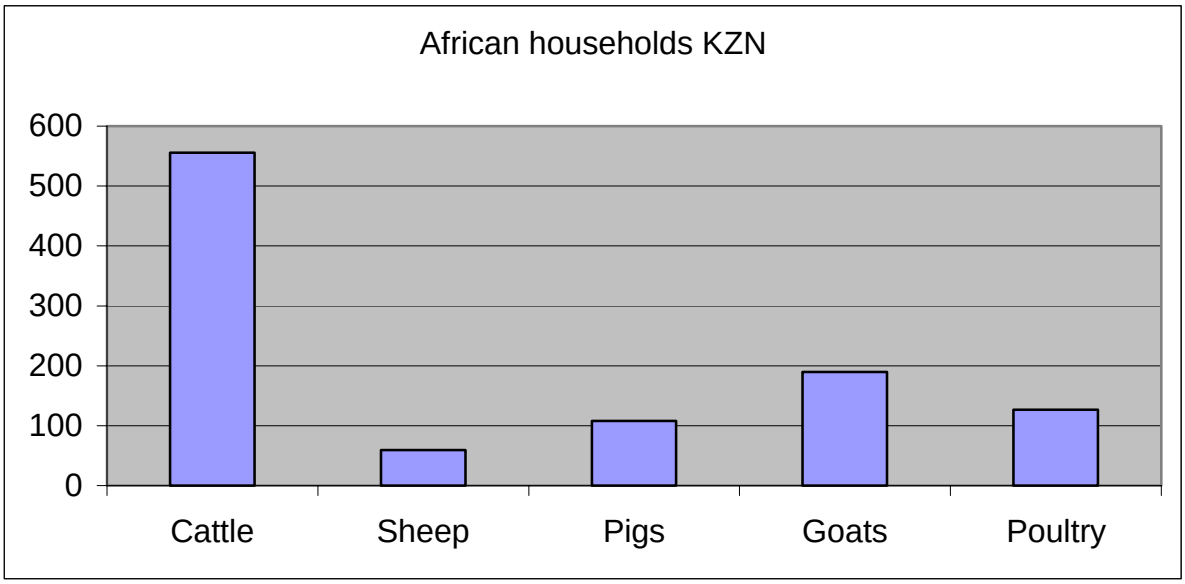

Figure 13 Comparison of the average monetary value of livestock consumed by Africans in KwaZulu Natal in Rands

Data Source: IES 2000

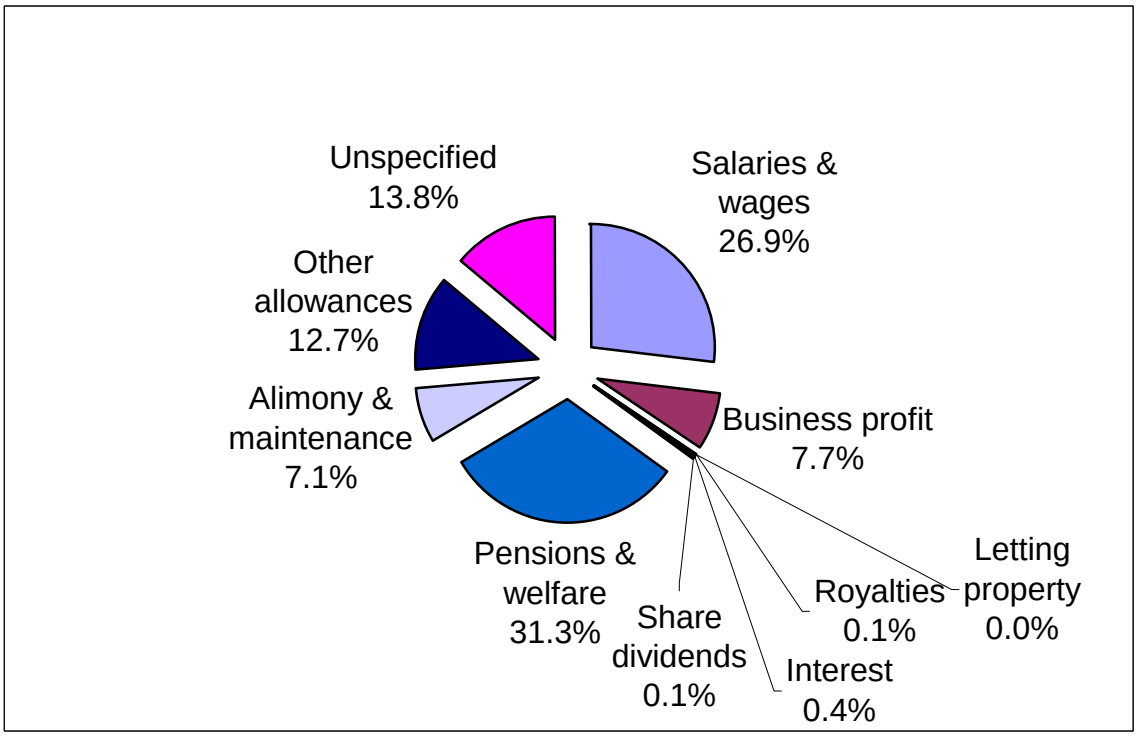

Figure 14: Proportion of cash income sources as indicated by Eastern Cape households

Data Source: IES 2000

Figure 14 shows what the households engaged in home production for home consumption indicated as their source of income. Pensions are their most important source of income, with

31.3 percent of households reporting it as their main source of income, followed by income from salaries and wages, with 26.9 percent of households reporting it as their main source of income. Income from remittances accounts for 12.7 percent of the households who reported it as their main source of income; followed by 7.1 percent of households who reported grants as their main source of income. These grants include child support grants and maintenance allowances from divorced spouses. The households who reported income from business as their main source of income numbered 7.7 percent. Income from business includes farming activities as well. About 13.8 percent of households did not specify their main source of income. In the Eastern Cape no household reported letting property (0.0 percent) as their main source of income, but a low percentage of households reported, share dividends (0.1 percent), interest (0.4 percent) and royalties (0.1 percent), as their main sources of income.

