RURAL ECONOMIC GROWTH AND SMALL-SCALE POULTRY PRODUCTION: THE ECONOMIC AND TECHNICAL CONSTRAINTS

by

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ABSTRACT

Small-scale commercial poultry enterprises are often used in development projects to (a) improve food self-sufficiency, and (b) to generate income. The analysis of survey data gathered from the rural areas of KwaZulu-Natal shows that the majority of small-scale poultry producers come from previously disadvantaged communities and have significantly lower enterprise growth rates than larger producers. Principal Component Analysis is used to determine underlying "dimensions" of the main technical poultry production parameters, which with the aid of a t-test indicate that management practices and equipment use are significantly different for small-scale and larger producers but that feed utilisation and disease reduction practices are similar. The results of a block-recursive regression analysis indicate that enterprise growth rate is constrained by poor access to credit, high transaction costs and unreliable local markets. Using growth linkage concepts it was found that small-scale poultry enterprises have the potential to initiate economic growth by drawing under-utilised resources such as labour into production when their products are "exported". The impact of the subsequent multiplier effect is strongest in the non-tradable, non-agricultural sector. To enhance this multiplier through increased rural economic growth government policies should focus on reducing transaction costs by improving education and physical infrastructure, sponsoring training and assisting with mentoring services. Facilitating the development of appropriate business institutions capable of managing co-owned resources is particularly important as well as legal and financial management instruction. Economic growth also requires a stable, equitable and well-adapted institutional environment where

the potential threat of a functional and affordable conflict resolution mechanism is crucial to discourage opportunistic behaviour. Many disputes associated with poultry production in KwaZulu-Natal currently remain unresolved because legal court action is prohibitively expensive and legal uncertainty arises where informal tribal authorities administer conflicts. Setting up small-claims courts is one option of correcting these inefficiencies; the desired effect would be to strengthen property rights, reduce transaction costs and promote economic growth. Poultry has established itself as an appropriate vehicle to stimulate economic growth in rural KwaZulu-Natal and its impact is expected to be greater if growth constraints are alleviated for a large number of small enterprises rather than encouraging a few larger enterprises to grow bigger.

PREFACE

The research work described in this thesis was carried out in the Disciplines of Animal and Poultry Science and Agricultural Economics, University of Natal, Pietermaritzburg, from April 1999 to December 2002 under the supervision of Professor Rob Gous and co-supervision of Professor Michael Lyne as a joint Agribusiness initiative.

This study represents the original work by the author and has not otherwise been submitted in any form for any degree or diploma to any University. Where use has been made of the work of others it is duly acknowledged in the text.

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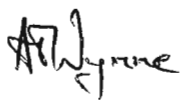

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TABLE OF CONTENTS

CHAPTER TWO

CHAPTER THREE

CHAPTER FOUR

CHAPTER FIVE

LIST OF TABLES

LIST OF FIGURES

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CHAPTER ONE

1. INTRODUCTION

1.1 OBJECTIVES

In the developing areas of South Africa, like in other developing countries, small-scale farmers find it difficult to participate in commercial markets due to a range of constraints. Such barriers include high transaction costs (Fenwick and Lyne, 1998a, Makhura, 2001); a shortage of quality labour (Nattrass and May, 1986); poor liquidity, including low cash income and limited access to credit and saving facilities (Christensen, 1993; Udry, 1995); a dearth of information (Delgado, 1996); tenure insecurity (Thomson and Lyne, 1993), and; weak growth linkages (Delgado *et al.*, 1997). Groenewald (1993) maintains that a lack of entrepreneurship, expertise, tenure security, access to product and factor markets, small farm size and inappropriate technology are the major bottlenecks to agricultural modernisation in third world agriculture.

Given these limitations, small-scale commercial poultry enterprises are still promoted and used by Government and Non Governmental Organisation (NGO's) in development projects to (a) improve food self-sufficiency and alleviate malnutrition as it provides an excellent protein source (MacGregor and Abrams, 1996; Farrell, 2000), and (b) to create income generating activities (Mingay, 1998; Trollip, 1998; Wethli, 1999). Improving food self-sufficiency within rural

communities will only mitigate poverty by improving nutrition. To exit the poverty cycle, sustainable economic growth through increased employment and income generation needs to be created in poor rural areas (Fairlamb and Nieuwoudt, 1990). Small-scale commercial poultry production is widely seen as an appropriate vehicle to achieve this intent (Gueye, 1998; Sonaiya, 1998; Slippers, 1998; Wethli, 1998). This does not mean that small-scale commercial poultry producers should remain small: Hazell and Roel (1983) argue that economic growth occurs when very small farms are transformed into larger entities. The objectives of this thesis are to (a) identify factors that restrain the growth of small-scale poultry enterprises in KwaZulu-Natal, (b) determine the relative importance of these factors, and (c) consider policies that would help alleviate these constraints.

1.2 JUSTIFICATION

Domestic fowl are kept by almost every village household in Africa (Gueye, 1998). Sonaiya (1997) contends that more than 80 percent of poultry in Africa are kept in rural areas which make substantial contributions to annual egg and meat production. Generally small flocks of between 5 and 20 birds are kept by village households (Gueye, 1997a) where women and children play a key role in their management (Gumede, 1986; Spradbrow, 1997; Bisschop 1997a; Chitukuro and Forster, 1997; Gueye, 1997a; Safalaoh *et al.*, 1998). In a survey undertaken in northern KwaZulu-Natal, Bisschop (1997b) found that 83 percent of sampled rural households kept an average flock of eighteen village chickens.

Free-range and backyard systems are the most practised types of husbandry. The free-range, traditional or village system is most popular in rural areas (Gueye and Bessei, 1997). Here indigenous fowl are left to freely scavenge around household compounds, feeding on available resources such as earthworms, household refuse, insects, harvest residues, etc. Generally their feed is not supplemented apart from periods of food scarcity and clean water is not usually provided (Gueye, 1998). The birds often roost in high places or shelter in human habitations such as household kitchens. Rudimentary coops are constructed above ground in some cases, which provide protection against the weather and nocturnal predators. In the backyard system, birds (usually indigenous) are generally confined to a specific area, receive water and supplementary grain and spend the night in specially constructed shelters. However, in both the free-range and backyard systems, birds almost never receive veterinary care and are primarily reared for home use. In essence, the poorest social strata can keep village fowls because very low land, labour and capital inputs are required (Spradbrow, 1997). Moreover, the sustainability of these production systems has largely been demonstrated under harsh village conditions (Bessei, 1996).

The advantages of these production systems and the use of indigenous village chickens are good egg and meat flavour, hard shells, high dressing percentages and practically no input costs. Tradition often dictates that indigenous chickens are used during customary or religious festivals and because of their preferred qualities usually command premium prices (Spradbrow, 1997). However, Bisschop (1998)

argues that because most rural households keep and consume indigenous chickens they are infrequently sold and do not constitute a regular source of income. Indigenous chickens are limited in terms of their commercial viability because of their slow growth rates, poor egg production, late sexual maturity, high rearing moralities and susceptibility to disease (Gueye, 1998). Nevertheless, productivity can be improved through better feeding, housing, health, daily management (Wethli, 1999) and genetics (Farrell, 2000). Although improved exotic breeds used in commercial production are available, these are not well adapted to the harsh village environment and usually require more intensive production systems.

Commercial strains are adopted when rural producers have an income generating intent and therefore want larger scales of production (Wethli, 1999). Enterprises of this type are generally used as a source of additional income and are generally part-time occupations unless the scales of operation are large. According to Latt and Nieuwoudt (1988) such earnings from market related activities are classified as commercial activities and contribute towards economic growth. Therefore, this study focuses on small-scale commercial production rather than subsistence free-range and backyard systems that are largely undertaken for home consumption.

Small-scale commercial poultry enterprises are not common in rural areas (Bisschop, 1998) despite a strong interest in this activity (Madikizela and Groenewald, 1998). Some of the reasons for this are presented in Table 1. Where commercial broiler production is practised, birds are often purchased from larger

commercial producers at three to six weeks old and then grown out using commercially purchased feed and sold locally (Slippers, 1998). Similarly, hawkers aggressively retail fully grown live birds in rural areas within a few days of purchasing them from larger commercial producers. Only a few individuals and groups of farmers in rural areas are involved in raising small numbers of day-old chicks for sale using an "all in all out" batch system. Under these circumstances a batch of broilers are produced every eight to ten weeks per house. Laying hens are popular where point-of-lay pullets and commercial feed are readily available (MacGregor and Abrams, 1996).

Table 1: Reasons for not raising hybrid broiler and layer stock.

Reason for not keeping hybrid stock	Count	Percentage
Insufficient funds to start	40	39.6
Lack of awareness	26	25.7
Difficulties housing birds	12	11.9
Insufficient time or labour	7	6.9
Fear of theft	6	5.9
Fear of disease	3	3.0
Market competition	2	2.0
Transport difficulties	2	2.0
Group dynamic difficulties	1	1.0
Village chickens are adequate	1	1.0
Predation	1	1.0
Total	**101**	**100.0**

Source: Bisschop, 1998

Mortality rates of birds among small-scale commercial poultry producers is often distressingly high (Bisschop, 1997b). Most disease problems that arise can be related to poor farm management and associated technical problems (Safalaoh *et al.*, 1998). Housing is generally inadequate or inappropriate, chickens are frequently

underfed, hygiene is poor, bedding inadequate, incorrect brooding temperatures and vaccines and medication, if given at all, are often administered incorrectly. These technical constraints are usually overcome through training and extension. Unfortunately subsidised training and extension by the State is presently inadequate (Mkhize, 1998). In addition, access to inputs are difficult especially in remote rural areas because of relatively high transport costs (*e.g.* for feed and birds), constrained scale economies and high transaction costs faced by both input suppliers and producers. Suitable target markets for poultry products are also limited, a critical factor according to Gueye (1997b). Lastly, small-scale farmers do not have significant assets and find it virtually impossible to obtain start-up capital/credit required for intensive commercial production systems. In an attempt to overcome these problems many individuals and households in rural KwaZulu-Natal have banded together into groups (Bisschop, 1998; Mingay, 1998; Mkhize, 1998; Slippers, 1998; Trollip, 1998; Wethli, 1998), which have some of their own inherent problems (Wynne and Lyne, 1995). Small-scale commercial poultry production is widely believed to have the potential to stimulate economic growth in rural areas (Gueye, 1998; Sonaiya, 1998; Slippers, 1998; Wethli, 1998). However, the above mentioned problems first need to be better understood so that clear policy guidelines can be developed to address them in whole or in part so that rural economic growth and poverty alleviation become a reality.

1.3 HYPOTHESIS AND ANALYTICAL METHODS

The main hypotheses of the study are that small-scale enterprises in rural areas are prejudiced relative to larger enterprises because of (1) their inability to capture size economies and (2) their less effective implementation of poultry production technology. Economic theory and descriptive statistics from sample survey data are first used to assess these differences. Principal component analysis is used to summarise the data by condensing the more important variables into fewer orthogonal variables. Factors that inhibit enterprise growth are then investigated using a block recursive regression model. This technique employs ordinary Least Squares (OLS) regression to estimate the first equation and Two Stage Least Squares (2SLS) to estimate the remaining four equations to correct for any correlation between the stochastic endogenous explanatory variables and their stochastic error term.

It is also hypothesised in the study that growth linkages in rural areas are weak and that collective action and institutional innovation can be used to enhance these linkages as well as alleviate growth constraints. New Institutional Economics together with descriptive statistics from the empirical sample survey are used to formulate policy recommendations that focus on accelerating the growth and development of small-scale poultry enterprises in rural KwaZulu-Natal.

1.4 STUDY AREA

KwaZulu-Natal province is situated on the East Coast of South Africa bordering Mpumalanga province, Swaziland and Mozambique to the north, the Eastern Cape province and Lesotho to the south and the Free State province to the west. It covers 91 481 square kilometres accounting for 7.5% of the total surface area of South Africa. The subsequent descriptive subsections are based on information drawn from the 1996 population census reported by the Development Bank of southern Africa (DBSA, 2000).

1.4.1 Demography

The population of KwaZulu-Natal is approximately 8.4 million, constituting the highest concentration of people in South Africa. The projected population growth rate between 1996 and 2000 was 2.14%, which is higher than the national average of 2.10%. Children under the age of 15 accounted for 36% of the province's population, indicating a high natural population growth potential. In-migration from Mozambique is another strong population growth factor. KwaZulu-Natal has the fifth highest urbanised population, which is similar to the Eastern Cape and Mpumalanga. IsiZulu is the predominant language (79.8%) followed by English (15.8%) and Afrikaans (1.6%).

1.4.2 Labour and Employment

The labour force of KwaZulu-Natal comprises approximately 2.6 million people, accounting for 18.6% of South Africa's total labour force, the second largest behind Gauteng Province (25.8%). However, only 53% of KwaZulu-Natal's potentially economically active population participates in the labour market, which is the third lowest in South Africa. This can be attributed to the large proportion of the Province's population that resides in deep rural areas who predominantly participate in the subsistence economy. The official unemployment rate is 39.1% (national average of 33.8%) with 55.2% of the unemployed residing in rural areas. Only 25.0% of the province's labour force have a Grade 12 or higher qualification and 14.7% have no formal schooling.

1.4.3 Economic Structure and Performance

The economy of KwaZulu-Natal is the second largest contributor to South Africa's Gross Domestic Product (GDP) with a reported economic growth rate of 2.6% between 1991 and 1996. This is substantially higher than the national average of 1.5%. Important sectors in its economy include transport and communication (22.9%), manufacturing (21.5%) and agriculture (17.8%). However, the Gross Geographic Product (GGP) per capita is lower (R5 037) than the national average (R6 498) indicating a below average welfare for its population. Within the province, population and economic activities are concentrated. For example, 36% of the

population resides in the Durban Metropolitan area but this only accounts for 4.7% of the surface area and produces 62% of the GGP.

1.4.4 Infrastructure

KwaZulu-Natal is ranked fifth in terms of combined access to all services, which are detailed in Table 2. The province has the second lowest access to water but this is not surprising given that KwaZulu-Natal has the largest population with more than half of this population living in rural areas. Access to telephones and electricity is below the national average but the province has above average sanitation provision.

Table 2: Number of households with access to services, DBSA 1996.

Type of Service	KwaZulu-Natal		South Africa	
	Households	%	Households	%
Water	1 100 416	66.3	7 234 029	79.8
Sanitation	1 383 690	83.3	7 472 448	82.5
Telephones	447 048	26.9	2 591 250	28.6
Electricity	883 944	53.2	5 188 642	57.3

1.5 DATA COLLECTION AND DESCRIPTIVE STATISTICS

1.5.1 Data Collection

A pilot survey was undertaken with representatives from the Nansindlela Research Farm[1] and with a small group of KwaZulu-Natal Poultry Institute[2] members. The responses were used to clarify and refine the questions and layout of the questionnaire. Thereafter, two concurrent surveys were undertaken to ensure variation of enterprise size in the sample data. The first survey comprised a two-stage stratified sample, which was used to sample mostly small-scale commercial poultry enterprises operating in communal areas of KwaZulu-Natal. The costs of conducting a random sample were cost prohibitive given the relatively low incidence of small-scale commercial poultry production in the rural areas of KwaZulu-Natal (Bisschop, 1998). Therefore, the primary sampling frame used was a list of government extension officers operating in KwaZulu-Natal. These extension officers in their respective locations helped conduct interviews with known producers (secondary sampling units) using a structured questionnaire. On average, six interviews were conducted in each of 11 locations (strata). Fieldwork commenced in December 1998 and was completed in February 1999. Table 3 shows

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[1] Nansindlela Research Farm is located on the edge of the Valley of a Thousand Hills and focuses on developing viable and sustainable small-scale enterprises for rural application. It is managed under the guidance of the Institute of Natural Resources, Pietermaritzburg.

[2] The KwaZulu-Natal Poultry Institute is a body representing all poultry producers in KwaZulu-Natal and is situated in Pietermaritzburg. It is funded by the collection of levies on the purchase price of birds sold from large commercially recognised hatcheries.

the town/district where rural interviews were conducted and the respective number of respondents.

Table 3: Town/district where rural interviews were conducted

Town/District	Respondents
Driefontein	4
Dududu	9
Empangeni	8
Ezakeni	6
KwaMbonambi	3
Loskop	8
Mahlutshini	4
Maqabaqabeni	9
Vulamehlo	5
Wasbank	8
Watersmeet	2
Total	66

The second survey targeted mostly larger-scale commercial poultry producers (excluding public companies like Rainbow Chickens) using a postal survey. The KwaZulu-Natal Poultry Institute provided a list of 305 valid addresses for producers who purchased chicks (layers and broilers) from recognised hatcheries. Questionnaires were mailed in November 1998 and the last responses were returned in February 1999. A response rate of 22.6% was achieved which was reduced to 19.0% because 11 responses were unusable. Table 4 shows the town/district where postal questionnaires were received and the respective number of respondents. Both surveys employed the same questionnaire. A map of the study area is presented in Figure 1 (p. 14) indicating locations where data was sourced from both rural interviews and postal questionnaires.

Table 4: Town/district where postal questionnaires were received

Town/District	Respondents	Town/District	Respondents
Balgowan	1	Lions River	1
Camperdown	1	Matatiele	1
Cato Ridge	1	Merrivale	3
Crammond	1	Mkuze	1
Creighton	1	Mooiriver	1
Dalton	1	New Hanover	1
Highflats	1	Newcastle	2
Dundee	1	Pennington	1
Durban	1	Pietermaritzburg	7
Eston	1	Port Shepstone	2
Harrismith	1	Richmond	1
Hillcrest	1	Shelly Beach	1
Howick	4	Thornville	1
Inanda	1	Tongaat	1
Isipingo Beach	1	Umhlali	1
Ixopo	1	Umkomaas	1
Kearsney	1	Umlaas Road	2
Kokstad	1	Verulam	1
Ladysmith	3	Vryheid	3
Lidgetton	1	Weenan	1
Total			**58**

1.5.2 Descriptive Statistics

Group means were computed from the pooled survey data (n=123) using the median of total product sales per annum per enterprise (R30 240) to discriminate between larger and small-scale producers. Their significant differences are presented in Table 5. It should be noted that some of the postal questionnaire respondents (Table 4) are classified as small-scale producers and some of the interview respondents (Table 3) are classified as larger producers. Furthermore, the sample size (N) varies in the descriptive tables that follow because all the respondents did not answer every question.

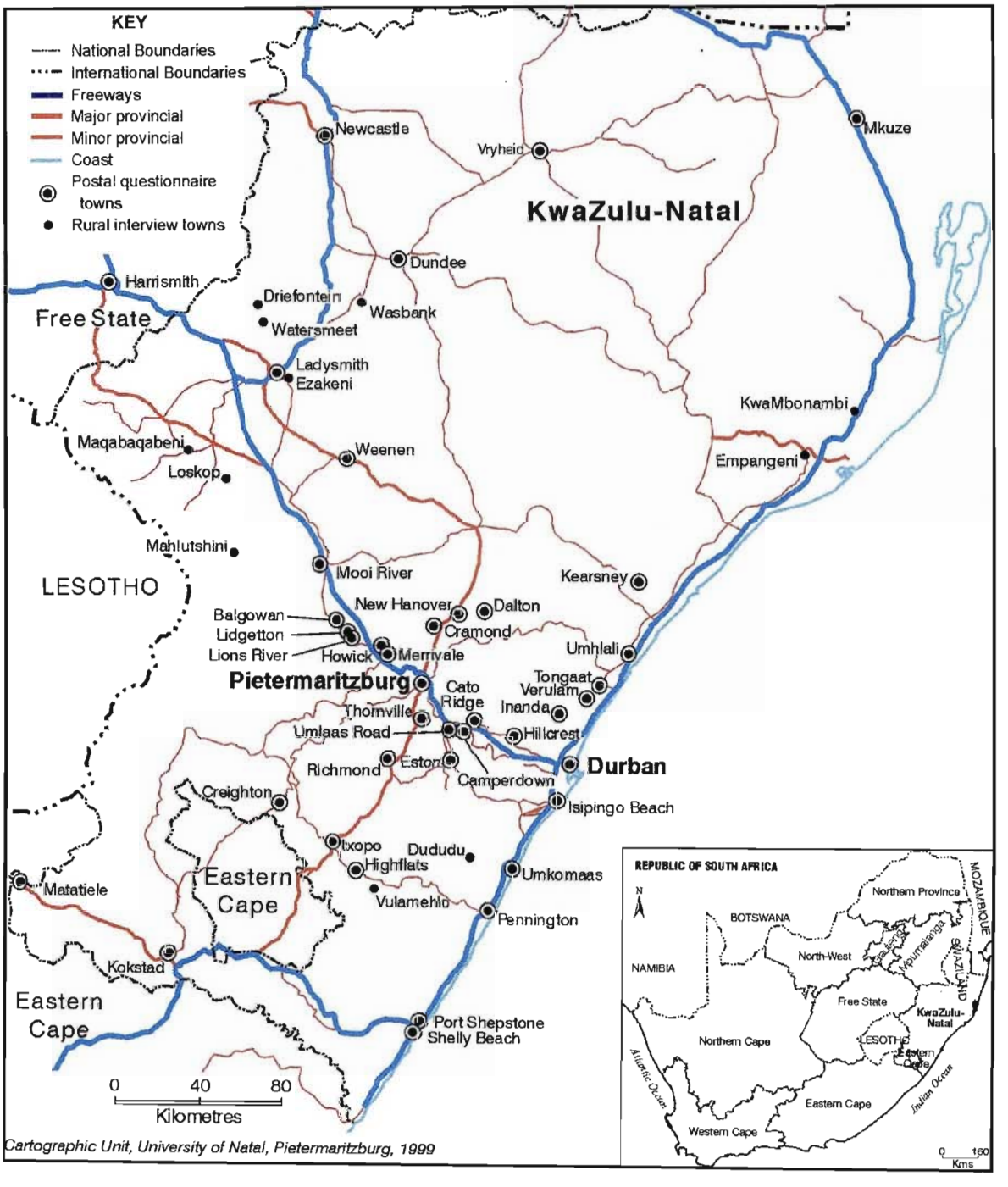


Figure 1: Map of the study area

Table 5: Total product sales per annum and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Layer income[A]	Small	12	3401.00	2887.91	13.0	**-2.620****
	Large	14	1058583.00	1507020.57		
Broiler income[A]	Small	55	12465.16	8832.70	54.0	**-2.522*****
	Large	55	676894.70	1953950.25		

Notes 1: [A] Some producers operated both layer and broiler enterprises.
2: Equal variances not assumed and one tailed t-test used.
3: ***, **, * significant at the one, five and ten percent levels of probability respectively.

The average age of respondents is 48.7 years without any significant difference between small-scale and larger enterprises (Table 6). However, education levels do differ significantly; small-scale enterprises have an average education of Standard 5 whilst Standard 9 is the average for larger enterprises (where 12 and 13 represent a diploma and degree respectively).

Table 6: Age and education and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Age	Small	61	48.80	12.60	119.9	-0.014
	Large	61	48.84	12.98		
Education	Small	62	5.21	3.81	120.8	**-5.904*****
	Large	62	9.06	3.45		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Table 7 shows that small-scale enterprises comprise mostly female respondents (75.4%) compared with a minority amongst larger enterprises (28.6%), which confirms *a priori* expectations. Respondents amongst small-scale enterprises are also less able to communicate in English (45.9% relative to 87.3% for larger enterprises). Most small-scale enterprises are situated on communal land (83.6%),

whilst 74.6% of larger enterprises are situated on freehold land. In other words, small-scale poultry producers come mainly from previously disadvantaged communities.

Table 7: Gender, language and tenure differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Respondent Sex	(124)	Male	24.6	71.4	48.4
		Female	75.4	28.6	51.6
English Speaking	(124)	No	54.1	12.7	33.1
		Yes	45.9	87.3	66.9
Land Tenure	(124)	Private	16.4	74.6	46.0
		Communal	83.6	25.4	54.0

Note 1: Variables are mutually exclusive and sum to 100%.

Access to electricity, telephones, water borne sewage and potable water provide an indication of respondents' access to infrastructure and services or "development" status. Table 8 indicates that larger enterprises clearly have a "development" advantage.

Table 8: Infrastructure variables differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Electricity	(122)	No	31.7	9.7	20.5
		Yes	68.3	90.3	79.5
Telephone	(122)	No	65.0	25.8	45.1
		Yes	35.0	74.2	54.9
Toilets	(122)	Water borne	16.7	69.4	43.4
		Pit latrines	83.3	30.6	56.6
Water	(122)	River	23.3	9.7	16.4
		Standpipe	33.3	6.5	19.7
		Rain Tanks	1.7	9.7	5.7
		Pump	30.0	43.5	36.9
		Municipal	11.7	30.6	21.3

Note 1: Variables are mutually exclusive and sum to 100%.

Table 9 highlights that small-scale enterprises are significantly further away (kilometres) from tar roads and commercial banks (used as a proxy for development nodes) indicating that small-scale enterprises are more "remote". Vehicle ownership (*i.e.* number of vehicles owned) compensates for this distance factor but significantly fewer small-scale enterprises own vehicles. Although "taxi" transport is available in these remote areas this is costly and often irregular.

Table 9: Distance variables and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Tar Road Distance	Small	61	8.36	9.13	118.5	**2.379*** **
	Large	61	4.63	8.15		
Bank Distance	Small	61	35.55	15.36	119.3	**5.530*** **
	Large	61	20.74	14.20		
Vehicle Ownership	Small	61	0.30	0.46	97.6	**-9.123*** **
	Large	62	0.92	0.27		
Taxi Rank Distance	Small	61	3.93	13.42	94.5	-0.763
	Large	61	5.43	7.54		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

At first glance these broad descriptive statistics indicate that small-scale poultry producers find themselves at a disadvantage relative to larger enterprises. This is explored further in Chapter 2, which looks at the economic theory of farm size and economies of size and introduces the concept of transaction costs.

CHAPTER TWO

2. FARM SIZE, TRANSACTION COSTS AND SIZE ECONOMIES

2.1 INTRODUCTION

Over time there has been considerable debate whether large or small farms are better suited to stimulate economic growth. Safaloah *et al.* (1998) states that approximately 80 percent of commercial poultry producers in southern Malawi raise less than 3 000 broiler birds per year. When compared with wage employment for skilled workers, farms of this size cannot produce attractive incomes, even under optimal technological conditions. However, the co-existence of large and small-scale poultry farms in South Africa (Amin, 1998) may suggest that different sized farms can be efficient. Small-scale farm strategists advocate a policy of breaking up large farms into smaller farms on the grounds that productivity per hectare is higher on a smaller farm. This support arises because of small-scale farms' intensive utilisation of labour and capital, therefore fulfilling employment and equity goals (Ellis, 1988: 192) which larger farms do not meet. On the other hand, it is argued that agricultural innovations are often scale dependent (Thomson and Lyne, 1991), especially technology (Welch, 1978; Feder *et al.*, 1982, Feder, 1985; Shaw and Costa, 1985).

An efficient farm utilises fewer resources to generate a given quantity of output. In other words, an efficient farm generates a greater output than an inefficient farm

with the same quantity and quality of resources. Pasour (1981) argues that enterprises are efficient in a perfectly competitive market when the marginal rates of substitution between any two factors is the same for all producers. However, this perfectly competitive market scenario assumes; (i) perfect communication; (ii) instantaneous equilibrium, and; (iii) cost-less transactions. Decision-makers are thus assumed to have perfect knowledge about all relevant variables, including future occurrences, which is unrealistic. Consequently, it is difficult to measure efficiency because individual decision-makers face different transaction costs, value opportunity costs differently and display different attitudes to risk (Friedman, 1976; Pasour, 1981).

Broadly defined, transaction costs are the full costs of carrying out exchange (Coase, 1960) where transaction costs vary by product, type of agent in the marketing chain and the individual agent within a category of agents (Delgado, 1996). Transaction costs also encompass the search for a trading partner and screening thereof, bargaining and decision making costs (in some cases officials can hold up trade), transferring the product (typically transportation, processing, packaging and securing title if necessary), policing or monitoring the agreement to see that its conditions are fulfilled, enforcing or seeking damages for any violation of the exchange agreement and the costs associated with the risk and uncertainty of transferring goods and services in view of imperfect information (Dahlman, 1979; Staal *et al.*, 1997). It is hypothesised that transaction costs are higher amongst small-scale poultry producers relative to larger enterprises. This chapter explores

this hypothesis using economic theory relating to farm size. Descriptive data from the sample survey is also included.

2.2 FARM SIZE

Farm size is often understood as been synonymous with land area. This measure can easily be ascertained and is simple to understand. However, land area is sometimes an unsatisfactory indicator of business size because the proportions in which land and other factor inputs (*e.g.* labour and capital) combine vary principally between types of farming, but also between farms of the same type (Britton and Hill, 1975: 15). This is largely because land area does not give an indication of the quality or location of the land. For example, the land area of a rural poultry farm cannot be directly compared with a rural beef farm because a poultry farm has a higher relative proportion of farm capital invested in housing and equipment. Similarly, a rural poultry farm cannot be directly compared with a peri-urban poultry farm of similar land area because their access to inputs and markets differs. In addition, small-scale poultry houses vary widely in relation to physical size, number and quality (stocking density, ventilation, insulation, biosecurity and appropriate equipment). Consequently, house size and number are also not suitable measures of enterprise size.

Output is often a more appropriate measure of farm size as it enables comparisons across farms. Weekly poultry output measures are often used by the large-scale

commercial broiler industry because the product is homogenous (*i.e.* broilers are sold at 6 weeks). However, small-scale poultry producers often deviate from the technical breeder recommendations resulting in a heterogeneous product (*i.e.* broilers are often sold in excess of 6 weeks). In addition, consumers usually purchase live birds from small-scale poultry producers in rural areas that are commonly selected on varying physical traits. Therefore, when the output to be compared is heterogeneous total product sales is the preferred method but bias could result in this farm size measure if the production mix varies between farms of different sizes (Vlastuin *et al.*, 1982). However, the production mix is usually consistent amongst poultry enterprises where commercial feed is used (Wethli, 1999). Total product sales, therefore, appears to be the best measure of enterprise size to compare small-scale and larger commercial poultry producers. This and other size measurements obtained from the sample survey are benchmarked against one another in Table 10. All measurements are significantly different except land area, which is measured in hectares.

In any industry where production resources are specialised, enterprise sizes will tend to vary (Groenewald, 1991). Hence, in a market economy one could speak of an optimum distribution of farm size rather than an optimum size of farm (Friedman, 1976: 142). A study to determine the single optimum farm size would be meaningless because different farms are part of different exchange relationships and are likely to be subject to different levels of transaction costs for selling the

same output mix. Flexibility in farm size and farm-size structure developments should, therefore, be promoted, not controlled (Groenewald, 1991).

Table 10: Enterprise size variables and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Layer Income (R) (per annum)	Small	12	3401.00	2887.91	13.0	**-2.620****
	Large	14	1058583.00	1507020.57		
Broiler Income (R) (per annum)	Small	55	12465.16	8832.70	54.0	**-2.522*****
	Large	55	676894.70	1953950.25		
Layer Houses (on-farm)	Small	13	1.00	0.00	13.0	**-3.380*****
	Large	14	6.43	6.01		
Broiler Houses (on-farm)	Small	55	1.38	0.78	57.0	**-5.863*****
	Large	55	4.57	3.94		
Number of Layers (on-farm)	Small	13	31.69	29.00	13.0	**-3.159*****
	Large	14	1897.50	2209.86		
Number of Broilers (on-farm)	Small	55	113.09	81.35	53.1	**-4.270*****
	Large	55	1727.35	2776.98		
Land Area (ha)	Small	60	45.57	287.64	112.2	-1.020
	Large	58	103.11	322.83		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Economies of size are defined as the proportionate change in output when all inputs are increased in the same proportion (Hallam, 1991). However, in practice inputs are rarely, if ever, increased in the same proportions (Stanton, 1978; Doll and Orazem, 1978: 219). Experience in agriculture as well as in manufacturing has frequently confirmed that average costs per unit produced decline as fixed costs (*e.g.* management, supervision, information, machinery, depreciation, security and transaction costs) are spread over a greater output. Furthermore, if average total cost declines with increasing output (assuming size remains constant) economies of size result as current inputs are extended without additional cost. Consequently, the smaller farm with limited output and certain unavoidable costs finds itself at a

disadvantage (Huffman, 1974; Welch, 1978: 259). Hazell and Roel (1983) state that economic growth should transpire when these smaller farms are transformed into larger entities. However, this transformation process requires that smaller farms have access to information, resources and marketing opportunities.

2.3 INFORMATION ECONOMIES

Deininger and Binswanger (1992) argue that large-scale un-mechanised agriculture is less efficient than small-scale labour based farming. This deduction arises because the use of family labour on small-scale farms is thought to cost less than hired labour as there are no search and hiring costs (*i.e.* transaction costs are close to zero) and supervision costs may indeed be lower for family labour. However, in a situation where an active and diversified off-farm labour market prevails, such as in KwaZulu-Natal (Lyne and Ortmann, 1996), the opportunity cost of family labour is therefore likely to approximate his or her expected market wage rate. As potential profits are low on small-scale farms in rural KwaZulu-Natal (Nieuwoudt, 1990), it is clear that more skilled and mobile members of households have a competitive advantage in off-farm employment. Mincer (1963:71) notes that opportunity costs of family members differ, which is supported by Nattrass and May (1986) who have shown that labour migration from rural areas in South Africa is age, gender, and skill specific. The vast majority of migrant workers are young and better educated men. This loss of quality labour and management from rural areas has adverse implications for productivity on small-scale farms (Low, 1986:42).

Management, like a machine, is an indivisible and lumpy input. Good management initially gives rise to economies of size and may also provide increasing returns to size (Groenewald, 1991) because better managers have lower cost curves due to lower information costs (Huffman, 1974). Therefore, optimal farm sizes will tend to increase with technical change under quality management (Binswanger and Elgin, 1988). Although seen as a lumpy and indivisible input, some management skills can be rented. Private extension officers can be hired by the hour (Feder and Slade, 1984). Likewise, through contract farming, larger farmers can provide technical, financial and marketing advice to smaller farmers (Binswanger and Elgin, 1988). However, rental markets for management can only partially circumvent the lumpiness of management skills because actual farming decisions and the supervision of labour cannot be bought in the market, nor is there any substitution for the important site-specific experience of a farmer or manager.

The incentive for managers to learn and adapt their practices comes from the expected gains arising from adoption (Huffman, 1974). However, the implementation of new technology by smaller farms is constrained by the fixed transaction costs incurred acquiring information (Lyne, 1996; Feder *et al.,* 1982). These fixed transaction costs are further compounded when farms are isolated from markets and information sources by inadequate infrastructure. In this regard, Fitschen and Klitgaardt (1996) and Alwang *et al.* (1996) have found a strong relationship between rural poverty and isolation from infrastructure.

Larger farms have a greater incentive to invest in education and information and also in investments that enhance responses because net returns are greater on larger farms (Welch, 1978: 274). Huffman (1974) empirically demonstrates that larger farmers have a greater incentive to adopt new technology and that information use has size economies. Farmers with higher education and better access to information have higher levels of cumulative information and better allocative abilities and consequently adopt earlier than other farmers, *ceteris paribus* (Feder *et al.*, 1982, Feder and Slade, 1984). In addition, better-educated farmers can assimilate and interpret information at lower costs than less educated farmers. Consequently, small-scale farmers find themselves at a disadvantage because of their difficulty in learning how to operate and manage new technology.

Size economies associated with information access transpire in the timely adoption of new technology, better marketing channels and improved credit rates (Binswanger, 1994). Feder and Slade (1984) report that farmers who are visited regularly by extension agents adopt faster, increasing their productivity. Huffman (1974) concurs that inadequate schooling can be substituted for with an increase in extension activity. Binswanger (1994) also supports this argument and contends that smaller farmers rarely lag more than a few years behind their larger counterparts in technology adoption if fixed information and transaction costs are borne by well resourced extension services.

Table 11 shows that the majority of small-scale enterprises in the sample survey (55.9%) indicated government as their primary source of initial information followed by NGO's (18.6%) and that their current source of information is dominated by government sources (79.7%). Sampling bias was unfortunately introduced because government extension officers were used as a sampling frame, which are otherwise reported to be ineffective across the entire province (Mkize, 1998). Larger enterprises indicated own research (22.2%), friends (20.6%), NGO's (20.6) and input suppliers (19.0%) as their primary information sources but relied mostly on input suppliers (34.9%), government (25.4%) and own research (20.6%) for their current information needs. Without government extension officers the small-scale poultry enterprises identified in the sample survey would find themselves at a significant disadvantage.

Table 11: Information sources differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Initial information	(122)	Input suppliers	3.4	19.0	11.5
		Family	0.0	3.2	1.6
		Friends	10.2	20.6	15.6
		Self	11.9	22.2	17.2
		Govt	55.9	7.9	31.1
		NGO	18.6	20.6	19.7
		Research Inst.	0.0	4.8	2.5
		Exhibitions	0.0	1.6	0.8
Current information	(122)	Input suppliers	6.8	34.9	21.3
		Family	0.0	1.6	0.8
		Friends	1.7	7.9	4.9
		Self	5.1	20.6	13.1
		Govt	79.7	25.4	51.6
		NGO	5.1	3.2	4.1
		Research Institute	1.7	4.8	3.3
		Exhibitions	0.0	1.6	0.8

Note 1: Variables are mutually exclusive and sum to 100%.

Communication plays an important role in linking enterprises with information sources, which helps reduce transaction costs. Most small-scale enterprises lodged orders for bird purchases through their extension officer (40.0%) whilst 31.7% used telephones to place orders directly with suppliers (Table 12). Larger enterprises mostly use telephones (49.2%) and fax (20.6%), which is also evident in feed orders and advanced sales (*i.e.* where the producer receives an order from their customers).

Table 12: Types of advanced orders differentiated according to size

Description (N)	Variable	Small, %	Large, %	Total, %
Type of bird order (123)	No order	8.3	1.6	4.9
	Telephone	31.7	49.2	40.7
	Fax	3.3	20.6	12.2
	Letters	0.0	7.9	4.1
	On collection	16.7	6.3	11.4
	Extension officer	40.0	0.0	19.5
	Other	0.0	14.3	7.3
Type of feed order (121)	No order	89.8	51.6	70.2
	Telephone	6.8	40.3	24.0
	Fax	0.0	6.5	3.3
	Extension officer	3.4	1.6	2.5
Type of sales order (123)	No order	58.3	54.0	56.1
	Telephone	10.0	30.2	20.3
	On collection	0.0	3.2	1.6
	Customer visits	31.7	12.7	22.0

Note 1: Variables are mutually exclusive and sum to 100%.

Record keeping provides current and relevant information from which daily management decisions can be made. From Table 13 it is apparent that small-scale enterprises are less inclined to keep financial records (*e.g.* costs incurred and income earned) than larger enterprises. Similarly, less attention is given to keeping production records such as bird numbers, mortality, vaccinations, feed and poultry outputs by small-scale enterprises.

Table 13: Record keeping differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Cost records	(122)	Yes	44.1	88.9	67.2
Income records	(122)	Yes	42.4	88.9	66.4
Savings/drawings	(122)	Yes	11.9	57.1	35.2
Numbers of birds	(122)	Yes	33.9	85.7	60.7
Mortality records	(122)	Yes	40.7	90.5	66.4
Vaccination records	(122)	Yes	13.6	71.4	43.4
Feed records	(122)	Yes	27.1	66.7	47.5
Egg records (layers)	(26)	Yes	18.2	100.0	64.0
Bird weights (broilers)	(109)	Yes	9.3	43.6	26.6

Note 1: Variables are mutually exclusive and sum to 100%; *i.e.* %"Yes" plus %"No" equals 100%.

2.4 PRODUCTION ECONOMIES

Technical economies of size arise through more efficient use of fixed capital (Britton and Hill, 1975: 118) usually by spreading fixed costs over a larger output such that average fixed costs decrease (Barnard and Nix, 1988:47). Binswanger *et al.* (1992:21) argues that economies of size often arise from the processing or marketing stages rather than from farm operations. These economies of size usually transpire when processing must occur within hours from harvesting which favours larger farms (Binswanger and Elgin, 1988). Binswanger *et al.* (1992:22) suggest that small-scale family farms usually supply markets where little co-ordination between harvesting and processing is required. This is evident with small-scale rural poultry producers who predominantly sell birds "live" compared with the large processing plants of Rainbow Chickens, which is a fully integrated operation (Amin, 1998).

On farm mechanisation usually increases optimum farm size as machines reach their lowest cost of operation at larger scales than labour intensive production (Hall and LeVeen, 1978: Binswanger *et al.*, 1992:24) because their associated fixed costs are spread. Therefore, as farms become more mechanised they will tend to be larger. However, this increase in minimum efficient farm size is less than expected where there is a rental market for machinery (Binswanger and Elgin, 1988). In contrast, rental markets for machinery are often not feasible where time bound operations are concerned (Binswanger *et al.*, 1992:21); *e.g.* transport required to deliver poultry to pension day markets. Rentals are also less likely when machines are fixed structures (*e.g.* automated feeders and certain feed mills). Furthermore, the renting of machinery involves fixed transaction costs that introduce size economies favouring larger operations (Lyne, 1996). If machinery cannot be rented by expanding operators equipment may need to be purchased (*e.g.* feeders, drinkers, fans, heaters, *etc.*), which usually requires borrowing of some sort. Inherently, most small-scale producers lack initial start-up capital, which results in relatively higher fixed interest costs increasing the risk of foreclosure during erratic production periods.

Experiences from lending agencies in South Africa are that small-scale farmers have substantially higher lending costs than larger farmers (Bates, 1996). This arises because lenders seldom have enough information to determine which small-scale farms are relatively productive and low risk borrowers (Carter, 1988) because the cost of information required to determine credit-worthiness may exceed the

benefits gained from a relatively small loan amount. These transaction costs associated with administering many small loans will usually be recovered through increasing the cost of credit. Therefore, small-scale farmers with a limited collateral base find it difficult to obtain small amounts of credit because the fixed costs of borrowing in formal credit markets usually outweighs the returns to be made (Binswanger *et al.,* 1992: 26).

Land, the most common form of agricultural collateral, only has value if there is a sale market, or a secondary market for long-term leases (Thomson and Lyne, 1993). This is not the case in rural KwaZulu-Natal, as land is mostly communally owned. Other collateral alternatives are limited. Collateral substitutes have been encouraged in some countries where land markets are dysfunctional, for example savings (Pitt and Khandker, 1995). However, money is usually saved primarily as an insurance substitute, especially in informal institutions such as burial societies, where savings are not easily accessible and can therefore not be used to improve cash flow. Fenwick and Lyne (1998b) found that formal savings in rural KwaZulu-Natal were high but these are used as a substitute for credit rather than as information or collateral to lenders since savings institutions (banks) are separate to lenders (input suppliers). Input suppliers, nevertheless, are well positioned to supply production credit because they often have access to their clients' production data, information that helps minimise their lending risks. Table 14 confirms that small-scale poultry enterprises in the sample survey find it more difficult to access production credit than larger enterprises.

Table 14: Cash or credit purchases differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Bird purchases	(122)	Cash	98.3	81.0	89.3
		Credit	1.7	19.0	10.7
Feed purchases	(121)	Cash	94.9	56.5	75.2
		Credit	5.1	43.5	24.8
Litter purchases	(72)	Cash	100.0	82.9	91.7
		Credit	0.0	17.1	8.3
Equipment purchases	(116)	Cash	96.4	73.8	84.5
		Credit	3.6	26,2	15.5

Note 1: Variables are mutually exclusive and sum to 100%.

Empirical studies suggest that small-scale farmers in South Africa are constrained by low and irregular incomes, which reduces their creditworthiness and is exacerbated by their consequent inability to save, borrow and further invest in agriculture (Lyne and Ortmann, 1992: 20-22). Formal credit institutions are reluctant to allocate credit to small-scale rural farmers because the risk of loan default is high; *i.e.* they find it difficult to meet the predetermined constant stream of repayments (Devereux *et al.,* 1989). According to Low (1986:111-115), many small-scale farm households in Southern Africa use livestock sales (species other than cattle are preferred) as a form of liquidity to smooth income fluctuations. Lugemwa and Darroch (1995) also found that off-farm income is a significant determinant of a small-scale farmer's ability to secure and repay seasonal loans. In this regard, Table 15 shows that larger poultry enterprises from the sample survey have a significantly higher alternative income from a similar number of alternative income sources. As expected larger enterprises on average also borrowed significantly larger amounts.

Table 15: Alternative incomes and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Alternate income levels	Small	45	48055.56	222584.80	66.7	**-1.715****
	Large	58	249600.80	858448.73		
Alternate income sources	Small	62	1.48	1.04	110.5	0.642
	Large	62	1.34	1.45		
Amount borrowed	Small	62	1759.68	7424.95	49.6	**-2.938*****
	Large	50	38392.32	87900.96		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

To borrow in the formal sector, credit applications also require submission of detailed investment plans that may be beyond the skills and resources of many small-scale poultry producers. As a result, rural households often borrow from friends and family in order to overcome these high transaction costs. In the sample survey, the majority of small-scale (89.8%) and larger enterprises (74.6%) relied on their own financial resources to initiate their poultry business (Table 16). Commercial banks (12.7%) and subsidised lending institutions such as KwaZulu Finance Corporation and the Land Bank (4.8%) were also used by some larger enterprises. None of the small-scale enterprises received credit from commercial banks and generally the sources of start-up capital are more limited amongst small-scale enterprises.

Table 16: Type of finance differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Type of start-up capital	(122)	Own resources	89.8	74.6	82.0
		Friends/relatives	1.7	1.6	1.6
		Stokvel/savings club	1.7	0.0	0.8
		Local money lender	0.0	1.6	0.8
		KFC/Land Bank	1.7	4.8	3.3
		Commercial Bank	0.0	12.7	6.6
		Government	1.7	1.6	1.6
		Other	3.4	3.2	3.3
Type of finance	(38)	Informal	33.3	23.1	26.3
		Formal	66.7	76.9	73.7
Informal finance	(124)	No finance	93.4	88.9	91.1
		Informal finance	6.6	11.1	8.9
Formal finance	(124)	No finance	86.9	68.3	77.4
		Formal finance	13.1	31.7	22.6

Note 1: Variables are mutually exclusive and sum to 100%.

External finance was obtained by 38 enterprises in the sample where larger enterprises obtained a higher proportion of formal finance (76.9%) than small-scale enterprises (66.7%). In a Tanzanian study, Sumberg (1998) reports a similar adoption rate of credit but a higher proportion obtained from informal sources. Formal finance comprises development banks, commercial banks and grants, whilst informal finance comprises family borrowings, stokvels and loans from input suppliers. Only a small proportion of larger and small-scale enterprises accessed formal or informal credit (Table 16).

As women have a lower social standing than do men (Berry, 1993) they face higher transaction costs accessing credit from informal sources (Fenwick and Lyne, 1998a). This has significant consequences considering that women are mostly involved in rural poultry enterprises (Spradbrow, 1997; Chitukuro and Forster,

1997; Bisschop 1997a; Gumede 1986; Safalaoh *et al.*, 1998; Gueye, 1997a). For men, transaction costs may be relatively low in informal financial markets but this does not imply that they are low in absolute terms. Here transactions tend to be highly personalised with unique terms bargained by both parties. In contrast, transactions in formal financial markets are fairly impersonal where each party is assessed on the same economic criteria: collateral, debt repayment capacity and transaction costs. A contract is usually written and legally binding on both parties with disputes being handled by an impartial third party.

The magnitude of transaction costs associated with credit applications reflect the degree of development and maturity of the financial system, available transport and communication facilities and the efficiency of the legal system (Coetzee, 1995). Efficient financial markets require public sector investment in both physical and legal infrastructure in addition to free market forces (Timmer, 1992; Sahn and Sarris, 1994). Legal uncertainty caused by the existence of a dual legal system - national and traditional - results in uncertainty about the validity of contracts, compensation and enforcement of court rulings, particularly for women (Lyne, 1996).

2.5 MARKETING ECONOMIES

On average small-scale enterprises in the sample survey consumed 17.64% of their egg production and 9.82% of their broiler production compared with 2.09% and

1.22% for larger enterprises respectively (Table 17). Although higher consumption patterns often result in consumption cost savings for small-scale producers, such consumption also attracts an opportunity cost of income foregone.

Table 17: Home consumption and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
% egg consumption	Small	11	0.18	0.23	11.5	**2.143****
	Large	13	0.02	0.07		
% broiler consumption	Small	54	0.10	0.14	58.0	**4.263*****
	Large	52	0.01	0.03		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

The marketing of broilers and eggs can be complicated by high incidences of home consumption because irregular and infrequent sales necessitate continuous bargaining and negotiation. These transaction costs are further accentuated when broiler and egg quality or their respective weights are variable and not easily ascertained in the absence of weighing scales, egg graders and labour time to undertake these tasks. This lack of quality standards in the small-scale industry may allow agents purchasing these products to reject them without just cause when they have contracted to purchase more than they can afford to consume or trade.

The grading of eggs by weight and the weighing of broilers also provides the producer with valuable production information with which he can make meaningful management decisions as well as to better market the product. Small-scale enterprises have a markedly lower adoption rate of both these practices (11.1%

versus 69.2% and 8.5% versus 39.7% respectively; Table 18). Different sized enterprises also differ in value adding activities that provide no additional information to the producer but improve the marketability of the product such as selling eggs in a box and slaughtering broilers (63.6% versus 100.0% and 8.5% versus 39.7% respectively).

Table 18: Value adding differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Eggs weight graded	(22)	Yes	11.1	69.2	45.5
Eggs sold in a box	(24)	Yes	63.6	100.0	83.3
Broilers slaughtered	(108)	Yes	9.3	25.9	17.6
Birds weighed	(122)	Yes	8.5	39.7	24.6

Note 1: Variables are mutually exclusive and sum to 100%; *i.e.* %"Yes" plus %"No" equals 100%.

Live transportation of birds especially over long distances can result in high mortalities and consequently high financial losses. Similarly, slaughtered poultry are highly perishable unless frozen which requires capital investment in abattoir facilities, refrigerated storage and refrigerated transport (Amin, 1998), which are specialised products that are lumpy in nature and often unaffordable for even larger producers. This helps explain why most small-scale producers predominantly market "live" birds locally. Another reason is the high transaction costs associated with distance from urban markets, which includes the costs associated with screening, bargaining and monitoring distant trading partners.

The type of market accessed also impacts transaction costs. Selling large volumes to a single customer helps reduce transaction costs (*e.g.* searching, monitoring,

bargaining, *etc.*) and therefore enables size economies to be captured. However, proximity to collection point may be more important than the final market when explaining market participation (Debrah and Anteneh, 1991; cited by Staal *et al.*, 1997). Larger producers are by definition collection points of a sort and may benefit from lower collection costs than smaller producers. As a consequence, marketing channels available to small-scale producers are often limited to those not exploited by larger producers. In an open market environment transaction costs are usually high because producers need to negotiate with a large number of clients. Producers, therefore, have an incentive to forego some income for a regular outlet and it is envisaged that certain consumers will be willing to pay more for sustained supplies from a reliable source.