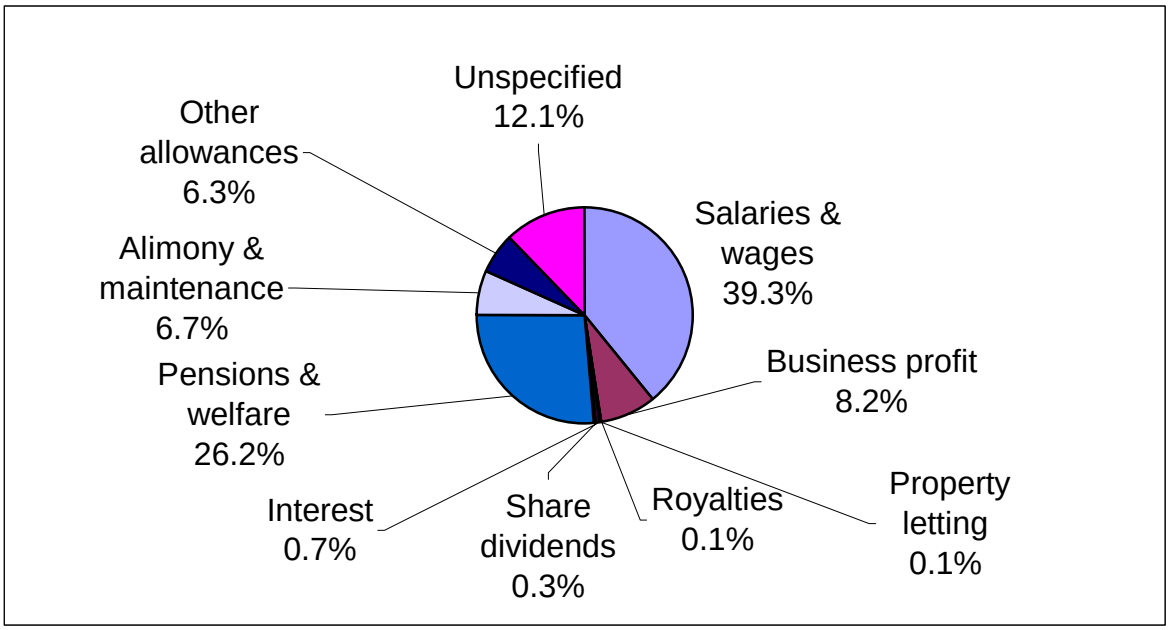

Figure 15: Proportion of cash income sources as indicated by KwaZulu-Natal households

Data Source: IES 2000

KwaZulu-Natal (Figure 15) demonstrates a similar pattern, except that the majority of households reported salaries and wages as their chief source of income (39.3 percent), followed by pensions (26.2 percent). Child support grants account for the main source of income of 6.7 percent of households, and 6.3 percent of households in KwaZulu-Natal reported remittances as their main source of income, whereas 8.2 percent of households reported income from business as their main source of income. Households reporting unspecified sources as their main sources of income numbered 12.1 percent. A very small

percentage of households reported share dividends (0.3 percent), royalties (0.1 percent), interest from loans (0.7 percent) and property letting (0.1 percent) as their main source of income.

The average annual income of Eastern Cape households that are engaged in HPHC is R16 142.62. The contribution of HPHC to income is 12.0 percent of the total income of Eastern Cape households. HPHC income is calculated by adding the value of home consumption and the value of sales of both livestock and crop produce. In KwaZulu-Natal, households have an average annual income of R18 443.12, and of this amount about 6.7 percent are from HPHC.

It is clear from the findings that the households that are engaged in home production for home consumption are poorer than the non-engaged ones. This is confirmed by the average annual total income received by non-engaged households, which is higher (R22 381. 53 in the Eastern Cape and R22 348.52 in KwaZulu-Natal) than that of households that are engaged (R16 142.62 in the Eastern Cape and R18 443.12 in KwaZulu-Natal). The dataset revealed that, of those households that are engaged in HPHC, there are some that do not spend any money on inputs, equating to about 48.4 percent of them, which is almost half the number of all households engaged in HPHC. The average annual expenditure on input use is R106.19 in the Eastern Cape and R85.18 in KwaZulu-Natal.

4.4. Concluding remarks

These results show that the number of people involved in HPHC is indeed high in the rural areas of the Eastern Cape, Limpopo, and KwaZulu-Natal, especially among African households, although in this study the focus was on the Eastern Cape and KwaZulu-Natal. One factor contributing to high involvement in these provinces is, according to statistics, that African rural households are generally poor and live close together. The data reveals that most of those households that are engaged in HPHC have a lower average income than the non-engaged households.

CHAPTER FIVE

5. CONCLUSIONS

5.1. Introduction

The objective of the analysis undertaken in Chapter Four was to identify trends relating to the research question posed in Chapter One as follows:

- What is the economic contribution of home production for home consumption in South Africa?

The objective of this Chapter is to answer the question posed in Chapter One supported by evidence from Chapter Four.

5.2. Answers to the research question

The analysis undertaken in Chapter 4 showed that home production is very important mainly for three provinces, (The Eastern Cape, KwaZulu-Natal, and Limpopo), and this was born out by the number of households that are involved in its practice. The analysis based on population group and location revealed that maize production is the type of production most favoured and it is more important in rural areas. Though other kinds of production are pursued, maize production remains the most favoured and most important.

The analysis also revealed that even though maize is the crop most often grown, its consumption value is less important than the contribution made by milk on average per annum. Cattle farming - compared with goat, pig, poultry and sheep farming - dominated in Kwazulu–Natal households. In the Eastern Cape, the results show that cattle and sheep contribute the most value per annum, on average, to home production for home consumption. Apart from being consumed at home, livestock are very important to sell for spending on childrens' education.

Furthermore, the results show that HPHC contributes very little per annum to most households. The results show that about 12 percent of annual income, on average, from African households in the Eastern Cape is from HPHC, whereas it is 6.7 percent in rural KwaZulu-Natal African households.

5.3. Conclusion

In conclusion, the analysis shows that households are indeed involved in HPHC, but it is clear from the statistics that HPHC makes a very small contribution to the livelihoods of households. This has been judged by the small money value that HPHC contributes per annum, on average, to households. But this highlights that households are indeed interested in HPHC even though it is not efficient.

This conclusion clearly indicates that to enhance the potential of HPHC, necessary interventions have to be made by government. The 1998 agricultural policy highlighted that one of the encouraging developments in recent years has been the growth of support for home gardens, especially in peri-urban and urban areas, where small plots of vegetables, in particular, can contribute significantly to both livelihoods and nutritional standards. The government strongly encouraged the involvement of NGOs and the sponsorship from the private sector.

However, much more needs to be done, especially among the poor in rural areas, to stimulate home gardening. Extension services have a major role to play in promoting production, and at the same time, encouraging suppliers of seed, tools and production equipment to devote more attention to this currently neglected section of the economy.

It is acknowledged that resources to enhance the welfare of the society are limited, but choices among alternatives have to be made, and the alternative is usually desirable if it is to make somebody better off. It is believed that enhancement of home production could lead to the improvement of livelihood and nutritional standards of the households.

Government should channel resources to try to raise the contribution of agriculture to low income households. Spending geared to this end should be carefully balanced against alternative approaches, such as boosting welfare grants or delivering food parcels. Investment in agriculture should yield sustained benefits, but this needs sustained commitment by the public sector to expenditure and institutional restructuring to achieve it.

Most rural households have some knowledge of farming and access to some agricultural resources; therefore, a strategy to develop HPHC agriculture should be given priority.

Although agricultural income is a small proportion of total income, livestock is important as a store of wealth and the only asset that can be liquidated (Fraser *et al.*, 2003).