The majority of larger layer enterprises from the sample survey managed to effect transaction costs savings by selling most of their eggs in bulk to stores or retail outlets (78.6%) followed by traders/hawkers (42.9%). Some larger enterprises (14.3%) also used the services of collective marketing agents, which only result in transaction cost savings if product volumes traded are significant. The dominant egg markets for small-scale enterprises are local residents (Table 19).

Table 19: Egg markets differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Local Residents	(24)	Yes	100.0	42.9	66.7
Traders and hawkers	(25)	Yes	10.0	42.9	29.2
School, hospital, hotel	(24)	Yes	10.0	28.6	20.8
Store or retailer outlet	(24)	Yes	10.0	78.6	50.0
Market agent or co-op	(24)	Yes	0.0	14.3	8.3

Note 1: Variables are mutually exclusive and sum to 100%; *i.e.* %"Yes" plus %"No" equals 100%.

The market differences between small-scale and larger enterprises are less evident for broiler sales. Both small-scale and larger enterprises predominantly exploit the local resident market (98.2% and 83.6% respectively) but larger enterprises utilise the services of traders (70.9%) more than small-scale enterprises (25.9%) and therefore economise on some transaction costs. A smaller but similar trend is evident for stores or retail outlets.

Table 20: Broiler markets differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Local residents	(110)	Yes	98.2	83.6	90.9
Traders and hawkers	(109)	Yes	25.9	70.9	48.6
School, hospital, hotel	(109)	Yes	3.7	9.1	6.4
Abattoir	(109)	Yes	0.0	9.1	4.6
Store or retail outlet	(109)	Yes	1.9	18.2	10.1
Market agent or co-op	(109)	Yes	0.0	1.8	0.9

Note 1: Variables are mutually exclusive and sum to 100%; *i.e.* %"Yes" plus %"No" equals 100%.

Product prices received by small-scale enterprises are significantly higher than those received by larger enterprises (Table 21). This can be attributed to the high demand for poultry relative to supply in rural markets. Cheaper products are also prevented from entering these markets because of the transaction costs associated

with the wide dispersion of potential buyers in areas with underdeveloped infrastructure. These higher prices, to some extent compensate small-scale enterprises for the high transaction costs associated with their small size and location.

Table 21: Product prices and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Egg price	Small	12	5.45	0.73	23.5	**4.196*** **
	Large	14	4.23	0.75		
Broiler price	Small	55	21.47	3.85	108.7	**7.114*** **
	Large	56	16.37	3.71		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

The most important marketing problems expressed by respondents in a survey of small-scale vegetable farmers in the Eastern Cape province were; unavailability of transport (46.4%), absence of market information (17.8%) and limited access to urban markets. Two-thirds of their produce was sold on thinly traded local markets (Madikizela and Groenewald, 1998). In Table 22 the most limiting marketing constraint identified amongst small-scale broiler enterprises in the sample survey is a lack of transport (31.8%). The most limiting constraint for larger broiler enterprises is their inability to sell their product (36.4%) mostly because of the "dumping" of cheap American imports (Amin, 1998). Only a few small-scale broiler enterprises (13.6%) were aware of the American imports or were affected by a reduction in local market prices. A similar trend is evident amongst layers where

larger enterprises indicated that price competition is their only marketing constraint, which does not feature at all amongst small-scale enterprises.

Table 22: Marketing constraints differentiated according to size

Description	Variable	Small, %	Large, %	Total, %
Broiler	Nil	34.1	12.1	24.7
	Price competition	13.6	30.3	20.8
	Inability to sell	13.6	36.4	23.4
	Lack of transport	31.8	9.1	22.1
	Inability to expand	4.5	3.0	3.9
	Security	2.3	6.1	3.9
	Other	0.0	3.0	1.3
Layer	Nil	40.0	0.0	16.7
	Price competition	0.0	100.0	58.3
	High demand	40.0	0.0	16.7
	Other	20.0	0.0	8.3

Note 1: Variables are mutually exclusive and sum to 100%.

2.6 SUMMARY

Total product sales appears to be the most appropriate measure of enterprise size because poultry products and the production mix are usually consistent where commercial feed is used. Flexibility in farm size, however, should be promoted and not controlled as different farms are subject to different levels of transaction costs. Broadly defined, transaction costs are the full costs of carrying out exchange, which vary by product, type of agent in the marketing chain and the individual agent within a category of agents.

Economies of size are defined as the proportionate change in output when all inputs are increased in the same proportion. For example, larger farms have a greater

incentive to invest in education and information and also in investments that enhance responses because the net returns are greater on larger farms. In this regard, without the services of government extension officers, small-scale poultry enterprises might find themselves at a significant disadvantage.

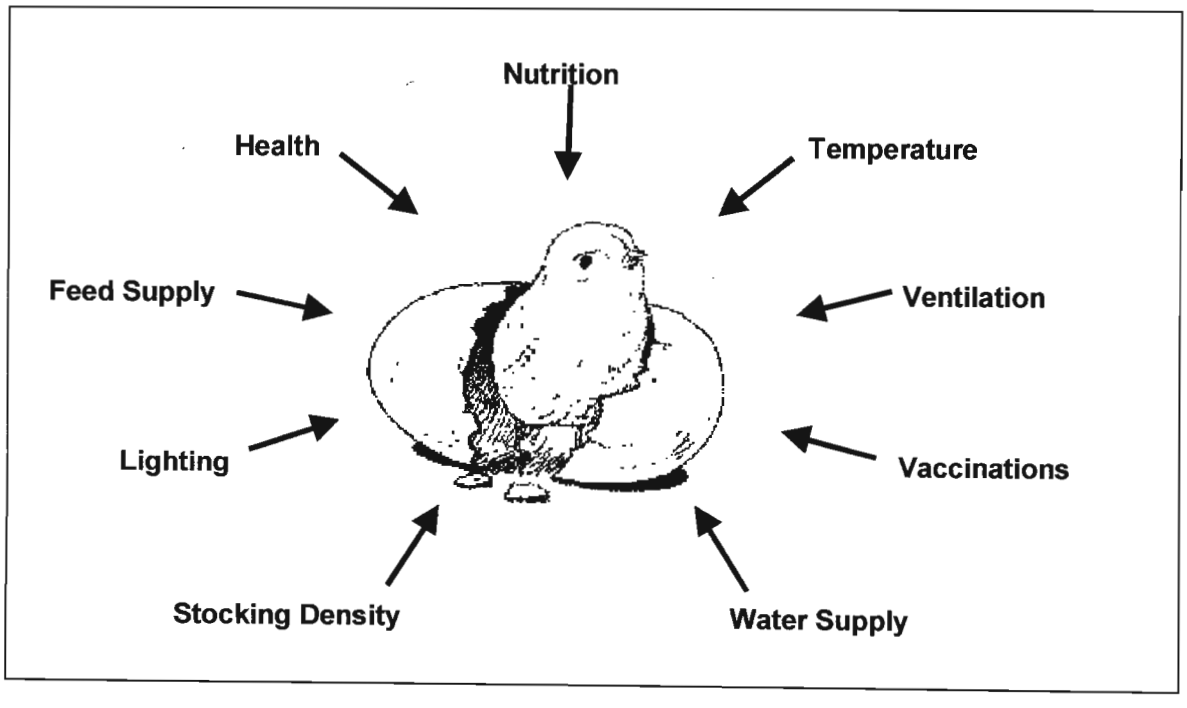
Credit access amongst small-scale farmers is often constrained because of high transaction costs especially for (1) farmers with limited alternative income sources, (2) for women accessing credit from informal sources and (3) for enterprises that have no collateral value for their land (*i.e.* communal tenure). Larger enterprises are better able to reduce marketing transaction costs because their size economies enable them to deal with only a few large market agents (*e.g.* stores, hospitals, schools, etc). Small-scale enterprises, however, are often unable to enter these preferred markets because their throughput is small and transport is limiting and/or expensive. Their small size also inhibits their ability to negotiate price discounts from input suppliers, which larger enterprises receive for bulk purchases. As a result of their higher cost structure, small-scale enterprises find it difficult to compete in urban markets where product prices are generally lower than in rural areas. Chapter 3 investigates differences in technical poultry production parameters between small-scale and larger enterprises.

CHAPTER THREE

3. TECHNICAL POULTRY PRODUCTION PARAMETERS

3.1 INTRODUCTION

Successful and profitable poultry production requires appropriate equipment and relevant management practices. Figure 2 illustrates some of the more important factors that limit poultry growth and product quality. Using the sample survey data, this chapter examines the equipment and management practices of both small-scale and larger enterprises and determines their differences.



Note 1: Adapted from Ross Breeders (1996).

Figure 2: Factors limiting poultry growth and quality

3.2 ASSESSMENT OF TECHNICAL PARAMETERS

3.2.1 Poultry Strains and Age Purchased

There are many strains of poultry used, ranging from indigenous village chickens to dual purpose (layer and broiler) strains and specialised commercial broiler and layer strains. Most small-scale (84.6%) and larger (71.4%) layer enterprises surveyed use the "Hyline Brown" strain and almost all broiler enterprises surveyed use the "Ross" strain (Table 23).

Table 23: Poultry strains differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layer Strain	(27)	Hyline Brown	84.6	71.4	77.8
		Lohmann	0.0	14.3	7.4
		Amberlink	0.0	14.3	7.4
		Rhode Island Red	7.7	0.0	3.7
		Zulu	7.7	0.0	3.7
Broiler Strain	(110)	Ross	100.0	96.4	98.2
		Cobb	0.0	3.6	1.8

Note 1: Variables are mutually exclusive and sum to 100%.

Day-old layers are less expensive and easier to obtain than "point-of-lay" pullets but skills and experience are needed to raise them through the brooding period to avoid high mortalities (Slippers, 1998). Table 24 indicates that 8.3% of small-scale enterprises used day-old layers compared with 21.4% of larger enterprises. Most broiler enterprises use day-old chicks, irrespective of their size. Table 24 also illustrates that both layer and broiler producers, small and large alike, keep birds of

the same age in the same house. This helps prevent the spread of disease and enables different feed and lighting programmes to be administered to optimise growth/production at particular ages, all of which constitutes good husbandry practice (Gous, 1999; Wethli, 1999). Price differentials received by small-scale and larger enterprises for pullets and day-old broilers are presented in Table 53 (p. 101).

Table 24: Age birds are purchased differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers – age	(26)	Day-old	8.3	21.4	15.4
		16 months	8.3	0.0	3.8
		17 months	0.0	7.1	3.8
		18 months	41.7	42.9	42.3
		19 months	0.0	7.1	3.8
		20 months	8.3	0.0	3.8
		21 months	33.3	14.3	23.1
		24 months	0.0	7.1	3.8
		Layers different ages	16.7	28.6	23.1
		Layers same age	83.3	71.4	76.9
Broilers – age	(110)	Day-old	90.9	96.4	93.6
		Day-old and Other	3.6	1.8	2.7
		4 weeks	1.8	0.0	0.9
		5 weeks	0.0	1.8	0.9
		6 weeks	1.8	0.0	0.9
		7 weeks	1.8	0.0	0.9
		Broilers different ages	9.3	18.2	13.8
		Broilers same age	90.7	81.8	86.2

Note 1: Variables are mutually exclusive and sum to 100%.

3.2.2 Poultry Feeds

Poultry feed may be bought in the form of mash or pellets/crumbles, the latter being more costly but cause less wastage and result in faster growth rates (Wethli, 1999). Table 25 shows the adoption of pellets/crumbles is higher amongst small-scale layer

enterprises (50.0%) relative to larger layer enterprises (15.4%). Both small-scale and larger broiler enterprises have high pellet/crumble adoption rates (79.6% and 87.0% respectively). Similarly, different feed types (starter, finisher and post finisher) have been adopted equally amongst both small-scale and larger enterprises, suggesting that technology transfer has been relatively successful for both small-scale and larger enterprises. Price differentials received by small-scale and larger enterprises for different commercial feed types are presented in Table 53 (p. 101).

Table 25: Use and type of commercial feed differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers Pellets	(25)	Yes	50.0	15.4	32.0
Broilers Pellets	(108)	Yes	79.6	87.0	83.3
Broiler Starter	(116)	Yes	88.1	82.5	85.3
Broiler Finisher	(116)	Yes	86.4	82.5	84.5
Broiler Post Finish	(116)	Yes	50.8	56.1	53.4
Commercial Feed	(123)	Yes	100.0	88.9	94.3

Note 1: Variables are mutually exclusive and sum to 100%; *i.e.* %"Yes" plus %"No" equals 100%.

To optimise production and financial returns it is important that birds receive the necessary essential nutrients in the appropriate balance. The lower adoption of commercially available feeds by larger enterprises (88.9%) in Table 25 may be attributed to the transport savings of using home-grown grain and the size economies associated with mixing large volumes of feed on farm. This hypothesis is supported by the significant differences reported in Table 26. Most of these mixing operations buy concentrates to blend in with home-grown cereals to supply the additional nutrients required that are available in commercial feed (Slippers, 1998).

Table 26: Asset ownership and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Number of Feed Mills	Small	61	0.02	0.13	71.0	**-3.028*** **
	Large	63	0.21	0.48		
Number of Feed Storage Bins	Small	61	0.00	0.00	62.0	**-2.707*** **
	Large	63	1.13	3.30		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

If broilers are not sold at their optimum age the profitability of the enterprise is impacted because additional feed resources are needed to sustain the birds with only marginal weight gain (Ross Breeders, 1996). Similarly, if the market is such that the birds cannot be sold promptly profit margins are also reduced. Table 27 indicates that the average age (days) at which broilers are sold and the average number of days for an enterprise to sell a batch are lower amongst larger enterprises, but the differences are not significant.

Table 27: Broiler selling and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Age at which broilers sold	Small	54	45.89	1.04	93.1	0.739
	Large	54	45.00	0.71		
No. of days to sell batch	Small	54	19.86	2.08	105.7	1.027
	Large	54	16.90	2.19		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

3.2.3 Housing and Litter

Table 28 indicates that purpose built poultry houses are more prevalent amongst larger enterprises relative to small-scale enterprises for both layers and broilers.

Sonandi *et al.* (1997) report that 68% of small-scale broiler producers in the Eastern Cape make use of converted buildings, and Sumberg (1998) states that the total percentage of purpose built housing in Tanzania is 92% for both small-scale layers and broilers. These differences do not necessarily pose technical problems provided the housing is suitably renovated to optimise poultry production. One of the most significant renovations to minimise disease is to have a cement floor (Gous, 1999). Small-scale enterprises lag larger enterprises in this regard but the reason might be as a result of economic factors rather than technology transfer. This hypothesis is supported by the low use of multiple roomed houses by both small-scale and larger enterprise, which would otherwise promote the spread of disease.

Table 28: Type of poultry house differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layer House	(26)	Shack	16.7	7.1	11.5
		Converted	33.3	14.3	23.1
		Purpose	50.0	78.6	65.4
Broiler House	(109)	Shack	14.8	5.5	10.1
		Converted	37.0	14.5	25.7
		Purpose	48.1	80.0	64.2
Layer Cement Floor	(26)	No	33.3	21.4	26.9
		Yes	66.7	78.6	73.1
Broiler Cement Floor	(109)	No	22.2	12.7	17.4
		Yes	77.8	87.3	82.6
Multiple Rooms	(124)	No	90.2	93.7	91.9
		Yes	9.8	6.3	8.1

Note 1: Variables are mutually exclusive and sum to 100%.

Ideally poultry houses should be more than two kilometres away from neighbouring poultry enterprises to help prevent disease transfer (Gous, 1999). Small-scale enterprises seemed on average to be closer to their neighbours than larger

enterprises (Table 29). Another important measure to control disease is the washing of the poultry house after every "batch", which was evident amongst almost all of the enterprises. During the brooding period for both layers and broilers, additional heating of the environment in which the chickens are raised is necessary (Ross Breeders, 1996) so the use of thermometers in poultry houses is a valuable tool to manage this heating process, thereby influencing growth rates and mortality. Once the brooding period has been completed there is less need for thermometers, other than to record the prevailing temperature for interest, and to explain losses due to heat stress. Approximately a third of all larger enterprises (layer and broiler) used thermometers; small-scale broiler and layer enterprises have 10% and zero percent adoption rates respectively.

Table 29: General husbandry practices differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers only	(13)	Other poultry prod >2 km	20.0	100.0	69.2
		Other poultry prod <2 km	80.0	0.0	30.8
		House not washed	0.0	25.0	15.4
		Houses washed	100.0	75.0	84.6
		Without thermometers	100.0	62.5	76.9
		Use thermometers	0.0	37.5	23.1
Broilers only	(96)	Other poultry prod >2 km	19.1	49.0	34.4
		Other poultry prod <2 km	80.9	51.0	65.6
		Houses not washed	8.5	4.1	6.3
		Houses washed	91.5	95.9	93.8
		Without thermometers	89.4	65.3	77.1
		Use thermometers	10.6	34.7	22.9
Layers and Broilers	(13)	Other poultry prod >2 km	14.3	16.7	15.4
		Other poultry prod <2 km	85.7	83.3	84.6
		House not washed	0.0	0.0	0.0
		Houses washed	100.0	100.0	100.0
		Without thermometers	100.0	66.7	84.6
		Use thermometers	0.0	33.3	15.4

Note 1: Variables are mutually exclusive and sum to 100%.

The type of floor litter used has important hygiene implications. This is less important for layers housed in elevated wire cages that allow guano to be easily removed from beneath the cage. This was the case in most of the larger layer enterprises (71.4%) where no litter was required, whilst 60.0% of small-scale layer enterprises housed birds on the floor and used wood shavings as litter (Table 30). The expense of the cages is the expected reason for the difference. Wood shavings have the best absorbent properties but substitutes like hay/straw, newspaper or pine needles may be more affordable and readily available, which are important considerations for small-scale enterprises. All larger broiler enterprises used wood shavings compared with 83.0% of small-scale enterprises.

Table 30: Type of litter differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(12)	No litter used	40.0	71.4	58.3
		Wood shavings	60.0	14.3	33.3
		Newspaper	0.0	14.3	8.3
Broilers	(95)	Wood shavings	83.0	100.0	91.6
		Hay/Straw	10.6	0.0	5.3
		Newspaper	2.1	0.0	1.1
		Pine-needles	4.3	0.0	2.1
Mixed	(13)	Wood shavings	42.9	100.0	69.2
		Hay/Straw	57.1	0.0	30.8

Note 1: Variables are mutually exclusive and sum to 100%.

3.2.4 Poultry Equipment

It is important that birds always have fresh, clean and cool water available (Slippers, 1998; Wethli, 1999; Gous, 1999). The "nipple" and "bell" type drinkers are more

sophisticated and expensive compared with founts and simple drinking troughs. Both small-scale and larger layer enterprises have similar adoption levels of "nipple" drinkers (Table 31). A "nipple" inserted into the top of an inverted two litre "coke" bottle was a common innovation amongst small-scale layer enterprises. Bell drinkers are most common amongst larger broiler enterprises and founts amongst small-scale broiler enterprises. All of the larger layer and the majority of the larger broiler enterprises adopted automatically refilling drinker systems compared with a much lower adoption rate amongst small-scale enterprises.

Table 31: Types of drinker differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(26)	Nipple	75.0	71.4	73.1
		Bell	0.0	28.6	15.4
		Founts	8.3	0.0	3.8
		Troughs	16.7	0.0	7.7
		Refill manual	83.3	0.0	38.5
		Refill automatic	16.7	100.0	61.5
Broilers	(109)	Nipple	0.0	18.2	9.2
		Bell	5.6	52.7	29.4
		Founts	79.6	25.5	52.3
		Troughs	14.8	3.6	9.2
		Refill manual	96.3	29.1	62.4
		Refill automatic	3.7	70.9	37.6

Note 1: Variables are mutually exclusive and sum to 100%.

A small proportion of larger layer enterprises have adopted mechanised feeders (21.4%); simple trough feeders are the most common irrespective of enterprise size (Table 32). Tube feeders are the preferred type of feeder amongst all the broiler enterprises, where larger enterprises have a higher adoption rate (74.5%) than small-scale enterprises (53.7%).

Table 32: Types of feeder differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(26)	Trough	83.3	64.3	73.1
		Tube	16.7	14.3	15.4
		Mechanised	0.0	21.4	11.5
Broilers	(109)	Trough	46.3	18.2	32.1
		Tube	53.7	74.5	64.2
		Mechanised	0.0	7.3	3.7

Note 1: Variables are mutually exclusive and sum to 100%.

Brooders or heating units are only important when rearing day-old chicks (Ross Breeders, 1996; Slippers, 1998; Gous, 1999) and therefore, it is not surprising that brooder adoption rates in Table 33 correspond closely to the age at which birds are purchased in Table 24 (p. 44). Many small-scale broiler enterprises have no heating (25.9%) relative to larger enterprises (1.8%) largely for reasons of affordability and inadequate training. Some producers used brooders amongst older birds in very cold conditions. Gas heaters predominate amongst larger enterprises (52.7%) followed by electric (40.0%). Conversely, the most common source of heating in small-scale broiler enterprises is electricity (31.5%) followed by paraffin (22.2%).

Table 33: Types of brooder differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(26)	No heating	83.3	64.3	73.1
		Wood	8.3	0.0	3.8
		Gas	0.0	28.6	15.4
		Electric	8.3	7.1	7.7
Broilers	(109)	No heating	25.9	1.8	13.8
		Wood	9.3	1.8	5.5
		Paraffin	22.2	3.6	12.8
		Gas	11.1	52.7	32.1
		Electric	31.5	40.0	35.8

Note 1: Variables are mutually exclusive and sum to 100%.

Egg production in layers and weight gain in broilers may be improved with the use of artificial lighting, which is used to provide the birds with a constant daylength longer than the natural daylength (Wethli, 1999). In all enterprises most light is provided from an electric source although a large proportion (25.5%) of small-scale broiler enterprises use paraffin (Table 34). Larger layer and broiler enterprises have higher adoption rates for lighting and utilise varying lighting periods more than small-scale enterprises.

Table 34: Types of lighting differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(26)	No lighting	33.3	35.7	34.6
		Paraffin	0.0	7.1	3.8
		Electric	66.7	57.1	61.5
		Lighting constant	91.7	57.1	73.1
		Alter lighting period	8.3	42.9	26.9
Broilers	(109)	No lighting	40.0	14.5	27.3
		Paraffin	25.5	9.1	17.3
		Gas	0.0	3.6	1.8
		Electric	34.5	72.7	53.6
		Lighting constant	75.9	56.4	66.1
		Alter lighting period	24.1	43.6	33.9

Note 1: Variables are mutually exclusive and sum to 100%.

3.2.5 Husbandry Practices

Table 35 shows that there is no significant difference between the number of batches of laying hens purchased or reared per annum, indicating that both small-scale and larger enterprises are fully utilising the productive cycle of their poultry housing. However, there is a significant difference between small-scale and larger enterprises regarding the number of broiler batches per annum. This is more likely

to be a function of marketing than husbandry practice. There is an insignificant difference between small-scale and larger enterprises for the minimum number of days the poultry house is rested between batches, which is an important husbandry practice to minimise the spread of disease.

Table 35: Batch numbers and days rested and their significant differences

Variable	Size	N	Mean	Std. Dev.	Df	t-test
Batches of Layers	Small	13	1.00	0.00	13.0	-1.000
	Large	14	1.07	0.27		
Batches of Broilers	Small	54	4.36	1.28	105.9	**-2.891*** **
	Large	54	5.06	1.24		
Min Days Rested	Small	59	17.64	29.13	69.2	0.738
	Large	63	14.71	9.38		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Amongst small-scale layer enterprises, only 8.3% of respondents indicated that vaccinations were administered on farm compared to 57.1% amongst the larger enterprises (Table 36). This differential is less for broiler enterprises. Vaccinations administered by the hatchery or layer pullet producer are termed off farm. The vaccines often require refrigeration but this is not a significant factor (Table 37). Training is considered to be the primary reason for these differences in adoption.

Table 36: Vaccinations differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(26)	If any or vaccinations off farm	91.7	42.9	65.4
		Vaccinations on farm	8.3	57.1	34.6
Broilers	(109)	If any or vaccinations off farm	13.0	7.3	10.1
		Vaccinations on farm	87.0	92.7	89.9

Note 1: Variables are mutually exclusive and sum to 100%.

Table 37: Asset ownership and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Number of Fridges Owned	Small	61	0.75	1.19	121.2	-0.189
	Large	63	0.79	1.14		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Impacts of poor husbandry or lack of vaccinations should be reflected in mortality rates per production period. Table 38 shows little difference between the causes of mortality between small-scale and larger enterprises, neither is there a higher incidence of disease amongst small-scale broiler enterprises. Half of the larger enterprises that had both layers and broilers were uncertain of the causes of their mortality. Although the differences in mortality rates were low during the survey period, it is known that during acute outbreaks of diseases such as Newcastle Disease, the unvaccinated birds in small-scale enterprises are more severely compromised than the vaccinated birds in larger enterprises (Gous, 1999). The levels of vaccinations reported in Table 36 for small-scale enterprises in the sample survey is expected to be higher than the population at large because of the sampling bias created by using extension officers as a sampling frame (Section 1.5.1).