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Appendix I

This appendix shows the do-file used for the creation of the HPHC dataset and it also gives an explanation of those commands. It also shows the Stata output of the median prices, mean, range and skewness before and after dropping the commercial farmers.

```
#delimit;

*==================
*===home-grownh.do===
*==================

*This do-file creates a hh-level dataset that contains value of consumption
and sales of livestock and produce;

*HOME PRODUCTION FOR HOME CONSUMPTION;
*==================================;

* 1) Opening database;

set more off;
use home-grown.dta, clear;

* 2) Separating out multiproduct households;
by hhid, sort: gen hhnum = _n;

* 3) "Missing values" are uncoded. Should have been zeroes;
tab P2202Q01, missing;
tab P2204Q01, missing;
*No missing values for both Q1's;

for var P2202Q02 P2202Q03 P2202Q04 P2202Q05: sum X if P2202Q01 ~= 9 & X ==
. ;
for var P2204Q02 P2204Q03 P2204Q04 P2204Q05 P2204Q06: sum X if P2204Q01 ~=
9 & X == . ;
*Conclude: All missing values are uncoded and can be changed to zeroes;

for var P*: replace X = 0 if X == .;

* 4) Checking consistency in reporting;

* 4.1) PRODUCE;
* 4.1.1) Check whether produce vars are zero when Q1 = 9;
gen flagprod = 1 if P2202Q01 == 9 &  (P2202Q02 > 0 | P2202Q03 > 0 |
P2202Q04 > 0 | P2202Q05 > 0);
*Fine - no positive values reported when Q1 = 9;
drop flagprod;

* 4.1.2) Double-counting: many entries duplicated exactly ;
gen flagprod = 1 if (hhid[_n] == hhid[_n-1]) & (P2202Q01[_n] ==
P2202Q01[_n-1]);
by hhid, sort: egen sumflagprod = sum(flagprod);
sort hhid hhnum;
*list hhid hhnum P2202Q01 P2202Q02 P2202Q03 P2202Q04 P2202Q05 flagprod
sumflagprod if P2202Q01~=9 & sumflagprod >= 1;
replace P2202Q01 = 9 if flagprod == 1;
for var P2202Q02 P2202Q03 P2202Q04 P2202Q05: replace X = 0 if flagprod ==
1;
drop flagprod sumflagprod;
```

```
* 4.2) LIVESTOCK;
* 4.2.1) Check whether consumption and sales are zero when Q1 = 9;
* Only consumption (expenditure) and sales (income) looked at, ignore rest
(data not needed);
gen flaglive = 1 if P2204Q01 == 9 &  (P2204Q04 > 0 | P2204Q05 > 0 |
P2204Q06 > 0);
codebook hhid;
*Not fine - 494  cases where positive livestock slaughters and sales
reported despite Q1 = 9;
replace flaglive = 0 if flaglive == .;
by hhid, sort: egen sumflaglive = sum(flaglive);
sort hhid hhnum;
*list hhid hhnum P2204Q01 P2204Q04 P2204Q05 P2204Q06 flaglive  if
sumflaglive >= 1;

*Some duplicate, some miscoded (see flaglive.txt). Two options;
*  (a) replace all non-duplicates with Q1 = 7 (select replace.do);
*  (b) simply replace livestock vars with zero if Q1 = 9, i.e. assume
miscoded (deselect replace.do);
do replace.do;
for var P2204Q02 P2204Q03 P2204Q04 P2204Q05 P2204Q06: replace X = 0 if
P2204Q01 == 9;
drop flaglive sumflaglive;
gen flaglive = 1 if P2204Q01 == 9 &  (P2204Q04 > 0 | P2204Q05 > 0 |
P2204Q06 > 0);
*Now all flaglive missing, i.e. no positive values reported when Q1 = 9;
drop flaglive;

* 4.2.2) Double-counting: many entries duplicated exactly ;
gen flaglive = 1 if (hhid[_n] == hhid[_n-1]) & (P2204Q01[_n] ==
P2204Q01[_n-1]);
by hhid, sort: egen sumflaglive = sum(flaglive);
sort hhid hhnum;
*list hhid hhnum P2204Q01 P2204Q02 P2204Q03 P2204Q04 P2204Q05 P2204Q06
flaglive sumflaglive if P2204Q01~=9 & sumflaglive >= 1;
replace P2204Q01 = 9 if flaglive == 1;
for var P2204Q02 P2204Q03 P2204Q04 P2204Q05 P2204Q06: replace X = 0 if
P2204Q01 == 9;
drop flaglive sumflaglive;

* 5) Implicit prices;
replace P2204Q01 = 6 if P2204Q01 == 7;
sum  P2202Q04 P2202Q05 if  P2202Q04 > 0 &  P2202Q05 == 0;
sum  P2202Q04 P2202Q05 if  P2202Q04 == 0 &  P2202Q05 > 0;
by P2202Q01, sort: sum  P2202Q04 P2202Q05 if  P2202Q04 > 0 &  P2202Q05 > 0;

sum  P2204Q05 P2204Q06 if  P2204Q05 > 0 & P2204Q06 == 0;
sum  P2204Q05 P2204Q06 if  P2204Q05 == 0 & P2204Q06 > 0;
by P2204Q01, sort: sum  P2204Q05 P2204Q06 if  P2204Q05 > 0 &  P2204Q06 > 0;

gen pprod1 = P2202Q05/P2202Q04 if P2202Q01 == 1 & P2202Q04 > 0 & P2202Q05 >
0;
gen pprod2 = P2202Q05/P2202Q04 if P2202Q01 == 2 & P2202Q04 > 0 & P2202Q05 >
0;
gen pprod3 = P2202Q05/P2202Q04 if P2202Q01 == 3 & P2202Q04 > 0 & P2202Q05 >
0;
gen pprod4 = P2202Q05/P2202Q04 if P2202Q01 == 4 & P2202Q04 > 0 & P2202Q05 >
0;
gen pprod5 = P2202Q05/P2202Q04 if P2202Q01 == 5 & P2202Q04 > 0 & P2202Q05 >
0;
gen pprod6 = P2202Q05/P2202Q04 if P2202Q01 == 6 & P2202Q04 > 0 & P2202Q05 >
0;
gen pprod7 = P2202Q05/P2202Q04 if P2202Q01 == 7 & P2202Q04 > 0 & P2202Q05 >
0;
```

```