Table 38: Causes of mortality differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Layers	(13)	Unknown	40.0	12.5	23.1
		Weather	20.0	37.5	30.8
		Disease	20.0	12.5	15.4
		Other	20.0	25.0	23.1
		Numerous causes	0.0	12.5	7.7
Broilers	(96)	Unknown	8.5	6.1	7.3
		Weather	29.8	24.6	27.1
		Disease	44.7	26.5	35.4
		Other	12.8	16.3	14.6
		Numerous causes	4.3	26.5	15.6
Mixed	(13)	Unknown	0.0	50.0	23.1
		Weather	28.6	16.7	23.1
		Disease	28.6	33.3	30.8
		Other	28.6	0.0	15.4
		Numerous causes	14.3	0.0	7.7

Note 1: Variables are mutually exclusive and sum to 100%.

Table 39 indicates the actual mortality percentage for layer and broiler enterprises, which are not significantly different for small-scale and larger enterprises. This reaffirms that disease reduction husbandry practices between small-scale and larger enterprises are either similar or different, but adequate.

Table 39: Mortality percentages and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Layer mortality	Small	12	0.05	0.04	18.7	-0.896
(per production cycle)	Large	13	0.07	0.08		
Broiler mortality	Small	54	0.12	0.12	91.6	1.468
(per production cycle)	Large	55	0.09	0.08		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

3.3 PRINCIPAL COMPONENT ANALYSIS

Numerous technical production parameters have being described, which need to be analysed jointly and summarised by a multivariate technique, of which Principal Component Analysis is the most appropriate. This technique was first described by Karl Pearson (1901) but was only used as a practical computing method much later by Hotelling (1933). The widespread use of the technique, however, only occurred after electronic computers became widely available (Manly, 1986:59) because the required calculations are extremely daunting when manually analysing more than a few variables. The objective of Principal Component Analysis is to take p variables $X_1, X_2, \ldots, X_p$ and find combinations of these to produce indices $Z_1, Z_2, \ldots, Z_p$ that are uncorrelated. The lack of correlation is a useful property because it means that the indices are measuring different "dimensions" in the data. In addition, the indices are ordered so that Z_1 displays the largest amount of variation, Z_2 displays the second largest and so on; *i.e.* var (Z_1) > var (Z_2) > ... > var (Z_p), where var (Z_i) denotes the variance of Z_i in the data set being considered. Z_i are called Principal Components (PCs), which are detailed in the following equation, where b_{ii} are factor loadings:

Equation 1: Principal Component Analysis

$$Z_1 = b_{11}X_1 + b_{12}X_2 + \ldots + b_{1p}X_p$$

$$Z_2 = b_{21}X_1 + b_{22}X_2 + \ldots + b_{2p}X_p$$

$$Z_p = b_{p1}X_1 + b_{p2}X_2 + \ldots + b_{pp}X_p$$

Best results are obtained when the original X variables are highly correlated, which will result in the data set being adequately described by fewer Z variables. The main technical poultry parameters are expected to be correlated, in which case the survey data can be summarised by Principal Component Analysis. Table 40 defines the main technical poultry parameters (X_1, X_2, ... , X_P) used to determine the underlying Principal Components or "dimensions" (Z_1, Z_2, ... , Z_P).

Table 40: Technical parameters used in the principal component analysis

Variable	Description
House	Dummy scoring 1 if the poultry house is purpose built, 0 otherwise.
Heater	Dummy scoring 1 if either gas or electric heaters are used, 0 otherwise.
Light	Dummy scoring 1 if either gas or electric lights are used, 0 otherwise.
Alter lighting period	Dummy scoring 1 if the lighting period is changed to optimise production, 0 otherwise.
Thermometer	Dummy scoring 1 if thermometers are used to monitor temperature, 0 otherwise.
Refill	Dummy scoring 1 if drinkers are automatically refilled, 0 otherwise.
Proximity of other farms	Dummy scoring 1 if other poultry farms are more than two kilometre radius away, 0 otherwise.
Commercial feed	Dummy scoring 1 if commercial feed is used, 0 otherwise.
Pellets	Dummy scoring 1 if pelleted feed is used, 0 otherwise.
Rations	Dummy scoring 1 if feed rations are varied over the production cycle, 0 otherwise.
Drinker	Dummy scoring 1 if nipple drinkers are used, 0 otherwise.
Mechanised feeder	Dummy scoring 1 if mechanised feeders are used, 0 otherwise.
Concrete floor	Dummy scoring 1 if poultry housing has a concrete floor, 0 otherwise.
Litter	Dummy scoring 1 if wood shavings are used as litter, 0 otherwise.

An orthogonal varimax factor rotation was applied to the Principal Component Analyses in order to find PCs that are easier to interpret, using SPSS version 9.0, 1999. This method is based on the assumption that the interpretability of factor j can be measured by the variance of the square of its factor loadings; *i.e.* the variance of b^2_{1j}, b^2_{2j}, ..., b^2_{pj}. If this variance is large, then the b^2_{ij} values tend to be either close

to zero or close to unity. The varimax factor rotation therefore, maximises the sum of these variances for all the factors (Manley, 1986; 75). Variables with rotated factor loadings greater than 0.3 and eigen values greater than one are reported in Table 41. These eigen values and percentage variations are comparable with a similar analysis conducted by Bizimana *et al.* (2002).

Table 41: Loadings and eigen values for technical principal components

Underlying Variable (scoring 1, otherwise 0)	N	Adoption	PC1 Loading	PC2 Loading	PC3 Loading	PC4 Loading
House	122	0.648	0.494			
Heater	122	0.623	0.804			
Light	123	0.585	0.774			
Alter lighting period	122	0.336	0.468	0.472		
Thermometer	122	0.221	0.396		0.507	
Refill	122	0.393	0.519		0.468	
Proximity of other farms	122	0.361	0.578			-0.446
Commercial feed	123	0.943		0.632		
Pellets	121	0.777		0.670		
Rations	102	0.559		0.675		
Drinker	122	0.230			0.809	
Mechanised feeder	122	0.057			0.790	
Concrete floor	122	0.836				0.669
Litter	121	0.835				0.784
Eigen Values			3.233	1.844	1.403	1.251
Percentage Variation			23.094	13.173	10.023	8.935

The first principal component, PC1, captures management practices and can therefore be interpreted as an index positively related to the use of these practices. PC2 is an index of feed utilisation, as it captures information relating to the use of different types of poultry feed and the birds feeding period, which is a function of lighting. PC3 has high loadings for equipment, including thermometers, drinking systems that automatically refill, the use of nipple drinkers and mechanised feeders

creating an index for equipment use. PC4 has high loadings for proximity to other farms, concrete floors within the poultry house and the use of wood shavings as litter, all of which play an important part in reducing the spread of disease. Hence, PC4 is an index of disease reduction practices.

To determine if these "dimensions" are significantly different for small-scale and larger enterprises a t-test was carried out on the four orthogonal PCs. Table 42 presents the results, which indicate that management practices and equipment use are significantly different but that feed utilisation and disease reduction practices are similar.

Table 42: Technical principal components and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
PC1-Management	Small	61	1.06	1.14	109.3	**-9.273*** **
	Large	62	2.72	0.82		
PC2 Feed	Small	61	1.47	0.77	116.8	0.324
	Large	62	1.42	0.94		
PC3-Equipment	Small	61	0.14	0.50	105.2	**-6.188*** **
	Large	62	0.86	0.76		
PC4-Disease	Small	61	1.01	0.61	118.5	-0.038
	Large	62	1.01	0.53		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

3.4 SUMMARY

In the survey conducted, most small-scale (84.6%) and larger (71.4%) layer enterprises use the "Hyline Brown" strain and almost all broiler enterprises use the "Ross" strain. Only 8.3% of small-scale enterprises purchased day-old layers

compared with 21.4% of larger enterprises. Most broiler enterprises use day-old chicks, irrespective of their size. Both layer and broiler producers, small and large alike, keep birds of the same age in the same house.

Adoption of pellets/crumbles is higher amongst small-scale layer enterprises (50.0%) relative to larger layer enterprises (15.4%) but adoption rates of pellets/crumbles are higher for broiler enterprises irrespective of size. Adoption rates for the use of different feed types (starter, finisher and post finisher) is also similar. The average age at which broilers are sold and the average number of weeks for an enterprise to sell a batch are lower amongst larger enterprises but the differences are not significant.

Purpose built poultry houses are more prevalent amongst larger enterprise relative to small-scale enterprises. Small-scale enterprises are less inclined to have concrete floors in their poultry houses and on average are closer to their neighbours than larger enterprises, thereby increasing their overall risk of disease. All enterprises irrespective of size wash their houses after every "batch".

Most of the larger layer and broiler enterprises use drinker systems that automatically refill with a much lower adoption rate amongst small-scale enterprises. Only a small proportion of larger layer enterprises use mechanised feeders (21.4%). Larger layer and broiler enterprises have higher adoption rates for lighting and utilise varying lighting periods more than small-scale enterprises.

Amongst small-scale layer enterprises, only 8.3% of respondents indicated that vaccinations were administered on farm compared to 57.1% amongst the larger enterprises; this differential is less for broiler enterprises. However, actual mortality percentages are not significantly different for small-scale and larger enterprises.

Technical poultry production parameters are summarised by four orthogonal Principal Components (PCs); *viz.* management activities, feed utilisation, equipment use and disease reduction practices but only management activities and equipment use are significantly higher amongst larger enterprises. The focus of Chapter 4 is to ascertain if these factors and others impact enterprise growth.

CHAPTER FOUR

4. FACTORS IMPACTING POULTRY ENTERPRISE GROWTH

4.1 INTRODUCTION

In a survey of small-scale farmers in Mpumalanga, Makhura *et al.* (1998) found that the larger farmers (where arable land is used as the measure of size) have better access to formal markets, credit and information, and that they demonstrate greater managerial capabilities such as record keeping than do smaller farmers. Mbowa (1998) found that small-scale sugarcane farms in KwaZulu-Natal producing less than 500 tons of cane (±10 ha) require significantly more resources to produce a Rand's worth of output than farms producing more than 2 500 tons (±50 ha). This is evidence of strong size economies, *i.e.* declining costs per unit produced as fixed costs (*e.g.* management, supervision, machinery, information, depreciation, security and most transaction costs) are spread over a greater output. The smaller farm, therefore, with limited output and certain unavoidable fixed costs finds itself at a disadvantage (Huffman, 1974; Welch, 1978:259).

Enterprise growth amongst small-scale producers is constrained by a host of factors. Section 4.2 presents an overview of some of the more obvious factors that were discussed in Chapter 2 and develops some of these concepts further. From this foundation a block recursive regression model is constructed to help better explain

the constraints that inhibit enterprise growth and prevent small-scale producers from capturing the benefits of size economies.

4.2 MAIN FACTORS IMPACTING ENTERPRISE GROWTH

4.2.1 Transaction costs

Makhura (2001) has shown that market participation is a function of *ex ante* transaction costs. These are mainly fixed costs associated with the search for trading partners, negotiating and drafting agreements. Fixed transaction costs are higher when farms are isolated from markets and information sources by inadequate infrastructure. This is supported by Fitschen and Klitgaardt (1996) and Alwang *et al.* (1996) who found strong relationships between rural poverty and isolation from infrastructure in the former KwaZulu homeland.

At this point it is important to highlight some conceptual and measurement difficulties that arise when attempts are made to quantify transaction costs. When transaction costs are high enough to prevent exchanges from occurring, these costs cannot be observed because no transaction exists. Observed transaction costs therefore may not provide much of a guide for policy interventions that are intended to promote entry by producers into certain activities that are not currently undertaken (Staal *et al.*, 1997). This is less important for this study because all the respondents in the sample survey actively participated in some sort of poultry

production enterprise. Consequently, the *ex ante* transaction costs have been overcome and the level of participation is now affected by the extent of *ex post* transaction costs. *Ex post* transaction costs are essentially the same as *ex ante* transaction costs but also include risk premiums associated with moral hazard (*i.e.* breach of contract). These latter transaction costs increase with the size of a transaction and therefore affect volumes traded and the type of contracts observed. Local sources of *ex ante* and *ex post* transaction costs include:

- Limited access to communication technology such as telephones and postal services (Matungul, 2002:81 & 101; Hendriks and Lyne, 2003).
- Large distances to towns over poor roads (Fitschen and Klitgaart, 1996; Makhura, 2001:73-74; Matungul, 2002:101; Hendriks and Lyne, 2003).
- Limited access to vehicles for transport (Makhura, 2001:73-74; Matungul, 2002: 95; Hendriks and Lyne, 2003).
- Low levels of education that create difficulties in assembling and interpreting information (Feder and Slade, 1984; Makhura, 2001: 67-68; Matungul, 2002:81).
- A disintegration of community traditions and trust that increases moral hazard (Crookes, 2002:76-77).
- Tenure insecurity that reduces available collateral and information for lenders, increasing risk premiums and thereby rationing credit access (Fenwick and Lyne 1999).

- Dual legal systems create uncertainty where disputes involving local contracts are heard by traditional rather than formal courts of law (Lyne, 1996).
- Limited access by women in rural areas to informal credit markets and tribal authorities that administer disputes (Berry, 1993; Lyne, 1996).

4.2.2 Institutional arrangements

The sustainability of an enterprise is a function of its institutional arrangements, where an institution consists of a combination of informal or customary constraints, formal legal rules (*e.g.* the constitutional rules of the business entity) and the enforcement characteristics of both (Furubotn and Richter, 1991:3). Common business institutions used in South Africa include public and private companies, trusts, closed corporations, co-operatives, and – in the case of many small-scale commercial poultry enterprises, informal associations whose members contribute to a joint venture. Public and private companies are generally preferred as business institutions as they attract equity and debt capital. In part, this is because shareholders and lenders are assured that key provisions for "good" governance are entrenched in law.

4.2.3 Access to credit

Bates (1996) argues that the transaction costs associated with small-scale farmers in South Africa accessing start-up credit are substantial. The most significant factor is

the absence of a land market in those areas of KwaZulu-Natal administered by tribal authorities, which effectively removes both the collateral value of land and an important source of information for lenders. For those enterprises that have overcome the *ex ante* transaction costs and obtained credit Barry *et al.* (1983:332) argues that superior financial managers can improve enterprise growth rates through ongoing access to credit and high leverage (Barry *et al.*, 1983:135). This suggests that levels of credit currently used by poultry producers should reflect their levels of start-up credit - provided that the enterprises have not been operating for too long.

4.2.4 Human capital

Better-educated farmers can assimilate and interpret information at lower costs than less educated farmers. Consequently, farmers with higher levels of formal education and better access to information usually have higher levels of cumulative information, display better allocative abilities, and adopt technology earlier than other farmers, *ceteris paribus* (Feder *et al.*, 1982; Feder and Slade, 1984). Larger-scale farmers tend to invest more heavily in education and information because the returns increase with farm size whereas the costs are size free (Welch, 1978:274). Huffman (1974) reports numerous empirical studies showing a strong positive correlation between farm size, education and the adoption of technology. However, the advantages associated with additional schooling can be substituted with an increase in well-informed extension activity.

4.2.5 Markets and prices

Larger-scale producers are expected to contract with fewer but bigger customers (supermarkets, hospitals, schools, *etc.*) reducing the price variability associated with thinly traded markets. Larger enterprises benefit from size economies in production and marketing and therefore are better able to compete in urban markets where prices are lower but much more reliable. Small-scale farmers face relatively high unit costs that limit their options in production and marketing to the detriment of their efficiency and equity (Staal *et al.*, 1997).

4.3 SPECIFICATION OF THE GROWTH MODEL

4.3.1 The Generalised Model

Building on the arguments presented so far, a block-recursive regression model is hypothesised to link and explain the factors that inhibit enterprise growth, preventing small-scale producers from capturing the benefits of size economies. The generalised model comprises five equations. Equation 2 asserts that levels of credit used are determined by the entrepreneur's choice of business organisation (*e.g.* sole proprietor, company or informal group), liquidity, wealth, education, experience, land tenure, gender and transaction costs.

Equation 2: **Credit** = *f* (Business Organisation, Liquidity, Wealth, Education, Experience, Tenure, Gender, Transaction Costs)

Equation 3 explains initial enterprise size as a function of credit used, access to utilities such as reticulated water and electricity, market type, transaction costs and the quality of information.

Equation 3: **Initial Size** = *f* (**Credit**, Utilities, Market, Transactions Costs, Information)

In Equation 4 the adoption of technology is explained in terms of the enterprise's initial size and operating period, access to utilities, quality of information and the entrepreneur's level of education.

Equation 4: **Technology** = *f* (**Initial Size**, Operating Period, Utilities, Education, Information)

In Equation 5, growth rate is expressed as a function of the enterprise's initial size, investment in technology and the quality of information and management.

Equation 5: **Growth Rate** = *f* (**Initial Size**, **Technology**, Information, Management)

Lastly, Equation 6 expresses an enterprise's current size as a function of its growth rate and period of operation.

Equation 6: Enterprise Size = *f* (**Growth Rate**, Operating Period)

Further analysis of Equation 6 and its variables have being omitted because no policy implications can be inferred from the estimation of this equation. Ordinary Least Squares (OLS) regression can be used to estimate Equation 2 but not the other equations as they include endogenous explanatory variables (highlighted in boldface). For Equation 2 to Equation 5 parameter estimates obtained by OLS are inconsistent due to the likely correlation between the stochastic endogenous variables and the stochastic error term (Gujarati, 1995:688). To address this problem, the endogenous explanatory variables can be substituted with instrumental variables estimated from all of the exogenous variables in the system (Gujarati, 1995:687). This can be achieved using Two Stage Least Squares (2SLS) developed independently by Theil (1953) and Basmann (1957). The workings of the 2SLS technique are explained using simplified versions of Equation 2 to Equation 5, where Y_1 is credit, Y_2 is initial size, Y_3 is technology, Y_4 is growth rate and X_1 to X_4 are examples of the exogenous variables in all the equations. These simplified equations are presented below, where u is the error term:

Equation 7: $$Y_1 \equiv \beta_{10} + \gamma_{11} X_1 + u_1$$

Equation 8: $$Y_2 \equiv \beta_{20} + \beta_{21} Y_1 + \gamma_{22} X_2 + u_2$$

Equation 9: $$Y_3 \equiv \beta_{30} + \beta_{32} Y_2 + \gamma_{33} X_3 + u_3$$

Equation 10: $Y_4 \equiv \beta_{30} + \beta_{42} Y_2 + \beta_{43} Y_3 + \gamma_{44} X_4 + u_4$

To eliminate the likely correlation between the stochastic explanatory variables (Y_n) and the stochastic disturbance terms (u_n), "proxies" for Y_n are calculated such that, although resembling the original stochastic explanatory variable in the sense that they are highly correlated, they are uncorrelated with the disturbance term. These proxies are the instrumental variables and are obtained by regressing the original stochastic explanatory variables on ALL the exogenous variables from ALL the equations, as outlined below:

Equation 11: $Y_1 \equiv \hat{\Pi}_{10} + \hat{\Pi}_{11} X_1 + \hat{\Pi}_{12} X_2 + \hat{\Pi}_{13} X_3 + \hat{\Pi}_{14} X_4 + \hat{\Pi}_{15} X_5 + \hat{u}_1$

Equation 12: $Y_2 \equiv \hat{\Pi}_{20} + \hat{\Pi}_{21} X_1 + \hat{\Pi}_{22} X_2 + \hat{\Pi}_{23} X_3 + \hat{\Pi}_{24} X_4 + \hat{\Pi}_{25} X_5 + \hat{u}_2$

Equation 13: $Y_3 \equiv \hat{\Pi}_{30} + \hat{\Pi}_{31} X_1 + \hat{\Pi}_{32} X_2 + \hat{\Pi}_{33} X_3 + \hat{\Pi}_{34} X_4 + \hat{\Pi}_{35} X_5 + \hat{u}_3$

Equation 14: $Y_4 \equiv \hat{\Pi}_{40} + \hat{\Pi}_{41} X_1 + \hat{\Pi}_{42} X_2 + \hat{\Pi}_{43} X_3 + \hat{\Pi}_{44} X_4 + \hat{\Pi}_{45} X_5 + \hat{u}_4$

From the equations above an estimate of the original stochastic explanatory variables are obtained as follows:

Equation 15: $$\hat{Y}_1 \equiv \hat{\Pi}_{10} + \hat{\Pi}_{11} X_1 + \hat{\Pi}_{12} X_2 + \hat{\Pi}_{13} X_3 + \hat{\Pi}_{14} X_4 + \hat{\Pi}_{15} X_5$$

Equation 16: $$\hat{Y}_2 \equiv \hat{\Pi}_{20} + \hat{\Pi}_{21} X_1 + \hat{\Pi}_{22} X_2 + \hat{\Pi}_{23} X_3 + \hat{\Pi}_{24} X_4 + \hat{\Pi}_{25} X_5$$

Equation 17: $$\hat{Y}_3 \equiv \hat{\Pi}_{30} + \hat{\Pi}_{31} X_1 + \hat{\Pi}_{32} X_2 + \hat{\Pi}_{33} X_3 + \hat{\Pi}_{34} X_4 + \hat{\Pi}_{35} X_5$$

Equation 18: $$\hat{Y}_4 \equiv \hat{\Pi}_{40} + \hat{\Pi}_{41} X_1 + \hat{\Pi}_{42} X_2 + \hat{\Pi}_{43} X_3 + \hat{\Pi}_{44} X_4 + \hat{\Pi}_{45} X_5$$

The estimates of the original stochastic explanatory variables are an approximation of the mean value of the original stochastic explanatory variables conditional upon the fixed X variables. Therefore, the original stochastic explanatory variables can now be expressed as:

Equation 19: $$Y_1 \equiv \hat{Y}_1 + \hat{u}_1$$

Equation 20: $$Y_2 \equiv \hat{Y}_2 + \hat{u}_2$$

Equation 21: $$Y_3 \equiv \hat{Y}_3 + \hat{u}_3$$

Equation 22: $$Y_4 \equiv \hat{Y}_4 + \hat{u}_4$$

The above equations show that the original stochastic explanatory variables consist of two parts; *viz.* $\hat{Y}_n$ which is a linear combination of the nonstochastic X variables

and a random component $\hat{u}_n$. According to OLS theory $\hat{Y}_n$ and $\hat{u}_n$ are now uncorrelated and Equation 7 to Equation 10 can be written as:

Equation 23: $Y_1 \equiv \beta_{10} + \gamma_{11} X_1 + u_1$

Equation 24: $Y_2 \equiv \beta_{20} + \beta_{21}(\hat{Y}_1 + \hat{u}) + \gamma_{22} X_2 + u_2$; which can be simplified to:

$$Y_2 \equiv \beta_{20} + \beta_{21} \hat{Y}_1 + \gamma_{22} X_2 + u_2^*$$

Equation 25: $Y_3 \equiv \beta_{30} + \beta_{32} \hat{Y}_2 + \gamma_{33} X_3 + u_3^*$

Equation 26: $Y_4 \equiv \beta_{40} + \beta_{42} \hat{Y}_2 + \beta_{43} \hat{Y}_3 + \gamma_{44} X_4 + u_4^*$

The difference between Equation 7 to Equation 10 and Equation 23 to Equation 26 is that Y_n is replaced by $\hat{Y}_n$, which is uncorrelated with u^*_n when the sample is large. Consequently, OLS can be applied to the latter equations to obtain consistent estimates for the initial size parameters; *i.e.* they converge to their true values as the sample size increases indefinitely.

4.3.2 Model Variables

Table 43 defines the variables used to estimate the hypothesised block-recursive regression model described in Section 4.3.1. The sign that each variable is expected to have on enterprise size is also indicated.

Table 43: Variables influencing the size of poultry enterprises

Variable		Description	Sign
Endogenous Variables			
Credit	Cr	The current level of overdraft plus term finances (Rand).	+
Initial Size	Is	The number of birds at the outset of production.	+
Technology	Tg	Positive technology index created by Principal Component Analysis.	+
Growth Rate*	Gr	(Current size –Initial size)/number of years in operation.	+
Exogenous Variables			
Group	Gp	Dummy scoring a 1 for producers that are members of an informal group or trust, 0 otherwise.	-?
Company	Co	Dummy scoring 1 for producers whose enterprises are constituted as Closed Corporation or Private Company, 0 otherwise.	+
Liquidity	Li	Proxy variable for liquidity measured by the amount of non-poultry income received per annum by the producer (Rand).	+
Wealth	We	Proxy variable for producer's wealth measured by the number of vehicles owned, including bakkies, cars, tractors and trucks.	+
Education	Ed	Education of producer in school standards (diploma=12 and degree=13)	+
Experience	Ex	Age minus education minus 8 years.	+/-?
Tenure	Te	Dummy variable scoring 1 if enterprise operated on tribal land, 0 otherwise.	-
Gender	Ge	Dummy variable scoring 1 if the sex of the owner/manager was female, 0 otherwise.	-
Transaction Cost	Tc	Positive index of transaction cost variables created by Principal Component Analysis.	-
Utilities	Ut	Dummy scoring 1 for enterprises with piped water and electricity, 0 otherwise.	+
Local Market	Lm	Dummy scoring 1 if enterprise's main market was local market, 0 otherwise.	-?
Initial Information*	Ii	Dummy scoring 1 if initial start-up information provided by input suppliers or government extension officers, 0 if provided by own initiative.	+/-?
Operation Period	Op	Number of years poultry enterprise has been in operation.	+
Current Information**	Ci	Dummy scoring 1 if current information provided by input suppliers or government extension officers, 0 if provided by own initiative.	+/-?
Management	Mg	Positive index of managerial quality created by Principal Component Analysis.	+

Note 1:* This is a measure of enterprise growth rate and not bird population growth rate, which would be a compound rate. Gr measures the growth impact on the local economy so is not scaled for size.
2:** Initial information from input suppliers and government extension officers could have a negative influence on enterprise size if better quality information is obtained by those producers using their own initiative.

Certain variables used in the generalised model such as technology adoption cannot easily be measured because they represent constructs of several variables (*e.g.* use of both automated feeders and drinkers). In such cases, principal component analysis is used to produce a single index that accounts for a substantial share of the variation in the underlying variables. This approach also reduces multicollinearity by collapsing correlated variables into one uncorrelated index (Manly, 1986:60). The theory of Principal Component Analysis is presented in Section 3.3 (the varimax rotation application has been omitted in this analysis).

Results from the Principal Component Analyses (SPSS version 9.0, 1999) are presented in Table 44. This technique was used to create positive indexes for technology adoption, transaction costs and management. The technology index (Tg) is a positive measure of adoption; the use of automated water and feed supplies indicates a high level of technology adoption, the use of bell or nipple drinkers a medium level, and the use of founts or trough drinkers a low level. High transaction costs (Tc) are hypothesised to be a function of poor telephone access, an inability to speak English, low education levels and a large "real" distance to commercial centres (represented by the producer's feed supplier). This "real" distance transaction cost indicator becomes insignificant if households own a vehicle/s in which case it is set to zero. Good management (Mg) reflects the presence of financial records (financial), varying light duration in the poultry house (husbandry), and value-adding by grading eggs or slaughtering broilers (marketing).

Table 44: Loadings and eigen values for size principal components

Underlying Variable (scoring 1, otherwise 0)	N	Adoption	First Principal Component Loading
Technology (Tg)			
Automated feed supply	124	0.56%	0.422
Automated water supply	124	38.71%	0.937
Use of bell/nipple drinkers	124	47.58%	0.944
Use of founts/trough drinkers*	124	54.03%	-0.954
Eigen Value			**2.856**
% Variation accounted for			**71.41%**
Transaction Costs (Tc)			
Inadequate telephone access	118	34.75%	0.803
Inability to speak English	118	33.90%	0.857
Education (as per Table 43)**	118	7.42 stds	-0.884
No vehicle ownership (1, otherwise 0) x distance to feed supplier	118	13.89 km	0.747
Eigen Value			**2.710**
% Variation accounted for			**67.74%**
Management (Mg)			
Compile financial records	122	64.75%	0.798
Vary poultry house lighting	122	33.61%	0.627
Add value***	122	31.15%	0.632
Eigen Value			**1.429**
% Variation accounted for			**47.64%**

Notes 1: * Founts/trough drinkers represent low technology.
2: ** The negative sign implies a reduction in transaction costs as education increases.
3: *** Value adding occurs when either eggs are graded or broilers slaughtered.

Table 45 presents the mean values of the variables listed in Table 43 (p. 73), computed for small-scale and larger respondents. The mean values differ significantly for all variables except "group" (Gp) and "experience" (Ex). The direction of all the differences is consistent with the signs hypothesised in Table 43.

Table 45: Variables influencing poultry enterprise size and their significant differences

Variable	Code	Size	N	Mean	Std. Dev	Df	t-test
Endogenous Variables							
Credit	Cr	Small	61	485.25	1531.84	61.0	**-4.172*** **
		Large	62	53150.32	99387.38		
Initial Size	Is	Small	60	86.28	132.11	58.2	**-4.656*** **
		Large	59	1841.95	2893.33		
Technology	Tg	Small	61	-0.58	0.80	103.7	**-9.486*** **
		Large	62	1.21	1.25		
Growth Rate	Gr	Small	60	20.01	37.23	59.1	**-4.453*** **
		Large	60	984.21	1676.68		
Exogenous Variables							
Group	Gp	Small	61	0.23	0.42	118.4	0.949
		Large	62	0.16	0.37		
Company	Co	Small	61	0.00	0.00	61.0	**-3.425*** **
		Large	62	0.16	0.37		
Liquidity	Li	Small	61	40073.82	191231.44	67.5	**-1.800***
		Large	62	235229.71	831673.83		
Wealth	We	Small	61	0.52	0.94	71.0	**-6.063*** **
		Large	62	3.18	3.31		
Education	Ed	Small	61	5.31	3.91	120.5	**-6.113*** **
		Large	62	9.52	3.71		
Experience	Ex	Small	61	34.98	15.84	120.0	1.480
		Large	61	30.77	15.60		
Tenure	Te	Small	61	0.84	0.37	119.0	**8.168*** **
		Large	62	0.24	0.43		
Gender	Ge	Small	61	0.75	0.43	121.0	**6.021*** **
		Large	62	0.27	0.45		
Transaction Cost	Tc	Small	61	13.73	16.27	99.8	**7.736*** **
		Large	62	-5.19	10.07		
Utilities	Ut	Small	61	0.38	0.49	119.8	**-4.117*** **
		Large	62	0.73	0.45		
Local Market	Lm	Small	60	0.87	0.34	112.2	**7.594*** **
		Large	62	0.31	0.46		
Initial Information	Ii	Small	61	0.59	0.50	118.9	**3.922*** **
		Large	62	0.26	0.44		
Operation Period	Op	Small	60	4.79	6.50	90.8	**-2.589** **
		Large	61	9.45	12.44		
Current Information	Ci	Small	61	0.84	0.37	113.8	**2.840*** **
		Large	62	0.61	0.49		
Management	Mg	Small	60	0.58	0.62	118.0	**-6.310*** **
		Large	62	1.26	0.56		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

From Table 45 it is clear that the vast majority of small-scale poultry enterprises are: (1) located on land administered by tribal authorities; (2) have poor access to utilities; (3) are managed by women who lack education and resources; (4) face high transaction costs; and (5) seldom use (more reliable) urban markets to sell products. Small-scale poultry producers come mainly from previously disadvantaged communities and have much lower growth rates than do larger enterprises.

4.4 ANALYSIS OF FACTORS INFLUENCING ENTERPRISE GROWTH

Given the variables presented in Table 43 (p. 73) the block-recursive regression model postulated in Section 4.3 can be formalised as an empirical model by the following set of estimated equations:

Equation 27: Cr_1 = f { **Gp, Co, Li_2, We, Ed, Ex, Te, Ge, Tc** }

Equation 28: Ln (Is) = f { Cr_1, **Ut, Lm, Tc, Ii** }

Equation 29: Tg = f { Ln $(Is)_3$, **Tc, Ed, Op, Ci, Ut** }

Equation 30: Gr = f { Is, Tg, **Ci, Mg** }

Notes 1: The credit variable defined in Table 43 is divided by 1000 to improve its scale.
2: The liquidity variable defined in Table 43 is divided by 1000 to improve its scale.
3: A natural logarithm was applied to "initial size" because a linear relationship with the technology index is unlikely.

4.4.1 Credit

As explained in Section 4.2.3, current credit (Cr) is used as a proxy for start-up credit in Equation 27. The OLS results presented in Table 46 show that the most important factor influencing the level of credit is wealth (*i.e.* the ability to provide the creditor with surety-ship or collateral in the form of movable assets). Constituting the enterprise as a company or closed corporation (to entrench accountability and strong investment incentives) helps to reduce creditors' risk and is the next most important determinant of credit. Liquidity, or the ability to repay fixed instalments, is the third and last of the significant explanatory variables. The insignificant coefficient estimated for land tenure could indicate that, even where land is marketable, its value is low relative to the capital requirements of a poultry enterprise. As expected women are less likely to obtain credit and the results show that gender is significant at the thirteen percent level of probability. Transaction costs as defined in Table 44 (p. 75) do not significantly effect the level of credit.

Table 46: OLS regression results for Equation 27 (Credit)

Equation 27		**Description**			
Technique		OLS			
Adjusted R^2 (%)		50.85%			
Sample Size		113			
Dependent Variable		Credit (*Cr*)			
F Statistic		**14.450*** **			
Predictor Variable		**Expected Sign**	**Coeff**	**Beta**	**t-test**
Constant			7.177		0.247
Exogenous Variables					
Group	Gp	+	7.940	0.042	0.609
Company	Co	+	88.492	0.315	**4.222*** **
Liquidity	Li	+	0.036	0.281	**4.022*** **
Wealth	We	+	12.737	0.410	**4.609*** **
Education	Ed	+	0.399	0.023	0.208
Experience	Ex	+	-0.414	-0.088	-1.122
Tenure	Te	-	5.139	0.034	0.346
Gender	Ge	-	-17.824	-0.119	**-1.566**
Transaction Costs	Tc	-	0.476	0.106	1.115

Notes 1: *** significant at the one per cent level of probability
2: ** significant at the five per cent level of probability
3: * significant at the ten per cent level of probability

4.4.2 Initial Size of the Enterprise

The initial size of an enterprise is partly a function of an individual's aversion to risk, which is difficult to measure. Although this variable was omitted from Equation 28, the adjusted R^2 statistic (Table 47) is high for cross-sectional data and compares well with the R^2 statistics computed for the other equations. The natural log of initial size increases with the level of credit accessed, and is therefore indirectly influenced by wealth, liquidity and institutional arrangements (Equation 27). Market reliability is the next most important determinant of enterprise size in Equation 28, followed by transaction costs. The significant and negative sign of the transaction cost coefficient indicates that bigger enterprises are better able to spread

fixed *ex ante* transaction costs regardless of which market is used. While not statistically significant, the coefficient estimated for the information variable carries a negative sign suggesting that larger farmers rely more upon their own sources of information than on information provided by government and input suppliers.

Table 47: 2SLS regression results for Equation 28 (Initial Size)

Equation 28		**Description**			
Technique		2SLS			
Adjusted R^2 (%)		46.42%			
Sample Size		113			
Dependent Variable		Ln Initial Size (***Ln Is***)			
F Statistic		**21.162*** **			
Predictor Variable		**Expected Sign**	**Coeff**	**Beta**	**t-test**
Constant			6.939		**20.119*** **
Endogenous Variable					
Credit	***Cr***	+	0.009	0.394	**3.593*** **
Exogenous Variables					
Utilities	Ut	+	-0.096	-0.028	-0.337
Local Market	Lm	-	-1.123	-0.314	**-3.653*** **
Transaction Costs	Tc	-	-0.026	-0.249	**-2.920*** **
Initial Information	Ii	+	-0.278	-0.079	-1.053

Notes 1: *** significant at the one per cent level of probability
2: ** significant at the five per cent level of probability
3: * significant at the ten per cent level of probability

4.4.3 Adoption of Technology

Table 48 shows that the adoption of technology depends mostly on enterprise size (*i.e.* size economies) and therefore indirectly on credit, market reliability and transaction costs (Equation 28). Education is the next most important determinant of technology adoption in Equation 29. The last significant variable, utilities,

highlights the importance of piped water and electricity as prerequisites for automated water and feed supplies.

Table 48: 2SLS regression results for Equation 29 (Technology Adoption)

Equation 29		**Description**			
Technique		2SLS			
Adjusted R^2 (%)		53.84%			
Sample Size		113			
Dependent Variable		Technology Adoption (***Tg***)			
F Statistic		**28.297*** **			
Predictor Variable		**Expected Sign**	**Coeff**	**Beta**	**t-test**
Constant			-2.705		**-5.848*** **
Endogenous Variable					
Initial Size	***Ln Is***	+	0.383	0.489	**4.830*** **
Exogenous Variables					
Education	Ed	+	0.098	0.309	**3.655*** **
Operation	Op	+	0.008	0.051	0.724
Current Information	Ci	+	-0.145	-0.047	-0.643
Utilities	Ut	+	0.584	0.213	**2.621*** **

Notes 1: *** significant at the one per cent level of probability
2: ** significant at the five per cent level of probability
3: * significant at the ten per cent level of probability

4.4.4 Growth Rate

The results presented in Table 49 show that enterprises with larger initial size grew faster than did smaller enterprises. There are no other significant explanatory variables in Equation 30. Policy must therefore be informed by the indirect determinants of growth, *i.e.* access to credit, transaction costs and market reliability (Equation 28). Technology adoption and managerial ability are reported to have little impact on enterprise growth, which is unexpected and probably due to the presence of multicolinearity. The technology index, for example, is determined

largely by initial enterprise size (Equation 29) and is strongly correlated with the management index (r=0.41). This multicolinearity effect is unimportant for policy purposes because the focus should be on the indirect determinants of growth, which are common. The value of this analysis is to show that enterprise growth is indeed impacted by these indirect determinants.

Table 49: 2SLS regression results for Equation 30 (Growth Rate)

Equation 30		**Description**			
Technique		2SLS			
Adjusted R^2 (%)		51.03%			
Sample Size		113			
Dependent Variable		Growth Rate (*Gr*)			
F Statistic		**31.484*** **			
Predictor Variable		**Expected Sign**	**Coeff**	**Beta**	**t-test**
Constant			-125.705		0.595
Endogenous Variables					
Initial Size	*Is*	+	0.557	0.972	**8.406*** **
Technology Adoption	*Tg*	+	46.205	0.050	0.579
Exogenous Variables					
Management	Mg	+	13.472	0.007	0.096
Current Information	Ci	+	73.523	0.025	0.372

Notes 1: *** significant at the one per cent level of probability
2: ** significant at the five per cent level of probability
3: * significant at the ten per cent level of probability

4.5 SUMMARY

A block-recursive regression model is hypothesised in this chapter to explain the factors that inhibit enterprise growth, preventing small-scale producers from capturing the benefits of size economies. The generalised model comprises five equations. The first equation (Equation 27) asserts that levels of credit used are determined by the entrepreneur's choice of business organisation (*e.g.* sole

proprietor, company or informal group), liquidity, wealth, education, experience, land tenure, gender and transaction costs. Equation two (Equation 28) explains initial enterprise size as a function of credit used, access to utilities such as reticulated water and electricity, market type, transaction costs and the quality of information. In the third equation (Equation 29) the adoption of technology is explained in terms of the enterprise's initial size and operating period, access to utilities, quality of information and the entrepreneur's level of education. Growth rate, determined in the fourth equation (Equation 30) is expressed as a function of the enterprise's initial size, investment in technology and the quality of information and management. Lastly, the fifth equation expresses an enterprise's current size as a function of its growth rate and period of operation but because this equation has no policy implications it was not estimated.

The results from the block-recursive regression analysis shows that enterprise growth rate is constrained mostly by poor access to credit, high transaction costs and unreliable markets. Levels of credit used are determined by wealth, liquidity and the institutional arrangements that define ownership and control of the enterprise. Transaction costs were approximated by an index that diminished if the entrepreneur had access to a telephone, could speak English, completed more years of schooling, and – for those who did not have vehicles – operated closer to urban markets. This chapter confirms that the majority of small-scale poultry producers in KwaZulu-Natal come from previously disadvantaged communities and have significantly lower enterprise growth rates than larger poultry producers. Chapter 5

investigates the importance of small-scale enterprises such as poultry in the local economy and how best to initiate and grow these enterprises, with the objective of stimulating wider rural economic growth.

CHAPTER FIVE

5. GROWTH LINKAGES

5.1 INTRODUCTION

Hazell and Roel (1983) argue that economic growth should transpire when very small farms are transformed into larger entities. In this instance economic growth is defined as an increase in rural household incomes, which transpires from increased local production activities and subsequent employment levels. This effect is "multiplied" if further production and employment result from the initial increase in household incomes; where the multiplier is defined as the ratio of change in "local" income to the change in autonomous expenditure that brought it about (Lipsey, 1989:484). This chapter examines the economic theory of growth linkages and explores the effects that small-scale and larger poultry producers have on local economic growth using data from the sample survey.

It is hypothesised that small-scale and larger enterprises effect local economic growth differently. Some of the more obvious variables expected to influence the economic growth of poultry enterprises in KwaZulu-Natal are presented in Table 50. The background economic theory to these variables and others that are less easily measured is discussed in the subsequent section.

Table 50: Variables influencing poultry enterprise growth

Variable	Description	Sign
Growth Multiplier Variables		
Growth rate	Current bird numbers less initial numbers divided by years in operation.	+
+R100 tradables	Dummy scoring 1 if addition R100 spent on tradables, 0 otherwise.	+
+R1000 tradables	Dummy scoring 1 if addition R1000 spent on tradables, 0 otherwise.	+
Growth Linkage Variables		
Transaction cost	Index of transaction costs created by Principal Component Analysis.	-
Technology	An index of technologies created by Principal Component Analysis.	+
Local market	Dummy scoring 1 if enterprise's main market is local market, 0 otherwise.	-
Grow own feed	Poultry producers who grow their own feed	+
Housing made locally	Poultry producers who purchase locally produced housing	+
Feeders made locally	Poultry producers who purchase locally produced feeders	+
Drinkers made locally	Poultry producers who purchase locally produced drinkers	+
Heaters made locally	Poultry producers who purchase locally produced heaters	+
Institution Variables		
Informal associations	Dummy scoring a 1 for informal groups or trusts, 0 otherwise.	+/-?
Company	Dummy scoring 1 for closed corporation or private company, 0 otherwise.	+

5.2 GROWTH LINKAGES AND ECONOMIC GROWTH

5.2.1 Linkages in agriculture

Transaction costs significantly impact growth linkages because they impact the ability to carry out exchange (Chapter 2 and Section 4.2 discuss transaction costs in detail). A single transaction cost variable was computed in Table 44 (p. 75) from the survey data using Principal Component Analysis (SPSS version 9.0, 1999), indicating that transaction costs are significantly higher for small-scale enterprises.

Growth linkages themselves can be grouped into backward and forward linkages arising from the establishment of a new production activity. Backward linkages

consist of derived demand for inputs and forward linkages consist of the induced creation of new productive activities from having a new intermediate product in the market. Agricultural growth was thought to have little effect on new effective demand for intermediate inputs or new induced downstream activities (forward linkages) because of the consumptive nature of agricultural products (Hirschman, 1958:109; Hazell and Roell, 1983), especially in the case of technologically stagnant subsistence agriculture. Non-agricultural sectors were thought to have greater linkages in the overall economy resulting in a higher multiplier effect.

However, including all backward linkages in the analysis gives a more comprehensive assessment of growth linkages in agriculture (Mellor, 1976:161). Growth in the agricultural sector increases incomes of producers and hence raises rural demand for consumer goods and services from outside the agricultural sector, particularly when the economy is closed. In agriculture, such backward based linkages can impact economic growth four to five times more than forward based consumption linkages (Delgado *et al.*, 1998).

5.2.2 Tradable and non-tradable goods

By definition, tradable goods are supply-constrained in small price-taking regions. New excess demands are met either by increased imports or decreased exports of the good or close substitutes *ceteris paribus*. Since tradable goods are supply constrained, increasing or shifting the supply curve to the right will promote

economic growth. This shift can be achieved through increased investment in public and private goods or through correcting existing distortions in input prices, where comparative advantage determines which tradable goods are produced in a particular area (Delgado *et al.*, 1998).

Non-tradable items are goods and services that at prevailing relative prices are rarely, if ever, traded across borders of the chosen trading zone, and do not have close substitutes in local consumption. Non-tradable goods and services are demand constrained; *i.e.* increases in demand within a defined trading zone will lead to increased local production of these items and hence growth. Therefore, the more elastic local supply is for non-tradables, *ceteris paribus,* the greater is economic growth. Ngqangweni (2000) and Hendriks and Lyne (2002) report that the expected value added from farm non-tradables is roughly half that from non-farm non-tradeables.

Goods cannot be both supply and demand constrained and therefore, cannot be classified as tradable and non-tradable goods simultaneously. However, virtually no good is intrinsically non-tradable because tradability is a function of price and transfer costs to external markets. Therefore, smaller trading zones are expected to have fewer non-tradables and less economic growth, *ceteris paribus*. Increasing the size of trading zone does not effect consumption patterns, but rather increases the marginal budget share to non-tradables. In this study, a radius of 20km - the

approximate one-way distance that old tractors, donkey carts and bicycles can transport their tradable products within a day - is considered the benchmark.

5.2.3 Growth Multipliers

Agricultural led growth had strong multiplier effects in Asian economies (local and regional) during the Green Revolution of the 1970's, stimulating substantial economic development through increased local employment and increased rural spending power (Delgado *et al.*, 1998). However, three South African studies by Belete *et al.* (1999) and Ngqangweni (2000) in the Eastern Cape and Hendriks and Lyne (2002) in KwaZulu-Natal estimated rural multipliers (1.35, 1.98 and 1.28 respectively; *i.e.* R1.00 increase in household income is predicted to add an additional 35, 98 and 28 cents to the local economy) to be far lower than Asian growth linkage estimates. These, however, are comparable with estimates for local economies in Burkina Faso, Zambia and Sengal (Delgado *et al.*, 1998). The low growth multipliers estimated by both Belete *et al.* (1999) and Hendriks and Lyne (2002) suggest that growth multipliers for rural South African economies are substantially weaker than other African countries. This can be attributed to South African households in general being less remote than other African countries; *i.e.* a smaller proportion of a household's budget share is spent on non-tradables.

From the empirical survey data Table 51 shows that if larger enterprises received an additional R100 and R1000 per production batch respectively their marginal budget

share spent on non-tradables would have decreased from 41% to 37%. Conversely, the marginal budget share spent on non-tradables increased from 56% to 67% for small-scale enterprises. These trends are consistent with *a priori* expectations because wealthier consumers (*i.e.* owners of larger enterprises) are more inclined to save. Savings, debt redemption and the spending of additional income on household appliances, clothing and most food items are considered tradable because they result in cash flow exiting the local trading zone. Expenditure on buildings, schooling, medication and reinvestment into the enterprise are considered non-tradable. Consequently, if one Rand were added to the income of a small-scale producer the growth multiplier would be higher as their marginal budget share for non-tradables is higher than that of larger enterprises (assumes small-scale and larger producers operate in similar trading zones). Therefore, alleviating growth restraints for a large number of small-scale enterprises is expected to impact more positively on rural economic growth than if a few larger enterprises were encouraged to become bigger.

Table 51: Growth multiplier variables and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
+R100 spent tradables	Small	61	0.56	0.51	117.9	**1.656***
	Large	59	0.41	0.50		
+R1000 spent tradables	Small	61	0.67	0.47	117.5	**3.409*****
	Large	59	0.37	0.49		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

5.2.4 Initiating economic growth

The presence of high transaction costs and the prevalence of non-tradable products would explain why some rural household resources are under-employed; *e.g.* people may want to work but in a growth stagnant area there is nothing remunerative to do. Developing an enterprise that produces a tradable product such as poultry, which draws on under-utilised resources such as labour (*i.e.* for husbandry practices and local manufacture of inputs such as cages) has the potential to stimulate economic growth.

The initial impetus to growth comes from relieving supply constraints (Delgado *et al.*, 1998). This usually involves technological change that cuts unit costs of production for tradables, but could be any factor that shifts the supply curve for tradables to the right; *e.g.* improved infrastructure that reduces transaction costs (Delgado, 1996). In the case of rural poultry production a single technology variable was computed from the survey data using Principal Component Analysis (SPSS version 9.0, 1999) capturing the majority of variation in some of the main underlying technology variables (Table 44; p. 75). Technology adoption amongst small-scale enterprises is significantly lower than their larger counterparts.

Backward growth linkages are maximised when farmers and their labour spend their income (earned from the sale of a tradable product such as poultry) on goods and services that are locally produced, non-agricultural, labour-intensive and

non-tradable in nature (Mellor, 1976:182). The more open an economy is to trade non-agricultural products, *ceteris paribus*, the lower the estimated growth multipliers for agriculturally based linkages. This is not an argument against openness since the initial growth impulse requires a dynamic tradable sector. Rather, backward growth linkages are more likely to induce rural growth when non-tradables constitute a major share of the local economy. A key issue is the propensity of rural households to consume non-tradable goods and services out of additional income.

The focus on the non-tradable sector is important because the impact of growth multipliers is maximised when incremental income is spent on non-tradable goods and services whose supply is price elastic (Delgado, 1996). This assumes that net extra demand for these goods and services is fully transmitted into increased production of these items, through increased use of otherwise under-utilised factors of production such as labour (Johnston and Mellor, 1961; cited by Delgado *et al.*, 1998). However, the supply of non-tradables becomes inelastic in the presence of high transaction costs that increase the costs of production (Haggblade *et al.*, 1989).

Empirical survey data in Table 52 indicates a significant difference between small-scale and larger poultry enterprises for growth rate (average annual increase in the number of birds housed), transaction costs and technology adoption variables. It also shows that forward linkages are better established by larger enterprises through their use of traders to "export" produce to urban markets; *i.e.* only 31% of larger

enterprises do not participate in urban markets compared to 85% for small-scale enterprises. All bird purchases by small-scale and larger enterprises were made from commercial farms/breeders resulting in almost no localised backward growth linkages in respect of bird purchases other than retail "mark-ups". Similarly, most feed is "imported" from large commercial suppliers resulting in a growth leakage, but Table 52 shows that larger enterprises appear to have more potential to grow their own poultry feed, although this practice is uncommon (*i.e.* adoption of only 1%).

Table 52: Growth linkage variables and their significant differences.