gen plive1 = P2204Q06/P2204Q05 if P2204Q01 == 1 & P2204Q05 > 0 & P2204Q06 >
0;
gen plive2 = P2204Q06/P2204Q05 if P2204Q01 == 2 & P2204Q05 > 0 & P2204Q06 >
0;
gen plive3 = P2204Q06/P2204Q05 if P2204Q01 == 3 & P2204Q05 > 0 & P2204Q06 >
0;
gen plive4 = P2204Q06/P2204Q05 if P2204Q01 == 4 & P2204Q05 > 0 & P2204Q06 >
0;
gen plive5 = P2204Q06/P2204Q05 if P2204Q01 == 5 & P2204Q05 > 0 & P2204Q06 >
0;
gen plive6 = P2204Q06/P2204Q05 if P2204Q01 == 6 & P2204Q05 > 0 & P2204Q06 >
0;

*Creating median prices*;
for var p*: egen medX = median(X);
for var p*: sum X, detail;

*PRODUCE;

replace P2202Q04 = P2202Q05/medpprod1 if P2202Q01 == 1 & P2202Q04 == 0 &
P2202Q05 > 0;
replace P2202Q04 = P2202Q05/medpprod2 if P2202Q01 == 2 & P2202Q04 == 0 &
P2202Q05 > 0;
replace P2202Q04 = P2202Q05/medpprod3 if P2202Q01 == 3 & P2202Q04 == 0 &
P2202Q05 > 0;
replace P2202Q04 = P2202Q05/medpprod4 if P2202Q01 == 4 & P2202Q04 == 0 &
P2202Q05 > 0;
replace P2202Q04 = P2202Q05/medpprod5 if P2202Q01 == 5 & P2202Q04 == 0 &
P2202Q05 > 0;
replace P2202Q04 = P2202Q05/medpprod6 if P2202Q01 == 6 & P2202Q04 == 0 &
P2202Q05 > 0;
replace P2202Q04 = P2202Q05/medpprod7 if P2202Q01 == 7 & P2202Q04 == 0 &
P2202Q05 > 0;
*153 changes made in total;

replace P2202Q05 = P2202Q04*medpprod1 if P2202Q01 == 1 & P2202Q04 > 0 &
P2202Q05 == 0;
replace P2202Q05 = P2202Q04*medpprod2 if P2202Q01 == 2 & P2202Q04 > 0 &
P2202Q05 == 0;
replace P2202Q05 = P2202Q04*medpprod3 if P2202Q01 == 3 & P2202Q04 > 0 &
P2202Q05 == 0;
replace P2202Q05 = P2202Q04*medpprod4 if P2202Q01 == 4 & P2202Q04 > 0 &
P2202Q05 == 0;
replace P2202Q05 = P2202Q04*medpprod5 if P2202Q01 == 5 & P2202Q04 > 0 &
P2202Q05 == 0;
replace P2202Q05 = P2202Q04*medpprod6 if P2202Q01 == 6 & P2202Q04 > 0 &
P2202Q05 == 0;
replace P2202Q05 = P2202Q04*medpprod7 if P2202Q01 == 7 & P2202Q04 > 0 &
P2202Q05 == 0;
*205 changes made in total;

gen     P2202Q03val = P2202Q03*medpprod1 if P2202Q01 == 1;
replace P2202Q03val = P2202Q03*medpprod2 if P2202Q01 == 2;
replace P2202Q03val = P2202Q03*medpprod3 if P2202Q01 == 3;
replace P2202Q03val = P2202Q03*medpprod4 if P2202Q01 == 4;
replace P2202Q03val = P2202Q03*medpprod5 if P2202Q01 == 5;
replace P2202Q03val = P2202Q03*medpprod6 if P2202Q01 == 6;
replace P2202Q03val = P2202Q03*medpprod7 if P2202Q01 == 7;
replace P2202Q03val = 0 if P2202Q03val == .;

*LIVESTOCK;

replace P2204Q05 = P2204Q06/medplive1 if P2204Q01 == 1 & P2204Q05 == 0 &
P2204Q06 > 0;
replace P2204Q05 = P2204Q06/medplive2 if P2204Q01 == 2 & P2204Q05 == 0 &
P2204Q06 > 0;
```

```
replace P2204Q05 = P2204Q06/medplive3 if P2204Q01 == 3 & P2204Q05 == 0 &
P2204Q06 > 0;
replace P2204Q05 = P2204Q06/medplive4 if P2204Q01 == 4 & P2204Q05 == 0 &
P2204Q06 > 0;
replace P2204Q05 = P2204Q06/medplive5 if P2204Q01 == 5 & P2204Q05 == 0 &
P2204Q06 > 0;
replace P2204Q05 = P2204Q06/medplive6 if P2204Q01 == 6 & P2204Q05 == 0 &
P2204Q06 > 0;

*61 changes made in total;

replace P2204Q06 = P2204Q05*medplive1 if P2204Q01 == 1 & P2204Q05 > 0 &
P2204Q06 == 0;
replace P2204Q06 = P2204Q05*medplive2 if P2204Q01 == 2 & P2204Q05 > 0 &
P2204Q06 == 0;
replace P2204Q06 = P2204Q05*medplive3 if P2204Q01 == 3 & P2204Q05 > 0 &
P2204Q06 == 0;
replace P2204Q06 = P2204Q05*medplive4 if P2204Q01 == 4 & P2204Q05 > 0 &
P2204Q06 == 0;
replace P2204Q06 = P2204Q05*medplive5 if P2204Q01 == 5 & P2204Q05 > 0 &
P2204Q06 == 0;
replace P2204Q06 = P2204Q05*medplive6 if P2204Q01 == 6 & P2204Q05 > 0 &
P2204Q06 == 0;
*72 changes made in total;

gen     P2204Q04val = P2204Q04*medplive1 if P2204Q01 == 1;
replace P2204Q04val = P2204Q04*medplive2 if P2204Q01 == 2;
replace P2204Q04val = P2204Q04*medplive3 if P2204Q01 == 3;
replace P2204Q04val = P2204Q04*medplive4 if P2204Q01 == 4;
replace P2204Q04val = P2204Q04*medplive5 if P2204Q01 == 5;
replace P2204Q04val = P2204Q04*medplive6 if P2204Q01 == 6;
replace P2204Q04val = 0 if P2204Q04val == .;


* 6) Finding commercial farmers/large producers here;

do hphcdrop.do;

*================================================*;

save home-grownp.dta, replace;
*This version of home-grown is at an "individual" level - not really person
level;

* 7) Create hh-level values of consumption and sales;

drop hhnum;
by hhid, sort: gen hhnum = _n;

by hhid, sort: egen valprodsale = sum(P2202Q05) ; by hhid, sort: egen
valprodcons = sum(P2202Q03val) ;

by hhid, sort: egen vallivesale = sum(P2204Q06) ;
by hhid, sort: egen vallivecons = sum(P2204Q04val) ;

for var val* : replace X = 0 if X == .;

rename P2205TOT valinputs;

keep if hhnum == 1;
keep hhid val* ;

save home-grownh.dta, replace;
```

Do-file on commercial farmers

```
#delimit;
set more off;

*=================*
*===hphcdrop.do===*
*=================*

;

* 5.1) Creating variable flagcom  - large producers
* Method: find large producers, reduce sales, value of sales and inputs to
zero;

* Production/sales: levels higher than the following are too high*;
*  Maize = 10000kg per annum in 3 hectares of land*;
*  Other grains = 5000kg per annum in 3 hectares of land*;
*  Milk = 12600 litres per annum in 8 cows*;
*  Eggs = 4375 dozen eggs (assume 150 hens, 350 eggs per year)*;
*  Fruit = 45000kg per annum on 1 hectare (general fruit)*;
*  Vegetables = 60000kg per annum on 1.5 hectares*;
*  Sorghum beer - no limit

list P2202Q02  if P2202Q02 > 10000 & P2202Q01 == 1;
list P2202Q02  if P2202Q02 > 5000  & P2202Q01 == 2;
list P2202Q02  if P2202Q02 > 12600 & P2202Q01 == 3;

gen     flagcom = 1 if P2202Q02 > 10000  | P2202Q05 > 10000  & P2202Q01 ==
1;
replace flagcom = 2 if P2202Q02 > 5000   | P2202Q05 > 5000   & P2202Q01 ==
2;
replace flagcom = 3 if P2202Q02 > 12600  | P2202Q05 > 12600  & P2202Q01 ==
3;
replace flagcom = 4 if P2202Q02 > 4375   | P2202Q05 > 4375   & P2202Q01 ==
4;
replace flagcom = 5 if P2202Q02 > 45000  | P2202Q05 > 45000  & P2202Q01 ==
5;
replace flagcom = 6 if P2202Q02 > 60000  | P2202Q05 > 60000  & P2202Q01 ==
6;

for var P2202Q04 P2202Q05 P2205Q01 P2205Q02 P2205Q03 P2205Q04 P2205TOT:
   replace X = 0 if flagcom >= 1 & flagcom <= 6;

*Livestock: current stock/sales exceeding the following too high*;
* Cattle  = 100*;
* Sheep   = 400*;
* Pigs    = 20 *;
* Goats   = 200*;
* Poultry = 200*;

replace flagcom = 10 if P2204Q03 >= 100 | P2204Q06 >= 100 & P2204Q01 == 1 ;
replace flagcom = 11 if P2204Q03 >= 400 | P2204Q06 >= 400 & P2204Q01 == 2 ;
replace flagcom = 12 if P2204Q03 >=  20 | P2204Q06 >=  20 & P2204Q01 == 3 ;
replace flagcom = 13 if P2204Q03 >= 200 | P2204Q06 >= 200 & P2204Q01 == 4 ;
replace flagcom = 14 if P2204Q03 >= 200 | P2204Q06 >= 200 & P2204Q01 == 5 ;

for var P2204Q05 P2204Q06 P2205Q01 P2205Q02 P2205Q03 P2205Q04 P2205TOT:
   replace X = 0 if flagcom >= 10 & flagcom <= 14;

*5.2) Consumption levels - truncating large consumers.

*Unrealistically large consumption levels are problematic*;
 *Assume following levels, av. adult equivalent household size of 3.4 in
rural areas*;

*  Maize = 680kg        *;
```

```
*  Grain = 680kg        *;
*  Milk  = 1241 litre      *;
*  Eggs  = 306 dozen       *;
*  Fruit = 1241kg       *;
*  Vegetables = 1241kg     *;
*  Beer = 1241 litre       *;

*Checking consumption levels of produce, detail*;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 1, detail;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 2, detail;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 3, detail;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 4, detail;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 5, detail;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 6, detail;
sum P2202Q03 if P2202Q03 > 0 & P2202Q01 == 7, detail;

*Truncating consumption levels;
replace P2202Q03 = 680 if P2202Q01 == 1 & P2202Q03 > 680;
replace P2202Q03 = 680 if P2202Q01 == 2 & P2202Q03 > 680;
replace P2202Q03 = 1241 if P2202Q01 == 3 & P2202Q03 > 1241;
replace P2202Q03 = 306 if P2202Q01 == 4 & P2202Q03 > 306;
replace P2202Q03 = 1241 if P2202Q01 == 5 & P2202Q03 > 1241;
replace P2202Q03 = 1241 if P2202Q01 == 6 & P2202Q03 > 1241;
replace P2202Q03 = 1241 if P2202Q01 == 7 & P2202Q03 > 1241;

*Checking slaughter levels, detail*;
sum P2204Q04 if P2204Q04 > 0 & P2204Q01 == 1, detail ;
sum P2204Q04 if P2204Q04 > 0 & P2204Q01 == 2, detail ;
sum P2204Q04 if P2204Q04 > 0 & P2204Q01 == 3, detail ;
sum P2204Q04 if P2204Q04 > 0 & P2204Q01 == 4, detail ;
sum P2204Q04 if P2204Q04 > 0 & P2204Q01 == 5, detail ;

replace P2204Q04 =   12 if P2204Q01 == 1 & P2204Q04 > 12;
replace P2204Q04 =   24 if P2204Q01 == 2 & P2204Q04 > 24;
replace P2204Q04 =   24 if P2204Q01 == 4 & P2204Q04 > 24;
replace P2204Q04 =  150 if P2204Q01 == 5 & P2204Q04 > 150;
```