Variable	Size	N	Mean	Std. Dev	Df	t-test
Growth rate	Small	60	20.01	37.23	59.1	**-4.453*** **
	Large	60	984.21	1676.68		
Transaction cost[A]	Small	61	13.73	16.27	99.8	**7.736*** **
	Large	62	-5.19	10.07		
Technology[B]	Small	61	-0.58	0.80	103.7	**-9.486*** **
	Large	62	1.21	1.25		
Local market	Small	60	0.87	0.34	112.2	**7.594*** **
	Large	62	0.31	0.46		
Grow own feed	Small	62	0.00	0.00	61.0	**-2.313*** **
	Large	62	0.01	0.27		
Housing prod locally	Small	61	0.93	0.25	90.9	**4.588*** **
	Large	62	0.62	0.49		
Feeders prod locally	Small	61	0.18	0.39	108.0	1.643
	Large	62	0.08	0.27		
Drinkers prod locally	Small	61	0.08	0.28	83.9	1.692
	Large	62	0.02	0.13		
Heaters prod locally	Small	44	0.07	0.26	63.2	1.152
	Large	53	0.02	0.14		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.
3: [A] The transaction cost variable determined by Principal Component Analysis (Table 44).
4: [B] The technology variable determined by Principal Component Analysis (Table 44).

The majority of small-scale (93%) and larger (62%) enterprises constructed their own poultry houses using local inputs indicating that small-scale enterprises have greater potential to establish backward growth linkages. Other equipment appears to have limited backward growth linkages for both small-scale and larger enterprises as most equipment is purchased or "imported" from commercial suppliers. Possible reasons why such equipment is not manufactured locally include an inability to market the products effectively (*i.e.* transaction costs are high, inability to capture size economies and pricing difficulties) and limited knowledge of the equipment required. Sophisticated equipment is also not always necessary where scales of production are small because low cost "family" labour is an available substitute.

5.2.5 Sustaining Economic Growth

Consumption patterns change across the income spectrum with respect to tradability and intensity of commodities consumed. Poorer people tend to spend a large share of both income and increments to income on basic starchy staples (Haggblade *et al.*, 1989). These are termed wage goods if they account for a large share of consumer expenditure in the specified trading zone (Delgado *et al.*, 1998). Such goods are often produced locally, in most cases are labour intensive and non-tradable in nature, usually because of their bulkiness and high transport costs relative to final value.

If the price of wage goods increases there will be upward pressure on wages relative to output prices of the tradable goods. This leads to less competitive tradable production and fewer opportunities for growth linkages. Conversely, if the supply of a tradable product increases, the demand for non-tradable inputs increases, which should draw under-utilised resources into production and stimulate potential growth multipliers. Factors that shift the supply curve of non-tradable goods to the right (*e.g.* lower transaction costs) can be expected to shift the supply curve of tradables in the same direction by lowering the costs of non-tradable inputs used in the production of tradable products (Delgado *et al.*, 1998).

Incremental local income spent on goods imported to a region (*e.g.* basic poultry equipment) does not add any additional income to the area but in fact constitutes an opportunity cost leakage from the growth multiplier. Another opportunity cost leakage results when growth stimulating inputs (*e.g.* basic poultry equipment manufactured locally) that are not in surplus are exported (Hazell, 1984; cited by Delgado *et al.*, 1998). Rural economic growth can also be subdued by savings, which constitute a leakage if reinvestment in the poultry enterprise or other local activities does not occur within the defined trading zone. Similarly, interest loan repayments constitute a growth leakage, although credit is nevertheless an important element in initiating and maintaining economic growth (Barry *et al.*, 1988: 332).

A static growth linkage flow chart is presented in Figure 3, which summarises the "cash" and resource flows for small-scale poultry producers in the rural areas of

KwaZulu-Natal. The initial economic growth impetus is provided by the "export" of poultry products from the localised rural economy.

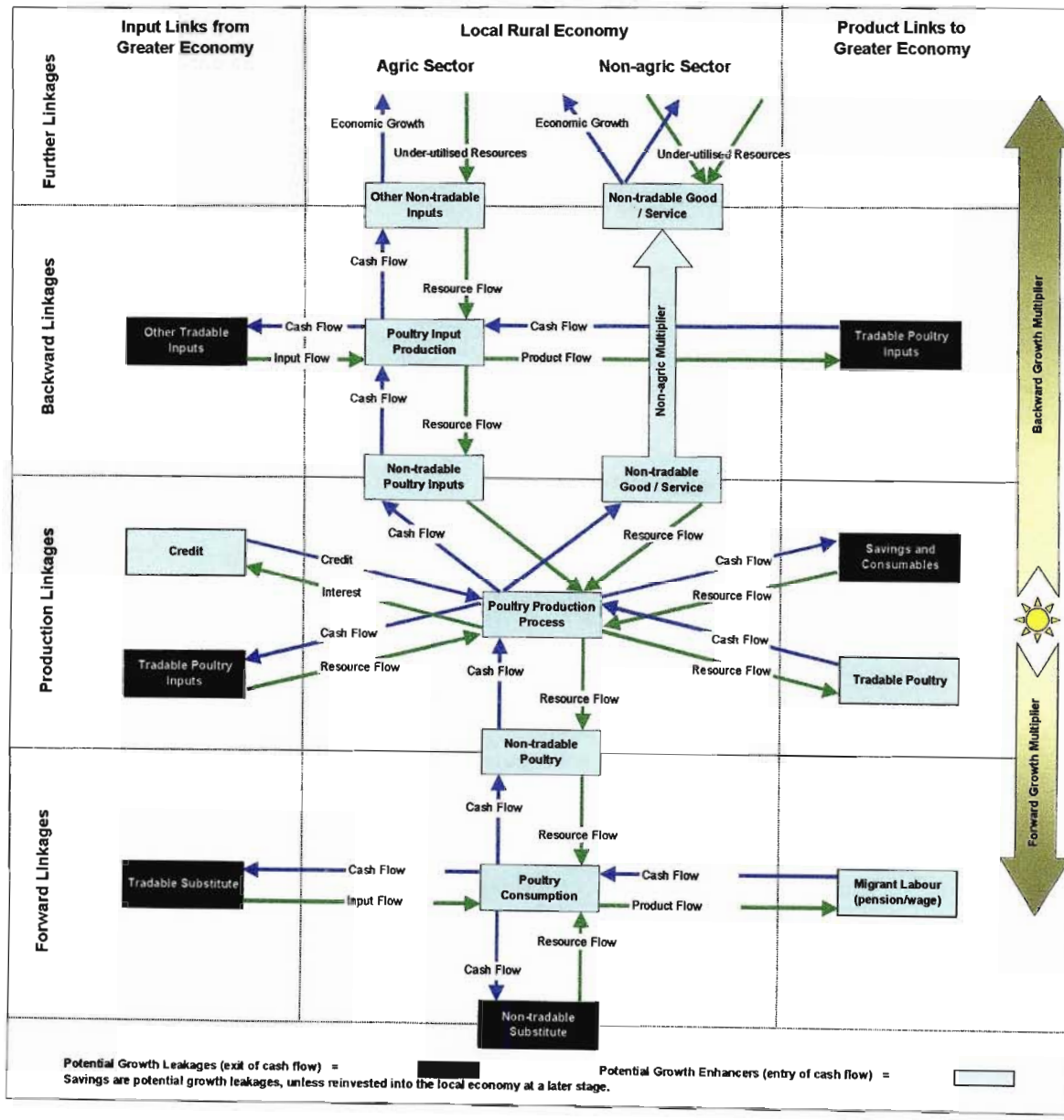


Figure 3: Growth linkage flow chart for rural poultry producers in KwaZulu-Natal

The linkages presented in Figure 3 explains "cash" and resource dynamics and improves our understanding of where potential bottlenecks exist that inhibit

economic growth. This provides helpful guidelines for broad interventions that alleviate growth constraints but more focused policy directives on how to mobilise small-scale enterprises are required. In this regard, Delgado (1999) suggests that small-scale enterprises be vertically integrated with processors and marketers. This would reduce transaction costs associated with accessing information and assets, and facilitate the substitution of resources between enterprises. Such integration is within reach of small-scale enterprises through contract farming schemes with larger commercial farmers, processors and marketing agents and other forms of collective action. For collective action to be successful, however, it is important that a representative institution (*e.g.* a company) is established that aspires to good governance with fair representation of its members or shareholders (*e.g.* a collective group of small-scale poultry enterprises). Its focus should be to capture size economies through improved access to assets, information and services rather than attempting to organise farms completely or change production patterns. In this regard, the provision of mentoring and training services for new managers including institution (*e.g.* company set-up and collective marketing options), legal and financial management instruction are important interventions that should be considered. Delgado (1999) considers this a more politically acceptable and sustainable option than an economy relying mostly on larger commercial farmers.

5.3 SUMMARY

This chapter confirms that small-scale commercial poultry production has the potential to initiate economic growth through the "export" of its products, and to draw under-utilised resources such as labour into production. The impact of the subsequent multiplier effect is likely to be strongest in the non-tradable, non-agricultural sector (*e.g.* in the production of poultry equipment and construction of poultry housing).

Small-scale and larger poultry enterprises have significantly different growth rates (average annual increase in the number of birds housed), transaction costs and technology adoption variables. Forward linkages, however, are better established by larger enterprises through their use of traders to "export" produce to urban markets. In terms of backward linkages small-scale enterprises are more inclined to construct their own poultry houses using local inputs. Although technology adoption is significantly higher amongst larger producers sophisticated equipment is not necessary where scales of production are small and "family" labour readily available. In short, alleviating growth constraints for a large number of small-scale enterprises is expected to impact more positively on rural economic growth than if a few larger enterprises are encouraged to become bigger.

To make the supply of tradables like poultry products more price elastic and so nurture economic growth in the rural areas of KwaZulu-Natal, government policies

should focus on absorbing some of the transaction costs in inherently resource poor communities; *i.e.* by improving rural education, upgrading physical infrastructure (public transport and communications) and through increased extension enhance technology transfer. This broad intervention should improve information and product flows into and out of rural communities, which should facilitate the establishment of rural enterprises that produce an abundance of tradable products such as poultry. In time scale economies should increase and competition should emerge putting downward pressure on product prices that will benefit local consumers. The resultant economic growth is also expected to increase employment levels in these rural areas, which should raise income levels and provide an avenue to exit the poverty cycle. Such growth should be enhanced with the vertical integration of small-scale enterprises with processors and marketers through collective action, which is the focus of Chapter 6.

CHAPTER SIX

6. COLLECTIVE ACTION AND INSTITUTIONAL EFFICIENCY

6.1 INTRODUCTION

Proponents of New Growth Theory argue that physical and human resources cannot be fully utilised unless the prevailing economic and political institutions create the necessary incentives (Olson, 1996). These institutions attempt to reduce uncertainty (Beghin and Fafchamps, 1995) and regulate, even if imperfectly, the social behaviour of individual agents through informal customary constraints, formal legal rules and the enforcement characteristics of both (Furubotn and Richter, 1991:3). Such rules constitute the legal system of society (Bromley and Cochrane, 1994). This chapter examines the institutional incentives associated with collective action with the intention of providing guidelines that encourage small-scale enterprises to consolidate and capture size economies. It also explores what factors constitute an efficient institution with the aim of facilitating institutional support that will nurture group establishment and encourage general economic growth in rural areas.

6.2 COLLECTIVE ACTION

6.2.1 Potential Efficiency Gains

It is obvious that small-scale enterprises purchase fewer inputs per annum than larger enterprises but the expected price discounts attained are less obvious. Using the sample survey data, Table 53 illustrates that the price difference between small-scale and larger enterprises for day-old chicks is insignificant. However, the price for pullets and different broiler rations are significantly different, both which are major costs in the production process.

Table 53: Prices of birds and feed and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Day-old chick price	Small	53	2.60	1.92	93.2	0.059
	Large	53	2.58	2.73		
Pullet price	Small	12	19.39	5.37	22.2	**1.960****
	Large	13	14.47	7.10		
Price broiler start ration	Small	52	86.07	8.33	96.9	**3.058*****
	Large	47	81.11	7.80		
Price broiler finisher ration	Small	51	80.57	6.84	91.6	**2.521*****
	Large	47	76.81	7.85		
Price broiler post finisher ration	Small	30	75.29	9.61	53.8	**1.925****
	Large	32	71.10	7.24		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Economies of size can also reduce transport costs. Table 54 indicates a significant difference in the cost of transporting feed (one 50kg bag) but not birds (one day-old chick) between small-scale and larger enterprises.

Table 54: Transport costs and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Feed transport costs	Small	41	6.17	2.35	51.9	**5.459*** **
	Large	25	2.97	2.29		
Bird transport cost	Small	15	0.05	0.06	27.0	-1.612
	Large	25	0.15	0.32		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Table 55 indicates that feed suppliers are less concerned about transporting their product to their small-scale enterprise customers (5.1%) than bird suppliers (42.4%). Commercial feed suppliers produce a wide range of products in large volumes that service a number of industries. Their distribution programme focuses on large regular customers because these contracts ensure that their high fixed cost commitments associated with their capital investment are met. In addition, the marginal value of every additional ton produced increases in value, giving them the incentive and ability to discount prices. Bird hatcheries, however, have lower associated fixed costs and their product is specialised. Consequently, their distribution programme focuses on growing their customer base, whether large or small, regular or irregular at a consistent price. Hired transport used by small-scale enterprises is also often arranged by the hatcheries.

From a cost saving perspective there is potential for small-scale poultry producers to capture size economies by purchasing feed collectively. To facilitate this collective action and the vertical integration of small-scale enterprises described in Chapter 5, some possible associations available to small-scale poultry producers within the supply chain are illustrated in Figure 4 (numbers of entities are

illustrative only). In practice, these associations or groups are expected to be dynamic, adapting to constantly changing circumstances.

Table 55: Types of transport used differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Birds transported	(122)	By supplier	42.4	39.7	41.0
		Own transport	18.6	42.9	31.1
		Hired transport	33.9	12.7	23.0
		Shared collection	5.1	4.8	4.9
Feed transported	(121)	By supplier	5.1	32.3	19.0
		Own transport	28.8	54.8	42.1
		Hired transport	61.0	9.7	34.7
		Shared collection	5.1	3.2	4.1

Note 1: Variables are mutually exclusive and sum to 100%.

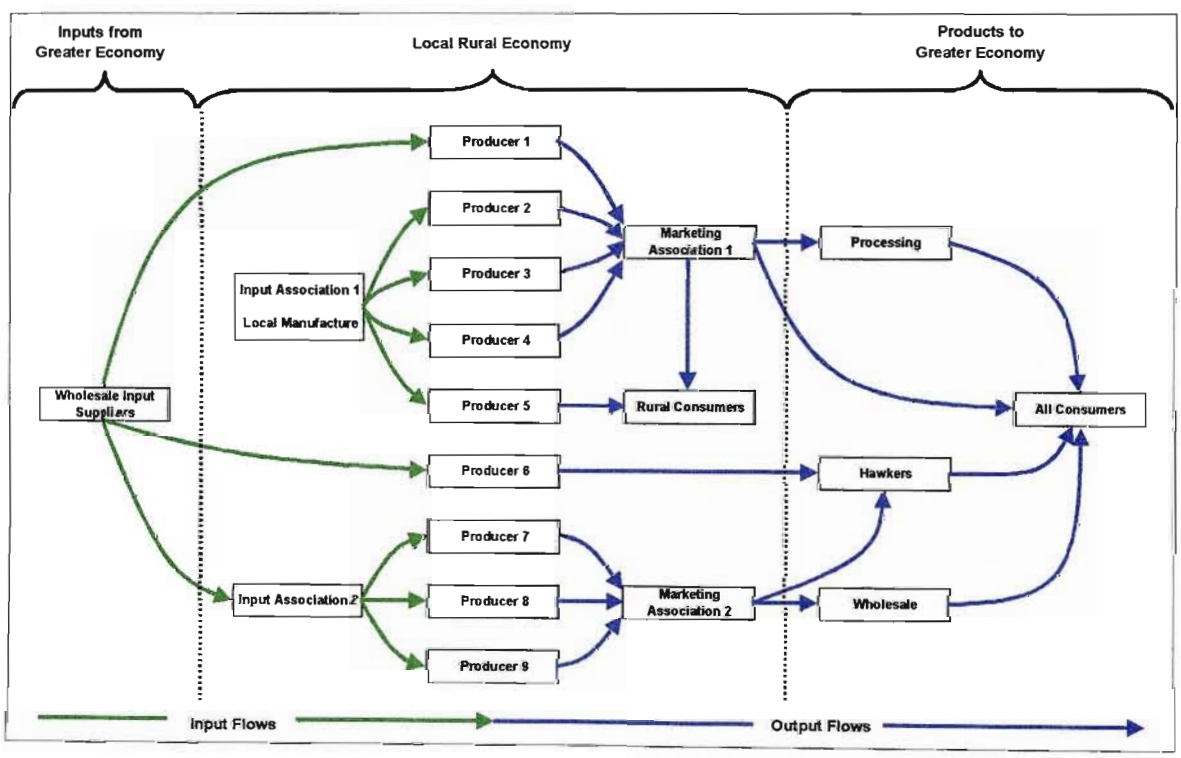


Figure 4: Supply chain flow chart for poultry producers in KwaZulu-Natal

6.2.2 Group Formation

The incentive to form groups is often weak because the collective benefits will attract free-riders (Ostrom, 1990:42, Runge, 1981). Essentially, a free-rider is someone who reaps the benefits of a particular action or situation but does not incur all the associated costs. Consequently, unless there is coercion (Olson, 1971:48) or a large net collective benefit (Wade, 1987) to make individuals act in their common interest, rational, self-interested individuals will not act collectively to form a group as each individual has the incentive to free-ride. Furthermore, each individual has to decide, based on his or her expectations regarding the actions of others, whether or not to become a group member (Runge, 1981). As group size increases, accountability decreases as the assurance regarding others' action decreases. Accordingly, the likelihood of collective action is reduced because transaction costs increase on account of uncertainty.

Even with complete assurance regarding others' actions, the economic incentive to free ride will exist in large groups if the marginal private returns of not complying with the group's ideals exceed the marginal private cost. For example, a poultry production group member may forfeit her allotted management responsibilities if she values her labour inputs more highly elsewhere (*i.e.* becomes a free rider). However, if the risk of being caught increases with improved accountability and if sanctions are high, the marginal private cost will exceed the marginal private returns of non-compliance, reducing free-rider effects. Consequently, collective action

becomes an attractive option when the assurance of compliance is high (Ciriancy-Wantrup and Bishop, 1975).

Collective action is also possible when a member, or sub-group of members, has a substantial interest in the group and receives a large share of the total benefits (Olson, 1971:34). Consequently, those adhering to group rules will be better off than if no rules existed, which implies that a certain number of free riders will be tolerated (Runge, 1985). However, the incentive to benefit from free riding in the short run must be measured against the incentive to uphold the co-operative agreement that promotes the welfare of the group as a whole. Rawls (1971, cited by Wade, 1987) has shown analytically that compliance of one individual to the rules can reinforce other members to do likewise. White and Runge (1995) contend that individuals are more likely to join a group if they expect others to do so and are less likely to participate if they do not expect others to. Nevertheless, even if free-riding by "weaker" members is tolerated, collective action will transpire only if: (1) transaction costs are low (*e.g.* groups are small and/or accountability high); (2) the boundaries of the new institution are respected; (3) individuals do not discount future payoffs too heavily; and (4) future returns are stable (Swallow and Bromley, 1994).

Buchanan (1993:4) argues that incentives do exist to create new collective group structures which is reinforced by Staal *et al.* (1997) who state that indigenous institutions and organisations have typically evolved to reduce transaction costs.

Initiating and sustaining collective action involves paying the transaction costs of co-ordinating the expectations and efforts of others, an important entrepreneurial function (White and Runge, 1995). Successful entrepreneurs must voice credible claims that externalities or public "bads" exist and that the current rights structure is either unjust or socially inappropriate and then build assurance that the issue can be resolved. It is then possible to mobilise people and resources to act on those claims and expectations. Therefore, collective action groups will emerge where a critical mass of individuals has practical knowledge of the potential gains from the intended output of the collective action (*e.g.* the establishment of poultry production groups).

Coase (1960) suggests that endogenous remedies are less likely in the presence of infinitely large transaction costs (*e.g.* large groups) where the divergence between social and private costs is high. Under these circumstances the state or other external facilitator may be required to initiate collective action especially in communities where capacity is lacking.

6.2.3 Accountability

By definition, a group implies a structure with rules, albeit very simple in some cases. Group members have the incentive to comply with group rules if sanctions are enforced in such a way that the marginal private costs exceed the marginal private benefits of defiance. However, this argument presumes that group members are accountable for their actions. In this regard, Murphree (1994) contends that

conformity is achieved mainly through peer pressure but for peer pressure to be effective the group must be structured and well defined to prevent free-rider activity. In short, compliance requires that members are accountable, and this in turn requires a finite membership list.

A finite membership list raises the issue of how members can enter and exit the group, the dynamics of which are closely aligned with investment incentives. To attract investment from its members, or finance from lenders, a group should be seen to act decisively in response to changes in the economic environment (Nieuwoudt, 1990). This transpires when the group (1) creates incentives that encourage members to meet its objectives and disincentives for breaking its rules (*e.g.* performance based remuneration packages); (2) promotes transparency (*e.g.* externally audited financial statements); and (3) provides an opportunity for members to express anxiety through disinvestment (*e.g.* to exit the group through the sale of shares) and/or sanction (*i.e.* vote) against certain management decisions. To achieve this, group members should receive both "sanction" and "benefit" rights that are allocated in proportion to individual member investments where benefit rights should be transferable at the market or audited price. This removes "portfolio" and "horizon" problems (Cook and Iliopoulos, 2000; 336) because larger investors are not forced to accept conservative portfolios preferred by smaller, risk-averse investors. Furthermore, all members can exit the group and realise their share of capital gains generated by prudent long-term investment

decisions at any time. Consequently, the free- and forced-rider problems associated with collective investment are minimised.

Benefits like cash dividends are a stock of subtractive units, where every unit taken by one member of the group reduces the quantity available for other members (Runge, 1981). Therefore, subtractive benefits (*e.g.* dividends) should only be received by members who comply with rules and foregone by members who break them (Runge, 1984). Non-subtractive benefits become important in larger groups providing compliance is encouraged by peer pressure; *e.g.* dividends are pooled and invested in a local crèche, clinic or school (Wynne and Lyne, 1995). Accountability amongst and between members is important in both cases, which is best achieved through an agreed and transparent constitution.

A constitution should be broadly accepted and legally binding on all parties concerned. This assumes adequate policing and enforcement and that parties have rapid and affordable access to a conflict resolution mechanism (Ostrom, 1990:100). However, if compliance is not mainly voluntary and members not accountable, the costs of monitoring and enforcement rise and collective benefits become open to abuse. Enforcement itself should only be necessary to prevent the infractions of a few group members from becoming more frequent.

6.2.4 Group Representation and Management Responsibility

Explanations of three distinct kinds of group structures or common property arrangements (adapted from Wynne and Lyne, 1995) are used to clarify representation and management responsibility.

1. The first relates to information groups. Here members manage their own production units but form a loose association primarily to share information. Management decisions are generally unconstrained although some marketing guidelines may be imposed.
2. The second relates to participation groups. Here members of a defined group jointly manage a single production unit within the bounds established by the group as a whole.
3. The third relates to non-participation groups. Here members of a defined group are represented by an elected committee who manage a single production unit on behalf of but within the bounds established by the group as a whole.

From the sample survey 39 respondents are affiliated to a group and the majority of these are small-scale enterprises (25). Table 56 highlights the main reasons for the establishment of information, participation and non-participation groups amongst these respondents. Information groups are primarily formed to share production information, especially amongst small-scale enterprises. The ability to collectively

raise capital was the main reason for the establishment of participation groups as well as information sharing especially for small-scale enterprises. Non-participation groups are primarily established to raise capital and in some cases are seen as good investment opportunities.

Table 56: Reasons for group establishment differentiated according to size

Group Type (N)	Variable	Small, %	Large, %	Total, %
Information (15)	Marketing Information	0.0	25.0	6.7
	Production Information	90.9	50.0	80.0
	Input Discount Information	9.1	25.0	13.3
Participation (16)	Raise Capital	50.0	100.0	68.8
	Share Information	30.0	0.0	18.8
	Share Input Discounts	10.0	0.0	6.3
	Charity/Non-profit	10.0	0.0	6.3
Non-Participation (8)	Good Investment	25.0	25.0	25.0
	Raise Capital	75.0	75.0	75.0

Note 1: Variables are mutually exclusive and sum to 100%.

Information groups are simply loose associations with little or no constraints on management. The costs and benefits of decision making are borne by the individual manager.

In participation groups, however, individual group members all participate in decision making, individually and/or collectively, which may have negative consequences for the group as a whole if one or more of the members are incompetent. This potential for inconsistent management practices is not suited to the management of intensive enterprises like poultry. In addition, individual members of a participation group cannot enter into exchanges with agents outside

the group without approval from all other members as each member has an indivisible stake in the collective outcome. Consequently, business is constrained because of increased transaction costs associated with negotiation. The larger the group, the greater the transaction costs and the more constrained exchanges become. Furthermore, the costs of enforcing group rules increases as group size increases.

Participation groups must be small if they are to succeed. Evidence presented by Olson (1971:54) suggests that functional participation groups generally have fewer than six members, while Lyne (1994) reports that participation groups with more than ten members were unable to make efficient use of farm land in New Zealand. From the sample survey data, Table 57 shows a significant difference between the mean number of group members in each group type. Information groups have the highest number of members (13.87) followed by participation groups (9.69) and lastly non-participation groups (8.75).