Appendix II

After commercial farmers were dropped

```
                          pprod1 (price of maize in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%          .35       .3333333
 5%     .5555556            .35
10%           .6       .3513174       Obs                 124
25%            1           .375       Sum of Wgt.         124

50%          1.5                      Mean           7.410474
                        Largest       Std. Dev.      23.57568
75%            3             80
90%     11.36364             96       Variance       555.8127
95%           26             98       Skewness       5.847137
99%           98            201       Kurtosis        41.9894

->  sum pprod2, detail

                          pprod2 (price of other grains in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .8571429       .8571429
 5%            1              1
10%            1              1       Obs                  29
25%        1.875              1       Sum of Wgt.          29
```

```
50%           2.5                       Mean           3.827258
                        Largest       Std. Dev.      3.716647
75%             5       6.666667
90%      6.666667       6.666667       Variance       13.81347
95%      8.333333       8.333333       Skewness       2.993001
99%            20             20       Kurtosis       13.45891

->  sum pprod3, detail

                           pprod3 (price of milk in litres)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           1.4            1.4
 5%           1.4            1.5
10%           1.5              2       Obs                  18
25%             2              2       Sum of Wgt.          18

50%         2.875                       Mean           5.277778
                        Largest       Std. Dev.      6.437967
75%             4           6.75
90%            20            9.6       Variance       41.44742
95%            24             20       Skewness       2.149513
99%            24             24       Kurtosis        6.21278

->  sum pprod4, detail

                           pprod4 (price of eggs in dozens)
-------------------------------------------------------------
      Percentiles      Smallest
 1%          2.64           2.64
 5%             3              3
10%             3              3       Obs                  25
25%             4              3       Sum of Wgt.          25

50%             5                       Mean           46.06816
                        Largest       Std. Dev.       123.812
75%           8.4             75
90%           100            100       Variance       15329.41
95%           200            200       Skewness       3.863685
99%           600            600       Kurtosis       17.50556

->  sum pprod5, detail

                           pprod5 (price of fruit in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .3333333       .3333333
 5%            .4             .4
10%           .45            .45       Obs                  26
25%             1             .5       Sum of Wgt.          26

50%     2.833333                       Mean           7.757086
                        Largest       Std. Dev.      19.20741
75%             7             10
90%            10             10       Variance       368.9246
95%      14.76923       14.76923       Skewness       4.496624
99%           100            100       Kurtosis       22.13746

->  sum pprod6, detail

                           pprod6(price of vegetables in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%          .225       .1666667
 5%            .6           .225
```

```
10%     .8571429            .25       Obs                 127
25%          1.5             .3       Sum of Wgt.         127

50%            3                      Mean              10.291
                        Largest       Std. Dev.       31.25626
75%           10            57.6
90%     15.71429              60       Variance        976.9536
95%     42.85714         68.57143      Skewness        8.939611
99%     68.57143         333.3333      Kurtosis        91.52055

->  sum pprod7, detail

                           pprod7 (price of sorghum beer in litres)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .2666667       .2666667
 5%     .3333333       .2666667
10%           .6       .3333333       Obs                  42
25%            1           .375       Sum of Wgt.          42

50%     2.080729                      Mean            5.804707
                        Largest       Std. Dev.       11.63947
75%          4.8             12
90%           10             24       Variance        135.4774
95%           24         46.66667      Skewness        3.621271
99%           60             60       Kurtosis        15.70596

->  sum plive1, detail

                           plive1 (price of cattle per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%            4              4
 5%            4           17.5
10%            4             27       Obs                   3
25%            4              .       Sum of Wgt.           3

50%         17.5                      Mean            16.16667
                        Largest       Std. Dev.       11.55783
75%           27              .
90%           27              4       Variance        133.5833
95%           27           17.5       Skewness       -.2091129
99%           27             27       Kurtosis             1.5

->  sum plive2, detail

                           plive2 (price of sheep per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%          150            150
 5%          150            200
10%          150            250       Obs                   7
25%          200            250       Sum of Wgt.           7

50%          250                      Mean            261.4286
                        Largest       Std. Dev.       74.70577
75%          300            250
90%          380            300       Variance        5580.952
95%          380            300       Skewness        .0705823
99%          380            380       Kurtosis        2.313116

->  sum plive3, detail

                           plive3 (price of pig per LSU)
-------------------------------------------------------------
no observations
```

```
->  sum plive4, detail

                          plive4 (price of goat per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%            1              1
 5%            1             20
10%           20            100       Obs                  18
25%          110            100       Sum of Wgt.          18

50%          135                      Mean           120.6111
                        Largest       Std. Dev.      44.62542
75%          150            150
90%          150            150       Variance       1991.428
95%          160            150       Skewness      -1.692028
99%          160            160       Kurtosis       4.961304

->  sum plive5, detail

                          plive5 (price of poultry per chicken)
-------------------------------------------------------------
      Percentiles      Smallest
 1%            1              1
 5%            5          1.625
10%           10       2.857143       Obs                  70
25%     16.66667              5       Sum of Wgt.          70

50%           20                      Mean           22.68546
                        Largest       Std. Dev.      14.22352
75%           25             40
90%           30             60       Variance       202.3085
95%           40             72       Skewness       3.024645
99%          100            100       Kurtosis       16.01491

->  sum plive6, detail

                          plive6 (price of other livestock per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           10             10
 5%           15             15
10%           20             20       Obs                  35
25%     21.42857             20       Sum of Wgt.          35

50%          300                      Mean           565.4456
                        Largest       Std. Dev.      732.6491
75%         1150           1500
90%         1500           1800       Variance       536774.8
95%         2000           2000       Skewness       1.490235
99%         3000           3000       Kurtosis        4.76467
```

Before commercial farmers were dropped

```
                          pprod1 (price of maize in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .1565558           .038
 5%     .4210526       .1565558
10%        .5625       .3333333       Obs                 143
25%           1            .35       Sum of Wgt.         143

50%         1.5                      Mean           22.09975
                        Largest       Std. Dev.      81.53002
75%         3.6            405
90%          25            440       Variance       6647.144
```

```
95%           98            500       Skewness       5.036927
99%          500       540.8436       Kurtosis       28.56318

->  sum pprod2, detail

                          pprod2 (price of other grains in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .8571429       .8571429
 5%             1              1
10%             1              1       Obs                  40
25%         1.875              1       Sum of Wgt.          40

50%     2.958333                       Mean           147.7651
                        Largest       Std. Dev.      560.7799
75%     6.333333       407.6923
90%     259.8462       920.3065       Variance       314474.1
95%     960.1533           1000       Skewness       4.906352
99%     3333.333       3333.333       Kurtosis       27.62496

->  sum pprod3, detail

                          pprod3 (price of milk in litres)
-------------------------------------------------------------
      Percentiles      Smallest
 1%      .462963        .462963
 5%           .8             .8
10%     .9839426       .9839426       Obs                  23
25%             2            1.4       Sum of Wgt.          23

50%           2.5                      Mean           4.402039
                        Largest       Std. Dev.      5.916558
75%             3           6.75
90%           9.6            9.6       Variance       35.00566
95%            20             20       Skewness       2.505131
99%            24             24       Kurtosis       8.082399

->  sum pprod4, detail

                          pprod4 (price of eggs in dozens)
-------------------------------------------------------------
      Percentiles      Smallest
 1%          2.64           2.64
 5%             3              3
10%             3              3       Obs                  26
25%             4              3       Sum of Wgt.          26

50%             5                      Mean           53.52707
                        Largest       Std. Dev.      127.1328
75%            21            100
90%           200            200       Variance       16162.75
95%           240            240       Skewness       3.388347
99%           600            600       Kurtosis       14.48569

->  sum pprod5, detail

                          pprod5 (price of fruit in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .3333333       .3333333
 5%            .4             .4
10%           .45            .45       Obs                  29
25%             1             .5       Sum of Wgt.          29

50%     2.666667                       Mean            7.14889
                        Largest       Std. Dev.      18.24252
```

```
75%     6.666667             10
90%          10             10       Variance       332.7895
95%     14.76923       14.76923       Skewness       4.774493
99%         100            100       Kurtosis       24.83333

->  sum pprod6, detail

                          pprod6 (price of vegetables in kgs)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           .2       .1666667
 5%           .6             .2
10%     .8571429            .225       Obs                 134
25%          1.5            .25       Sum of Wgt.         134

50%          3.1                      Mean           10.15869
                        Largest       Std. Dev.      30.47975
75%           10           57.6
90%     16.66667             60       Variance       929.0153
95%     42.85714       68.57143       Skewness       9.143799
99%     68.57143       333.3333       Kurtosis       96.00242

->  sum pprod7, detail

                          pprod7 (price of sorghum beer in litres)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     .2666667       .2666667
 5%     .3333333       .2666667
10%         .375       .3333333       Obs                  44
25%            1           .375       Sum of Wgt.          44

50%            2                      Mean           5.572106
                        Largest       Std. Dev.      11.41679
75%        4.275             12
90%           10             24       Variance       130.3432
95%           24       46.66667       Skewness       3.714369
99%           60             60       Kurtosis       16.46613

->  sum plive1, detail

                          plive1 (price of cattle per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           10              1
 5%          200              4
10%          800             10       Obs                 264
25%         1000           17.5       Sum of Wgt.         264

50%         1400                      Mean           1547.534
                        Largest       Std. Dev.      1804.196
75%         1775           4500
90%         2000           5000       Variance        3255122
95%         2500          15000       Skewness       9.980956
99%         5000          25000       Kurtosis        120.922

->  sum plive2, detail

                          plive2 (price of sheep per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     8.450705       8.450705
 5%          120             40
10%          170       83.33334       Obs                  94
25%          200            100       Sum of Wgt.          94
```

```
50%          300                       Mean           275.3674
                        Largest       Std. Dev.       98.8797
75%     327.2727             400
90%          400             450       Variance       9777.195
95%          400             500       Skewness       .5748808
99%          700             700       Kurtosis        5.86222

->  sum plive3, detail

                           plive3 (price of pig per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           25            25
 5%           50       40.83333
10%           60       43.33333       Obs                 94
25%          150             50       Sum of Wgt.         94

50%          265                       Mean           325.5585
                        Largest       Std. Dev.        295.502
75%          400             900
90%          625            1000       Variance       87321.44
95%          900            1400       Skewness       2.787343
99%         2000            2000       Kurtosis       14.13439

->  sum plive4, detail

                           plive4 (price of goat per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%            1               1
 5%         62.5               1
10%          100             7.5       Obs                138
25%          150              20       Sum of Wgt.        138

50%          200                       Mean           257.7719
                        Largest       Std. Dev.      230.1953
75%          300             500
90%          400             500       Variance       52989.89
95%          500            1800       Skewness       5.343149
99%         1800            2000       Kurtosis       39.09703

->  sum plive5, detail

                           plive5 (price of poultry per chicken)
-------------------------------------------------------------
      Percentiles      Smallest
 1%     1.166667               1
 5%            8       1.166667
10%           12          1.625       Obs                166
25%           20            2.5       Sum of Wgt.        166

50%           20                      Mean           24.97317
                        Largest       Std. Dev.      18.14909
75%           25             100
90%           35             100       Variance       329.3896
95%           60             105       Skewness        3.63308
99%          105             150       Kurtosis       20.61127

->  sum plive6, detail

                           plive6 (price of other livestock per LSU)
-------------------------------------------------------------
      Percentiles      Smallest
 1%           10              10
 5%           20              15
10%           20              20       Obs                44
```

25%	27.5	20	Sum of Wgt.	44
50%	300		Mean	612.0908
		Largest	Std. Dev.	722.8391
75%	1175	1800		
90%	1500	1846.154	Variance	522496.4
95%	1846.154	2000	Skewness	1.215076
99%	3000	3000	Kurtosis	3.963379

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