Table 57: Group membership numbers and their significant differences

Variable	Group Type	N	Mean	Std. Dev
Number of members	Information	15	13.87	3.07
	Participation	16	9.69	5.38
	Non-participation	8	8.75	5.70
	Total	39	11.10	5.09
ANOVA	**Sum of Squares**	**Df**	**Mean Square**	**F-test**
Between Groups	190.92	2	95.46	**4.335*** **
Within Groups	792.67	36	22.02	
Total	983.59	38		

Notes 1: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Simple rules regulating behaviour within participation groups may evolve endogenously but even small groups will find it difficult to devise complex rules that partition benefits to collective investments in the same proportion as members share costs because of the actions of free riders. Bisschop (1997a) reports that often birds belonging to a poultry production participation group are housed by only one member of the group, mainly for security reasons. This results in members residing closer to the location of the birds feeling exploited because they usually work harder and those further away feeling marginalised when benefits are distributed. In the absence of a comprehensive constitution such instability may result in group collapse. Results from the sample survey show that disagreements are the most common problem amongst small-scale participation groups, which is consistent with *a priori* expectations (Table 58). Information groups worked best amongst small-scale enterprises (81.8% indicating no problems) and non-participation groups amongst larger enterprises (100% indicating no problems).

Table 58: Group problems differentiated according to size

Description	(N)	Group Type	Small, %	Large, %	Total, %
Information	(38)	Nil	81.8	25.0	66.7
		Disagreements	0.0	0.0	0.0
		Commitment	18.2	75.0	33.3
		Dishonesty	0.0	0.0	0.0
Participation	(38)	Nil	40.0	40.0	40.0
		Disagreements	30.0	20.0	26.7
		Commitment	30.0	40.0	33.3
		Dishonesty	0.0	0.0	0.0
Non-participation	(38)	Nil	25.0	100.0	62.5
		Disagreements	25.0	0.0	12.5
		Commitment	25.0	0.0	12.5
		Dishonesty	25.0	0.0	12.5

Note 1: Variables are mutually exclusive and sum to 100%.

Non-participation groups are best able to facilitate exchanges with outside agents because the outside agents need only negotiate with the group representative/s, regardless of group size. In addition, if the potential benefits from "external" management exceed profits earned by "internal" management, its members may urge the representative committee to contract outside expertise. Inefficient management therefore attracts an opportunity cost and efficient resource allocation is enhanced through functional exchanges. However, should outside management be contracted this does not nullify the need for a representative committee. On the contrary, this representative body is an essential communication link between outside management and group members that can economise on transaction costs. Deininger (1995) maintains that such groups can utilise economies of scale, enhance competitiveness and provide technical information, advantages that often outweigh problems of free-riding and low investment.

The roles within non-participation groups are generally better defined than participation groups, which helps curb transaction costs, increase accountability and ultimately facilitate the development of complex rules; *e.g.* a comprehensive and coherent constitution can be compiled making the representative committee accountable for decision-making and benefit distribution. This facilitates the formation of larger groups and future growth because it allows individuals to be rewarded in proportion to their investment. Investment incentives are also increased because reward/compensation can be assured. A private company is an example of a non-participation group where group members are shareholders, the management

committee or representative body comprises the directors and benefits are distributed as dividends in accordance with shareholdings. Officially recognised organisations like private companies, trusts and close corporations have the advantage of accessing formal credit more easily partly because shareholders and lenders are assured that key provisions for "good" governance are well established and entrenched in law. Table 59 shows the adoption of informal associations relative to formal company structures amongst small-scale and larger enterprises. There is no significant difference in adoption of informal associations but there is a significant difference in adoption of formal company structures (16% of larger enterprises in the survey adopted company structures compared to zero for small-scale enterprises).

Table 59: Institutional variables and their significant differences

Variable	Size	N	Mean	Std. Dev	Df	t-test
Informal association	Small	61	0.23	0.42	118.4	0.949
	Large	62	0.16	0.37		
Company	Small	61	0.00	0.00	61.0	**3.425*** **
	Large	62	0.16	0.37		

Notes 1: Equal variances not assumed and one tailed t-test used.
2: ***, **, * significant at the one, five and ten percent levels of probability respectively.

Table 60 summarises some of the main institutional attributes for the different group types. High levels of facilitation (50% - 100%) seem to have instilled sound institutional structures, most meet frequently and have constitutions, membership lists, membership contracts and raise capital through membership fees. Unfortunately, most advocate equal member contributions, share in the profits

equally and fail to audit their financial accounts. This is contrary to principals established in Section 6.2.3 and would imply that group facilitators are uninformed about these matters.

Table 60: Group membership attributes differentiated according to size

Group Attribute	(N)	Group Type	Small, %	Large, %	Total, %
Group Facilitation	(39)	Information	90.9	100.0	93.3
		Participation	90.0	83.3	87.5
		Non-participation	50.0	75.0	62.5
Meeting Frequency (once a month or more)	(39)	Information	81.8	0.0	60.0
		Participation	20.0	33.2	25.0
		Non-participation	50.0	50.0	50.0
Group Constitution	(39)	Information	100.0	75.0	93.3
		Participation	100.0	83.3	93.8
		Non-participation	100.0	75.0	87.5
Membership List	(39)	Information	100.0	100.0	100.0
		Participation	100.0	83.3	93.8
		Non-participation	100.0	100.0	100.0
Membership Contract	(39)	Information	90.9	50.0	80.0
		Participation	60.0	66.7	62.5
		Non-participation	100.0	50.0	75.0
Membership Fees	(39)	Information	100.0	75.0	93.3
		Participation	90.0	100.0	93.8
		Non-participation	75.0	75.0	75.0
Equal Contributions	(38)	Information	100.0	100.0	100.0
		Participation	90.0	83.3	87.5
		Non-participation	75.0	75.0	75.0
Unequal profit share	(23)	Information	0.0	0.0	0.0
		Participation	20.0	0.0	13.3
		Non-participation	0.0	75.0	42.9
Auditing accounts	(38)	Information	0.0	0.0	0.0
		Participation	10.0	16.7	12.5
		Non-participation	0.0	50.0	25.0

Note 1: Group attributes are mutually exclusive; *i.e.* % present plus % absent equals 100%.

Irrespective of group type, collective action without an appropriate conflict resolution mechanism is fruitless (Ostrom, 1990:100). Group structures and their constitutions need to be officially recognised so disputes can be arbitrated

effectively and contracts widely enforced, which requires public sector investment in both physical and legal infrastructure (Timmer, 1992; Sahn and Sarris, 1994). Presently, tribal authorities in the remote areas of KwaZulu-Natal mainly administer conflicts which exacerbates legal uncertainty (Lyne, 1996) especially where commercial contracts are concerned. This has a direct bearing on the growth and success of small-scale poultry production enterprises because they are impacted by the prevailing economic and political environment within which they operate. Under these circumstances the institutional environment is said to be inefficient.

6.3 INSTITUTIONAL EFFICIENCY

An institutional environment establishes expectations about rights to resource use and about partitioning the income stream between agents as a result of economic activity (Hayami and Ruttan, 1985:95). However, an institution's effectiveness in partitioning these income streams depends on how exclusively property rights are defined and how well transaction costs have been curtailed (Nieuwoudt, 1990; Furubotn and Richter, 1991:1). If these conditions are not satisfied external agents become unable or unwilling to respect these derived income streams, which can in time erode the value of the original rights (Bromley and Cochrane, 1994). This section explains the interaction between property rights and transaction costs in terms of institutional efficiency and examines the importance of a functional and affordable conflict resolution mechanism.

6.3.1 Institutional Efficiency and Property Rights

Property rights are a subset of institutions (Runge, 1985) and define the usage of resources. They specify the norms of behaviour with respect to interactions with others, and the consequences of non-compliance (Furubotn and Richter, 1991:2). Property rights attempt to reduce uncertainty by providing individuals with information enabling them to form expectations relative to their dealings with others (Demsetz, 1967). Specific property rights are usually defined by the legal system or by society in general but many are simply *de facto*.

If property rights are secure (*i.e.* exclusive, assured and fully transferable) future rent streams generated by resources can be realised at any time. This compels owners to consider the long-term effects of management decisions and creates economic incentives to invest in and conserve resources since the benefits of such are to a large extent internalised (Pasour, 1990:201). The transferability of property rights creates an opportunity cost, which usually ensures that resources move to their most valued use. In the case of land, transferability creates collateral value, increasing the owner's ability to invest; an important requirement regarding capital intensive poultry enterprises. The value of a resource is determined by the nature of its property rights.

In the absence of transaction costs, the initial distribution of property rights does not matter from an efficiency point of view because these rights could be voluntarily

and costlessly allocated to attain the *pareto* optimal distribution. Consequently, the concept of economic efficiency and equity become inseparable if the neo-classical assumptions hold (Bardhan, 1989:5); *i.e.* prices alone are sufficient to ensure that resources are allocated to their highest-valued use (Barzel, 1989:9). Hayek (1945) concurs that market prices capture, co-ordinate and transmit widely dispersed information, which is to the mutual benefit of buyers and sellers.

However, the presence of transaction costs helps explain the existence of externalities that result in inefficient distributions of property rights (Baber, 1991:12) and ownership structures (Bardhan, 1989:5). When transaction costs are positive prices alone will not ensure optimum resource allocation (Coase, 1988:12). Moreover, no external observer can determine whether or not levels of exchange stop short of an "efficient" norm because transaction costs are perceived to be different by different economic agents (Buchanan, 1986: 94-95). Therefore, efficient resource allocation within a given institutional setting is always assured provided market participants are free to make or refuse exchange.

According to Furubotn and Richter (1991:3) new property rights emerge when one or more parties in a transaction perceive that they would be better off if they challenged the existing property rights structure. Agreement to such a change indicates that the new property rights are deemed to be more efficient than the old (Buchanan, 1991: 5), which would then result in a shift towards an improved institutional environment. The most efficient institutional setting is that which *all*

affected parties agree upon, which should occur when property rights are clearly defined, costs and rewards are fully internalised and contracts are legally enforceable (Barrow and Roth, 1990). Efficiency in this sense is concerned with the extent to which the institutions of society are responsive to the values and choices of individual citizens rather than the resource allocation within a given institution.

The above Coasian approach to institutional change does not consider the fact that transaction costs may prevent a lobby for change, or that a lobby may be unsuccessful. The adoption of new property rights can be resisted if those in opposition to change can overcome the problems of collective action (Olson, 1971:48) and organise themselves into a politically powerful lobby. Differential access to legal talent and the courts can also effect the institutional outcome (Runge, 1984). Furthermore, property rights chosen by some initial adopters to suit their interests may be complex and costly to change. Agents such as the tribal authority in the rural areas of KwaZulu-Natal who have considerable bargaining strength in that institutional environment are likely to influence decision making and policy development to their benefit. Under these circumstances the State may purposely prolong a socially inefficient institution to retain political support. However, if such inefficient institutions restrict beneficial changes, Buchanan (1986: 98) regards them as being fundamentally unfair to affected communities.

6.3.2 Institutional Efficiency and Conflict Resolution

Economic growth transpires when producers feel certain about the reliability of a customer or supplier. If uncertainty prevails a "flea market" mode of transacting transpires; *i.e.* customers inspect the good on the spot, pay cash and walk away with it. This is an unwieldy way of conducting business for all but the smallest of producers. To operate with any degree of predictability, firms must be able to take and place orders, arrange the future delivery of goods and services, dissociate payment from the physical delivery of goods and seek and provide warranty (Fafchamps, 1996).

Business losses arising from non-payment by customers or non-delivery by suppliers are part of a constant learning process where experimentation is often slow and perilous, especially in the absence of a functional conflict resolution mechanism. Rigid contracts that are strictly enforced are not necessarily the solution because enforcement is costly and contractual flexibility is often needed. This is especially true in areas with low levels of economic development (*e.g.* the rural areas of KwaZulu-Natal) because consistent product quality, rapid delivery and timely payment are inherently difficult. Under these circumstances parties often mutually agree to change existing contracts by rescheduling deliveries and payments. However, this genuine need for contract flexibility opens avenues for opportunistic behaviour. Harassment is often used as a means of debt collecting because the threat of court action is seldom credible due to the costs and long delays

involved. Such harassment also enables creditors to observe the business activities and consumption pattern of their debtors for evidence on their ability to pay. Therefore, the only protection creditors have is to ensure they know where debtors are in case they need to harass them.

Another institutional response to enforcement problems is for producers to deal with only a few well known suppliers and customers. In most cases businesses prefer to operate on this basis of trusting interpersonal relationships with the majority of disputes handled through direct negotiations. However, this limits the range of commercial partners a producer can possibly deal with in a businesslike fashion leading to the fragmentation of the local economy. This loss of efficiency is partly overcome by the operation of traders or hawkers who essentially create links between enterprises that would not otherwise be able to do business with each other. However, the use of ubiquitous traders does increase the costs of business transactions because of the time and capital spent on cajoling and policing suppliers and customers. Bisschop (1998) maintains that this process results in efficiency losses and subdues economic growth in the small-scale poultry sector operating in rural KwaZulu-Natal.

In a survey of small-scale irrigation vegetable farmers in the eastern Cape Madikizela and Groenewald (1998) found that 90 percent of respondents indicated that normally they are paid immediately on delivery and only sell on credit to individuals in the local community who get pensions on a quarterly basis. Despite

this risk management strategy more than half (53.3%) of the respondents still experienced delayed payments. Credit sales amongst traders was unpopular because traders had not honoured their payments in the past. Table 61 shows that credit sales amongst the sample survey respondents are more prevalent amongst small-scale enterprises (58.3%) than larger enterprises (40.3%). Both small-scale and larger enterprises minimise the risk of bad debt by establishing relationships and/or signing contracts with their debtors. The main motivation to preserve these relationships is to maintain sources of supply and demand: buyers pay their suppliers because they need more goods in the future and suppliers deliver on time to keep their customers. This business relationship is the creditor's best collateral.

Table 61: Poultry sales differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Poultry sales	(122)	Cash	41.7	59.7	50.8
		Credit	58.3	40.3	49.2
Relationship with credit	(60)	With relationship	88.6	80.0	85.0
		Without relationship	11.4	20.0	15.0
Contracts with credit	(60)	With contract	54.3	24.0	41.7
		Without contract	45.7	76.0	58.3

Note 1: Variables are mutually exclusive and sum to 100%.

The problems experienced with credit sales are detailed in Table 62, which include delayed payment, dishonoured cheques and payment failure. Dishonoured cheques are surprisingly high amongst larger producers (45.2%). Most enterprises first resolved these issues through negotiation, which in most instances were successful (±58%). Surprisingly none of the small-scale enterprises referred conflicts to the

tribal authority or legal courts and only 16.1% were referred to legal courts by larger enterprises as a last resort.

Table 62: Problems with credit sales differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Credit sale problems	(48)	Delayed payment	88.2	48.4	62.5
		Dishonoured cheques	5.9	45.2	31.3
		No Payment	5.9	6.5	6.3
First resolution attempt	(48)	No action taken	23.5	6.5	12.5
		Legal court	0.0	3.2	2.1
		Tribal authority	0.0	0.0	0.0
		Negotiation	76.5	71.0	72.9
		Harassment	0.0	19.4	12.5
Last resolution attempt	(48)	No action taken	52.9	54.9	39.6
		Legal court	0.0	16.1	10.4
		Tribal authority	0.0	0.0	0.0
		Negotiation	47.1	12.9	25.0
		Harassment	0.0	16.1	10.4
Resolution of problems	(48)	Usually	58.8	58.1	58.3
		Sometimes	23.5	22.6	22.9
		Hardly ever	11.8	6.5	8.3
		Never	5.9	12.9	10.4

Note 1: Variables are mutually exclusive and sum to 100%.

Tribal authorities and legal courts are even more ineffective at resolving conflict associated with bird purchases. The predominant problems experienced are incorrect numbers of birds delivered, failure to meet supply requirements, high mortalities and delivery failures (Table 63). Larger enterprises are more inclined to employ harassment and negotiation techniques to resolve this type of conflict than small-scale enterprises (73.3% and 53.3% respectively) and if unresolved no further action is generally taken. Conflicts experienced are more often resolved amongst larger enterprises than small-scale enterprises (70.5% relative to 42.9%) but legal courts and tribal authorities are not used at all.

Table 63: Bird purchase problems differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Bird purchase problems	(74)	Quantity	6.9	4.4	5.4
		Mortality	37.9	51.1	45.9
		Supply failure	51.7	28.9	37.8
		Delivery failure	3.4	15.6	10.8
First resolution attempt	(75)	No action	53.3	26.7	37.3
		Legal court	0.0	0.0	0.0
		Tribal authority	0.0	0.0	0.0
		Negotiation	46.7	64.4	57.3
		Harassment	0.0	8.9	5.3
Last resolution attempt	(69)	No action	76.0	79.6	52.2
		Legal court	0.0	0.0	0.0
		Tribal authority	0.0	0.0	0.0
		Negotiation	24.0	18.2	20.3
		Harassment	0.0	2.3	1.4
Resolution of problems	(65)	Usually	42.9	70.5	61.5
		Sometimes	33.3	13.6	20.0
		Hardly ever	9.5	9.1	9.2
		Never	14.3	6.8	9.2

Note 1: Variables are mutually exclusive and sum to 100%.

Similar trends are evident for feed purchases. Most conflicts arise from incorrect quantities, poor quality, failure to meet supply requirements, delivery failures and payment disputes (Table 64). Delivery failure is not an issue amongst small-scale enterprises because they are largely responsible for collecting their own feed. Although the majority of both small-scale and larger enterprise problems are resolved (75,0% and 72.7% respectively), neither the legal courts nor tribal authorities were used when problems were not resolved.

Table 64: Feed purchase problems differentiated according to size

Description	(N)	Variable	Small, %	Large, %	Total, %
Feed purchase problems	(53)	Quantity	10.0	9.1	9.4
		Quality	35.0	21.2	26.4
		Supply failure	30.0	33.3	32.1
		Delivery failure	0.0	24.2	15.1
		Payment disputes	25.0	12.1	17.0
First resolution attempt	(53)	No action taken	70.0	15.2	35.8
		Legal court	0.0	0.0	0.0
		Tribal authority	0.0	0.0	0.0
		Negotiation	30.0	72.7	56.6
		Harassment	0.0	12.1	7.5
Last resolution attempt	(53)	No action taken	90.0	60.6	50.9
		Legal court	0.0	0.0	0.0
		Tribal authority	0.0	0.0	0.0
		Negotiation	10.0	36.4	26.4
		Harassment	0.0	3.0	1.9
Resolution of problems	(53)	Usually	75.0	72.7	73.6
		Sometimes	15.0	15.2	15.1
		Hardly ever	0.0	6.1	3.8
		Never	10.0	6.1	7.5

Note 1: Variables are mutually exclusive and sum to 100%.

Policy intervention should not aim for conflict resolution mechanisms that rigidly enforce all contracts, which would close the door to risk-sharing and excusable default. Rather, it should promote economic efficiency and foster the development of a dynamic business community (Fafchamps, 1996). Success requires that opportunistic behaviour be discouraged in contractual matters either by attracting a high penalty or by helping firms assess the reliability of potential clients and suppliers. This potential threat of a functional and affordable conflict resolution mechanism in itself is expected to discourage opportunistic behaviour. Setting up small claims courts is one option where the inefficiencies of the current "dual" legal system in rural KwaZulu-Natal can are avoided. The desired effect of these small claims courts would be to strengthen property rights and reduce transaction costs

associated with harassment. These courts could also provide the local community with an integrity rating to further reduce transaction costs; *e.g.* enterprises that often appear in the small claims court would receive a "poor" rating. The establishment of such courts in the rural areas of KwaZulu-Natal would need to be facilitated by government in terms of standard operating procedures and funding. White and Runge (1995) caution, however, that existing institutions should not be undermined but rather adapted to the prevailing circumstances (Fafchamps, 1996). Therefore, this institutional transition could be smoothed if the tribal authorities are absorbed into these small claims courts.

6.3.3 Conflict Resolution; institutional change in rural KwaZulu-Natal

Endogenous institutional change in the tribal areas of rural KwaZulu-Natal may be impaired by the usual collective action problems and disparity in transaction costs especially between male and female members of the same rural household. Empirical evidence from Quisumbing (1995) shows that in developing countries as a whole, women perform almost 90 percent of all agricultural functions. Gueye (1998) reported in a literature survey that ownership of village poultry by women ranged from 86 percent (Nigeria) to 17 percent (Niger). Ownership aside, Bisschop (1997a) and Gumede (1986) emphasise that rural women are mostly responsible for poultry management. General statements on ownership can be misleading and are usually conservative because of the dominating position held by men in most African societies (Gueye, 1998). This arises because women usually cannot own or

inherit land under customary law (Arua and Okorji, 1997) resulting in their lack of political power in rural institutions. Berry (1993) argues that women face greater uncertainty in the outcomes of disputes in rural areas because they have a lower social standing than men do. Under these circumstances women have an incentive to initiate institutional change but are inhibited by the restraining transaction costs associated with the social risks of such action.

Transaction costs faced by women farmers that restrict economic activity include limited access to common property resources, lack of equipment and appropriate technology, low levels of education (Quisumbing, 1995) and their relative immobility arising from child rearing responsibilities. A woman's transaction costs are further magnified because local informal credit granting institutions often exclude women. Access to formal credit is limited by non-familiarity with loan procedures, little acceptable collateral and higher transaction costs such as access to information (Delgado, 1996). In addition, tribal authorities in the remote areas of KwaZulu-Natal mainly administer conflicts which exacerbates legal uncertainty (Lyne, 1996) especially where commercial contracts and women are concerned. Therefore, the development of small-scale poultry production groups that are intended to reduce transaction costs and promote rural economic growth are constrained by the prevailing institutional environment. The rate of economic growth is determined by the degree to which individuals are assured that they are part of a stable, equitable and well adapted institution (White and Runge, 1995).

6.4 SUMMARY

The growth of small-scale enterprises is constrained by size economies and transaction costs but these can be alleviated if small-scale enterprises can consolidate through collective action; *e.g.* lower prices could be negotiated for bulk purchases with less transaction costs. The formation of groups, however, is subject to collective action problems, which might require external facilitation to overcome prohibitive transaction costs.

Members of a collective action group need to be accountable to one-another to create incentives for group members to comply with group rules; this requires a finite membership list. A constitution should also be broadly accepted, which should specify that "sanction" and "benefit" rights are allocated in proportion to individual member investments. This helps remove "portfolio" and "horizon" problems and minimises free- and forced-rider problems.

Groups can be classified into three broad types; *viz* information, participation or non-participation groups. Non-participation groups are best able to facilitate exchanges with outside agents and hence have the largest potential to stimulate rural economic growth. Common institutional types amongst non-participation groups include public and private companies, trusts, closed corporations and co-operatives. These officially recognised institutions have the advantage of easily accessing

formal credit because key provisions for good governance are well established in their constitutions, which are entrenched in law.

Many disputes remain unresolved because of the high transaction costs associated with conflict resolution; *i.e.* legal court action is prohibitively expensive and legal uncertainty arises in the rural areas of KwaZulu-Natal where informal tribal authorities administer conflicts. Setting up small-claims courts is one option of correcting these inefficiencies; the desired effect would be to strengthen property rights, reduce transaction costs and promote economic growth. However, the existing tribal authority institution should not be undermined but rather adapted or absorbed by the new institution. Most business transactions operate on the basis of trusting interpersonal relationships but the potential threat of a functional and affordable conflict resolution mechanism is crucial to discourage opportunistic behaviour. Economic growth cannot flourish without a stable, equitable and well-adapted institutional environment.

CHAPTER SEVEN

7. CONCLUSIONS

7.1 OVERVIEW

- Small-scale commercial poultry production is widely seen as an appropriate vehicle to create income-generating activities that result in sustainable economic growth. Further economic growth transpires when small enterprises are transformed into larger entities. The objectives of the thesis are to (a) identify factors that restrain the growth of small-scale poultry enterprises in KwaZulu-Natal, (b) determine the relative importance of these factors, and (c) consider policies that would help alleviate these constraints.

- From the sample survey it was found that the average age of respondents is not significantly different between small and larger enterprises but that their education levels do differ significantly. Most small-scale enterprises are also operated by women (75.4%) on tribal land (83.6%) who cannot speak English (54.1%). Access to electricity, telephones, water borne sewage and potable water is less for small-scale enterprises, while larger enterprises are closer to tar roads and towns and have significantly greater access to transport. Larger farms have a greater incentive to invest in education, information and investments that enhance productivity responses because the net returns are greater on larger farms. Without the services

of government extension officers, small-scale poultry enterprises in the sample survey would find themselves at a significant disadvantage.

The ability of small-scale producers to negotiate price discounts from input suppliers relative to larger producers is limited because they do not receive discounts for bulk purchases. In addition, small-scale enterprises find it difficult to compete in urban markets where product prices are generally lower than in rural areas because their cost structures are higher.

Credit access amongst small-scale farmers is often constrained because of high transaction costs especially for (1) farmers with limited alternative income sources, (2) for women accessing credit from informal sources and (3) in the absence of a land market. Larger enterprises are better able to reduce marketing transaction costs by dealing with only a few market agents (*e.g.* stores, hospitals, schools, etc). Small-scale enterprises, however, are often unable to enter these preferred markets because their economies of size are small and transport is limiting. Technical poultry production parameters are summarised by four orthogonal Principal Components (PCs); *viz.* management activities, feed utilisation, equipment use and disease reduction practices. Management activities and equipment use are significantly higher amongst larger enterprises.

The block-recursive regression analysis shows that enterprise growth rate is constrained by poor access to credit, high transaction costs and unreliable markets.

Access to credit is determined by wealth, liquidity and the institutional arrangements that define ownership and control of the enterprise. Transaction costs were approximated by an index that diminished if the entrepreneur had access to a telephone, could speak English, completed more years of schooling, and – for those who did not have vehicles – operated closer to urban markets. The majority of small-scale poultry producers in the sample survey come from previously disadvantaged communities and have significantly lower enterprise growth rates than larger poultry producers.

Small-scale commercial poultry production has the potential to initiate economic growth through the "export" of its products, and to draw under-utilised resources such as labour into production. However, the impact of the subsequent multiplier effect is most likely strongest in the non-tradable, non-agricultural sector. The descriptive results suggest that small-scale producers face much higher transaction costs than larger producers. However, alleviating these transaction costs and other growth constraints for a large number of small-scale enterprises is expected to impact more positively on rural economic growth than if a few larger enterprises are encouraged to become bigger.

The growth of small-scale enterprises is constrained by size economies and transaction costs but these can be alleviated if small-scale enterprises can consolidate through collective action; *e.g.* lower prices could be negotiated for bulk

purchases with lower transaction costs. The formation of groups, however, is subject to collective action problems, which might require external facilitation.

Group members need to be accountable to one-another to create incentives for group members to comply with group rules; this requires a finite membership list. A constitution should also be broadly accepted, which should specify that "sanction" and "benefit" rights are allocated in proportion to individual member investments. This helps remove "portfolio" and "horizon" problems and minimises free- and forced-rider problems.

Groups can be classified into three broad types; *viz* information, participation or non-participation groups. Non-participation groups are best able to facilitate exchanges with outside agents and hence have the largest potential to stimulate rural economic growth. Common institutional types amongst non-participation groups include public and private companies, trusts, closed corporations and co-operatives. These officially recognised institutions have the advantage of easily accessing formal credit because key provisions for good governance are well established and their constitutions are entrenched in law. However, many disputes remain unresolved because of the high transaction costs associated with conflict resolution; *i.e.* legal court action is prohibitively expensive and legal uncertainty arises in the rural areas of KwaZulu-Natal because informal tribal authorities administer conflicts. Economic growth is negated if individuals cannot be assured that they are part of a stable, equitable and well adapted institution.

7.2 POLICY IMPLICATIONS

What public goods and services should government invest in to initiate and nurture rural economic growth? The results from this study of poultry producers suggest that government should first invest in education services in rural areas and physical infrastructure such as all-weather roads, postal services and tele-communications. This intervention should reduce private transaction costs and facilitate information and product flows into and out of rural areas, creating a foundation for economic growth. On this foundation, emerging poultry enterprises need to be nurtured through more focused support for new owners and managers. This support should not only include effective training and mentoring, but also assistance with the establishment of company structures to manage co-owned resources, to raise and manage finances and to market products effectively and collectively.

Such government intervention would improve information and product flows into and out of rural communities, facilitating the establishment of rural enterprises that produce an abundance of tradable products such as poultry. This would occur because transaction costs in these rural areas are reduced, which would make the supply of "tradables" like poultry products, more price elastic and accelerate economic growth in these rural areas. The associated enterprise growth and accumulation of wealth should create further employment opportunities, increase household incomes and subsequently alleviate rural poverty. In this regard, poultry has established itself as an appropriate enterprise to initiate and enhance economic

growth in rural KwaZulu-Natal, but other appropriate enterprises should also be nurtured.

Despite government investment in physical infrastructure, education and extension the development of commercial enterprises in rural KwaZulu-Natal is still likely to be constrained because of institutional inefficiencies. Many disputes remain unresolved because of the high transaction costs associated with conflict resolution; *i.e.* legal court action is prohibitively expensive and legal uncertainty arises where informal tribal authorities administer conflicts. A functional and affordable conflict resolution mechanism is crucial to discourage opportunistic behaviour, which has the potential to undermine investment in an entire area. Setting up small-claims courts is one option of correcting these inefficiencies; the desired effect would be to strengthen property rights, reduce transaction costs and promote economic growth. However, the existing tribal authority institution should not be undermined but rather adapted to avoid resistance and possible institutional collapse in these areas. Although most business transactions operate on the basis of trusting interpersonal relationships economic growth cannot flourish without this threat of an affordable and effective conflict resolution mechanism. The state has an important role to play in reducing the transaction costs that constrain the adaptation and development of better institutions that enhance rural economic growth and alleviate poverty.

Irrespective of whether change is initiated endogenously by the community or exogenously by the state, a new institution only becomes effective if it is both

widely accepted by the community and the laws of society. Therefore, the role of the state is also to facilitate the development of new rules (*i.e.* reduce the transaction costs associated with this process) and to uphold rules agreed upon to ensure the marginal private cost of breaking the rules remains high otherwise free-rider incentives become entrenched resulting in institution failure.

7.3 RECOMMENDATIONS FOR FURTHER RESEARCH

This study has shown that transaction costs arising from inadequate infrastructure, low levels of education and poor extension services can significantly inhibit rural economic growth. These are clear and easily identifiable deliverables, which the state can prioritise, budget for and implement accordingly. Therefore, one recommendation for future study is to develop an appropriate method of monitoring these deliverables, to determine any trends and to study the associated impacts over time.

Rural economic growth and poverty alleviation cannot be achieved by promoting any one enterprise (*e.g.* poultry production). A holistic and integrated approach is necessary. Therefore, further research is required to determine growth linkages for enterprises other than poultry and to clarify the drivers that strengthen these linkages. This type of information is necessary before policies can be formulated to strengthen these linkages that focus on enhancing rural economic growth.

Determining how to provide tax relief legitimately for services and inputs produced in rural areas is one such policy.

This study has also shown that the difficulties associated with small economies of size can be addressed through collective action, which itself is constrained by transaction costs. How best to facilitate the development of these micro-institutions is unclear because generic models may not always be appropriate in addressing parochial difficulties. This type of local institutional facilitation creates a wide scope for further research. Case study analysis is often the best way of determining the underlying incentives within locally based institutions and what attributes can best be replicated in other environments.

A question that is raised in this study is what institutional framework will best facilitate small-scale enterprises consolidating into larger commercial operations. This study motivated that non-participation groups are the most appropriate structures; *e.g.* companies, closed corporations, trusts, co-operatives, informal groups or combinations of the above. However, these structures have evolved under particular circumstances to meet specific objectives. Further research is required to ascertain what structure is best suited to encourage the development of small-scale rural enterprises and if necessary to develop an appropriate structure for this specific purpose. Accountability, investment incentives and clear entry and exit mechanisms have already been identified as critical success factors but these need

to be formalised into a suitable generic constitution that can be tailored to local conditions at minimum cost.

Further research is also required to determine the best process of initiating institutional change. Endogenous change is slow and is usually constrained by inherent local capacity constraints. Exogenous change is risky because one particular institutional arrangement might not be appropriate in all areas and more importantly acceptance of the change is less likely without local "buy-in" or participation. A compromise approach is fitting but guidelines on how this is best achieved needs to be developed and documented.

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APPENDIX

POULTRY PRODUCTION QUESTIONNAIRE

District:.....

Number:.....

Poultry Production Questionnaire

This survey is been conducted by the Department of Animal and Poultry Science, University of Natal in collaboration with the KwaZulu-Natal Poultry Institute (KZNPI). Should any further information be required please contact Adrian Wynne on 0331 - 260 6805. Information returned in the questionnaire will remain strictly ***CONFIDENTIAL***. Please use the following guidelines to aid answering:

- Respondents should be familiar with the poultry enterprise.
- If a question is not relevant or respondents prefer not to answer, code the reply **N/A** (not applicable).
- Abbreviations are highlighted (**bold underline print**) in the question to help answering.
- It usually takes 45 to 60 minutes to complete, please be patient.
- Please re-post the questionnaire in the self-addressed pre-paid envelope before the 22nd of December.

Please indicate your preferred T-shirt size: **Medium:** ☐ **Large:** ☐ **Extra-large:** ☐

1. GENERAL INFORMATION

1.1 Date: .....

1.2 Respondent's name: .....

1.3 Type of enterprise: Household/individual: ☐ Group: ☐ Formal Business: ☐

1.4 If a legal entity, what type? Close corporation: ☐ Trust: ☐ Company: ☐

Other: (please specify).....

1.5 Name of Group or Formal Business.....

1.6 Mailing address: .....

1.7 Contact Telephone Numbers:.....

2. DEMOGRAPHIC INFORMATION

2.1 Please complete the table on page 3 with the help of the explanatory notes on page 2. This section needs to be completed irrespective of the enterprise type (*i.e.* household/individual, group or formal business). It attempts to capture the structure and composition of the business entity and details of each of its members. Recognised abbreviations are highlighted in bold print in the explanatory notes.

DEMOGRAPHIC INFORMATION: Explanatory Notes

Member Initials: Please place initials of each member in the appropriate box.

Sex: Please place an **M** for male and **F** for female for each member.

Age: Please specify each members' age in years.

Position Held: Depending on the enterprise type (*i.e.* household/individual, group or business) please classify each member as one of the following categories:

Household: Father (**F**), mother (**M**), son (**S**), daughter (**D**), grandparent (**G**), aunt (**A**), uncle (**U**), cousin (**C**), friend (**F**), hired manager (**H**), labour employee (**L**).

Group: Land owner (**L**), chairman (**C**), bookkeeper/treasurer (**B**), secretary/administrator (**S**), member (**M**), hired manager (**H**), labour employee (**E**).

Business: Shareholder (**S**), owner (**O**), owner/manager (**OM**), manager (**M**), assistant manager (**AM**), bookkeeper (**B**), secretary (**S**), foreman (**F**), labourer (**L**).

Education: Please write done the Standard attained (*e.g.* Std 9) or tertiary education attained (*e.g.* BSc).

English speaking/writing: Please specify whether individual members can speak/write English (**Y**es/**N**o).

Residency: If members are on site more than two weeks in every four, please place an **R** for resident, otherwise **N** for Non-resident.

Current Occupation: Please categorise current occupation as; salary/wage employed (**W**), Self-employed (**SE**), housekeeper (**H**), scholar/student (**S**), disabled (**D**), pensioner (**P**), unemployed (**U**), infant (**I**).

Employment Type: Please categorise self-employment and wage/salary employment as; Farm manager (**F**), business manager (**M**), government services (**G**), clerk/bookkeeper/secretary (**B**), business representative (**R**), artisan (**A**), driver (**D**), labour (**L**).

Poultry Responsibility: Please mark with an **X** which members are responsible for the management and co-ordination of the poultry enterprise.

Poultry Records: Please mark with an **X** which members are responsible for recording poultry production and financial information.

Poultry Labour: Please mark with an **X** which members help physically (feeding, cleaning, etc) with the poultry enterprise.

Poultry Training: Please mark with an **X** which members have attended any formal poultry training courses where certificates have been obtained.

Poultry Investment: Please mark with an **X** which members invested money and capital into the poultry enterprise.

Poultry Income: For each member, please indicate the **net monthly income** received in return for services rendered to the poultry enterprise:
Less than R1000 (**1**); R1000-R1999 (**2**); R2000-R3999 (**3**); R4000-R6000 (**4**); greater than R6000 (**5**)

Total Monthly Income: Please classify each member as one of the following categories according to **total net monthly income** from all sources:
Less than R1000 (**1**); R1000-R1999 (**2**); R2000-R3999 (**3**); R4000-R6000 (**4**); greater than R6000 (**5**)

DEMOGRAPHIC INFORMATION (*see explanatory notes on page 2*)

Member Description	**Respondent**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Member Initials													
Sex (**M**/**F**)													
Age (Years)													
Position Held													
Education													
English speaking (**Y**/**N**)													
English writing (**Y**/**N**)													
Residency													
Current Occupation													
Employment Type													
Poultry Responsibility													
Poultry Records													
Poultry Labour													
Poultry Training													
Poultry Investment													
Poultry Income													
Total Monthly Income													

3. FARM INFORMATION

3.1 How long has the farm operated at its present location?.....years.

3.2 In the table below, please specify the land areas occupied according to tenure arrangements and indicate whether you are in possession of a title deed, written contract or PTO for the land you occupy or utilise.

Total Area Occupied (ha)	**Private (ha)**	**Rented (ha)**	**Communal (ha)**
Title Deed/Contract/PTO (Yes/No)			

3.3 If land was purchased, where were the finances obtained?

Own resources: ☐ Borrowings from friends or relatives: ☐ Stokvel or savings club: ☐

Local money lender: ☐ KFC or Land Bank: ☐ Commercial bank: ☐ Other: (please specify).....

.....

3.4 Do you own the buildings? Yes: ☐ No: ☐

3.5 In the table below we are looking at the importance of poultry as a farm income generating activity relative to other activities undertaken. Non-agricultural income and off-farm income generating activities are listed on the following page. Please indicate annual gross income (**Rands**) and the sales season (**months**) during which this income was received.

Agricultural Income		**Annual Gross Income (Rands)**	**Sales Season (months)**
Poultry			
Pigs			
Cattle			
Goats/Sheep			
Maize	Grain		
	Green		
Sorghum			
Wheat			
Beans			
Potatoes			
Green vegetables			
Fruit			
Sugar			
Timber			
Other			

Non Agricultural Income	Annual Gross Income (Rands)	Sales Season (months)
Hawking		
Trading Store/preparing meals		
Taxi/transport/car repairs		
Building		
Handicrafts/block making		
Other		

Off-Farm Income	Annual Gross Income (Rands)	Sales Season (months)
Salaries/Wages		
Pensions		
Other		

3.6 In the table below we are looking at the type and number of assets owned and/or used by the farm/household especially transport. Regarding the purchase method please use one of the following: (1) Own resources; (2) Borrowing from a relative or friend; (3) Stokvel or savings club; (4) Local money lender; (5) Asset supplier; (6) KFC or the Land Bank; (7) Commercial bank; (8) Other.

Assets Owned	Number	Purchase Year	Price (Rands)	Purchase Method	Contract (Y/N)
Transportation					
Motorbike					
Ox/Donkey Cart					
Motor Car					
Bakkie or van					
Truck					
Tractor					
Trailer					
Equipment					
Plough/planter					
Knapsack spayers					
Feed Mill and/or Mixer					
Bulk Feed Storage Bins					
Fridge/cold room					
T.V.					
Other					

3.7 How far away from the farm premises is the nearest tar road?.....kilometres

3.8 How far away from the farm premises is the nearest mini-bus taxi rank?.....kilometres

3.9 How far away from the farm premises is the nearest postal service?.....kilometres

3.10 How far away from the farm premises is the nearest bank?.....kilometres

3.11 Does the farm have electricity? Yes: □ No: □

3.12 What type of toilets does the farm use? Pit: □ Chemical: □ Flush: □

3.13 Where is water accessed? Collected from river: □ Nearby public standpipe: □
Rain storage tanks: □ Borehole/submersible/wind pump: □ Municipal water: □

3.14 If water is collected from either a river or public standpipe, how far away are these?.....kilometres

3.15 Does the farm own a telephone? Yes: □ No: □

3.16 If NO, how far away is the closest telephone that can be used?.....kilometres

3.17 Can messages be left at this telephone? Yes: □ No: □

4. POULTRY FLOCK INFORMATION

4.1 Do you cross commercial breeds with indigenous breeds? Yes: □ No: □

4.2 If YES, what are your reasons for doing so? .....

4.3 Please complete the following table regarding poultry flock information.

Flock Information	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
What is your average "flock" size (no. birds)?			
Male/Female Ratio			
Breed			
Age that birds are initially purchased			
Price per bird (Rands)			
Months of the year that birds are **NOT** kept			
Name of bird supplier			
Distance between supplier and enterprise			

4.4 Describe the type of supplier: Trading store: □ Local co-operative: □ Extension officer: □
Poultry agent: □ Hatchery: □ Other (please specify) .....

4.5 How do you purchase the birds? Cash: □ Credit: □

4.6 How are birds transported from the supplier to the farm? Delivered by supplier: □ Own transport: □
Taxi: □ Shared collection with other producers: □ Other: (please specify).....

4.7 How many birds are transported at any one time and what is the cost of transporting them?
Number of birds:.....Transport cost (Rands):.....

4.8 How many times have you received technical advice from the bird supplier over the last year?
Never: ☐ Between 1 and 4 occasions: ☐ Between 5 and 12 occasions: ☐ More than 12: ☐

4.9 Do you order birds in advance? Yes: ☐ No: ☐

4.10 How do you order birds in advance? Telephone: ☐ Fax: ☐ Letters in the post: ☐
Make new orders when collecting old orders: ☐ Through visitations by extension officers: ☐
Through visitations by suppliers: ☐ Other: (please specify) .....

4.11 Have you ever had any problems with bird purchases from previous and present suppliers?
Incorrect quantity: ☐ High mortalities: ☐ Failure to supply: ☐ Failure to deliver: ☐
Other: (please specify).....

4.12 What means did you first use to resolve these problems? No action taken: ☐ Legal court: ☐
Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐

4.13 What was your last resort to resolve these problems? No further action taken: ☐ Legal court: ☐
Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐ Find new supplier: ☐

4.14 Were problems successfully resolved? Usually: ☐ Sometimes: ☐ Hardly ever: ☐ Never: ☐

5. FEED AND NUTRITION INFORMATION

5.1 Do you grow grain crops for the purpose of feeding poultry? Yes: ☐ No: ☐

5.2 If you do mix your own feed, where do you obtain your feed ingredients?.....Town or city

5.3 Please complete the following table regarding feed and nutrition information.

Feed Information	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
Blend locally produced feed with commercial feed (Yes/No)			
Use commercial feed only (Yes/No)			
Predominantly use pellets (Yes/No)			
If you use a commercial starter ration what is the price (R/50kg)			
If you use a commercial finisher ration what is the price (R/50kg)			
If you use a post finisher ration what is the price (R/50kg)			
If you use a commercial layer ration what is the price (R/50kg)			

5.4 What is the name of your commercial feed supplier? .....

5.5 What is the distance between the commercial feed supplier and your farm?.....kilometres

5.6 Describe the type of supplier: Trading store: ☐ Local co-operative: ☐ Extension officer: ☐
Poultry agent: ☐ Feed miller: ☐ Other (please specify).....

5.7 How do you purchase feed? Cash: □ Credit: □

5.8 How is feed transported from the supplier to the farm? Delivered by supplier: □ Own transport: □
Taxi: □ Shared collection with other producers: □ Other: (please specify).....

5.9 How much feed is transported at any one time and what is the cost of transporting it?
Amount of feed:.....Transport cost (Rands):.....

5.10 How many times have you received technical advice from the feed supplier over the last year?
Never: □ Between 1 and 4 occasions: □ Between 5 and 12 occasions: □ More than 12: □

5.11 Do you order feed in advance? Yes: □ No: □

5.12 How do you order feed in advance? Telephone: □ Fax: □ Letters in the post: □
Make new orders when collecting old orders: □ Through visitations by extension officers: □
Through visitations by suppliers: □ Other: (please specify) .....

5.13 Have you ever had any problems with feed purchases from previous or present suppliers?
Incorrect quantity: □ Poor quality: □ Failure to supply: □ Failure to deliver: □
Other: (please specify).....

5.14 What means did you first use to resolve these problems? No action taken: □ Legal court: □
Tribal authority: □ Negotiation: □ Confrontation/harassment: □

5.15 What was your last resort to resolve these problems? No further action taken: □ Legal court: □
Tribal authority: □ Negotiation: □ Confrontation/harassment: □ Find new supplier: □

5.16 Were problems successfully resolved? Usually: □ Sometimes: □ Hardly ever: □ Never: □

6. HOUSING AND EQUIPMENT INFORMATION

6.1 Please complete the following table regarding housing information.

Housing Information	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
How many poultry structures/houses do you have?			
Are houses Shacks, Converted buildings or Purpose built?			
Are additional brooding houses or rooms used (Yes/No)?			
On average, what size are houses (length x width meters)?			
On average, how many birds are kept in each house?			
What is the average distance between houses?			
Do houses have a cement floor (Yes/No)?			
Are houses built from Brick/blocks, Timber, Corrugated iron, Wattle and daub?			

6.2 What litter do you use? Zero: □ Wood shavings: □ Other (please specify).....

6.3 How much do you pay for litter? Price per unit.....please state units used.....

6.4 What is the name of your litter supplier?.....

6.5 What is the distance between the litter supplier and your farm?.....kilometres

6.6 Describe the type of supplier: Trading store: □ Local co-operative: □ Extension officer: □ Poultry agent: □ Sawmill: □ Other (please specify).....

6.7 How do you purchase litter? Cash: □ Credit: □

6.8 How is litter transported from the supplier to the farm? Delivered by supplier: □ Own transport: □ Taxi: □ Shared collection with other producers: □ Other: (please specify).....

6.9 How much litter is transported at any one time and what is the cost of transporting it?
Amount of litter:.....Transport cost (Rands):.....

6.10 Please complete the following table regarding equipment information.

Equipment Information	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
Is a high-pressure washer used for cleaning (Yes/No)?			
Are there electric ventilation fans (Yes/No)?			
Are ventilation curtains used (Yes/No)?			
Do you use thermometers in each house (Yes/No)?			
What drinkers are used; Nipples, Bell, Founts or Troughs?			
Do you Refill each drinker or use Continuous supply?			
Do you use feed Troughs, tube Feeders, Scatter food on the floor or Mechanised feeders?			
Do you use Electric, Gas, Paraffin Wood or Zero brooders			
Do you use Electric, Gas, Paraffin, Wood or Zero heating?			
Do you use Electric, Gas, Paraffin, Solar or Zero lighting?			
During the day are birds released into outside Run, kept inside on Floor, kept inside in battery Cages?			
Do you supply your birds with laying boxes (Yes/No)?			XXXXXX

6.11 Please complete the following table regarding the predominant origin of equipment used.

Equipment Origin	**Houses**	**Feeders**	**Drinkers**	**Heaters**
Mostly purchased (Yes/No)?				
Mostly home-made (Yes/No)?				
Mixture (Yes/No)?				

6.12 What is the name of your commercial equipment supplier?.....

6.13 What is the distance between the commercial equipment supplier and your farm?.....kilometres

6.14 Describe the type of supplier: Trading store: □ Local co-operative: □ Extension officer: □
Poultry agent: □ Equipment Agent: □ Other (please specify) .....

6.15 How do you purchase equipment? Cash: □ Credit: □

6.16 How many times have you received technical advice from the equipment supplier over the last year?
Never: □ Between 1 and 4 occasions: □ Between 5 and 12 occasions: □ More than 12: □

6.17 Do you order equipment in advance? Yes: □ No: □

6.18 Is theft of poultry a problem? Yes: □ No: □

6.19 If Yes, what security measures have you adopted?.....

7. HUSBANDRY INFORMATION

7.1 How long has the enterprise produced poultry at its present location?.....years

7.2 At the outset, how many birds were housed?.....birds

7.3 Where did you obtain the required **start-up** capital? Own resources: □
Borrowings from friends or relatives: □ Stokvel or savings club: □ Local money lender: □
KFC or Land Bank: □ Commercial bank: □ Other: (please specify).....

7.4 Where did you obtain your initial information?.....

7.5 Presently what is your preferred source of information?.....

7.6 Can you obtain information from this source when you need it? Yes: □ No: □

7.7 Are there other poultry farms within two kilometres of your poultry farm? Yes: □ No: □

7.8 Please complete the following table regarding husbandry information. A **"batch"** is defined as a crop of birds of the same age. A **"unit"** is defined as the floor space occupied by a batch.

Husbandry Information	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
Do you alter the lighting period as birds get older (Yes/No)			
Are all birds in one house the same age (Yes/No)			
How many "batches" do you produce per house per annum?			
How long do you rest the "unit" between each "batch"?			
Do you wash out the "unit" after every "batch" (Yes/No)?			
Do you renew the litter after every "batch" (Yes/No)			
Is old litter discarded a kilometre away or more (Yes/No)			
Are dead birds removed a kilometre away or more (Yes/No)			
Do you limit people visiting your poultry houses (Yes/No)			

Husbandry Information	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
What vaccinations are received?			
1.....	.....	.....	.....
2.....	.....	.....	.....
3.....	.....	.....	.....
4.....	.....	.....	.....
5.....	.....	.....	.....

7.9 Please complete the following table on records kept and forward planning.

Records Kept and Forward Planning	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
Records of costs from purchases (Yes/No)			
Records of income from sales (Yes/No)			
Records of savings and drawings (Yes/No)			
Number of birds received or hatched (Yes/No)			
Mortalities (Yes/No)			
Vaccinations, date and type (Yes/No)			
Body weights (Yes/No)			
Feed intakes (Yes/No)			
Number of eggs laid (Yes/No)			XXXXXXXXX
Do you plan work/duties in advance (Yes/No)			

7.10 Has the practice of record keeping been beneficial to your operation? Yes: □ No: □

7.11 Please complete the following table regarding mortality percentages. The sum of the mortality percentages in periods 1, 2 and 3 should be equal to the total average mortality percentage per "batch".

Mortality Percentages per "Batch"	**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
Total average mortality percentage per "batch"			
Period 1 - Average mortality % in first week after arrival			
Period 2 - Average mortality % in weeks 2, 3 and 4			
Period 3 - Average remaining mortality %			

7.12 What are the major causes of mortality losses? Hot weather: ☐ Cold weather: ☐
Newcastle disease: ☐ Other disease: ☐ Brooder failure: ☐ Predators: ☐ Theft: ☐
Other (please specify).....

7.13 Do you keep a stock of commercial vaccines and antibiotics on-farm? Yes: ☐ No: ☐

7.14 Who do you purchase your commercial vaccines and antibiotics from?.....

7.15 What is the distance between the commercial veterinary supplier and your farm?.....kilometres

7.16 Describe the type of supplier: Trading store: ☐ Local co-operative: ☐ Extension officer: ☐
Poultry agent: ☐ Veterinary Agent: ☐ Other (please specify).....

7.17 How many times have you received technical advice from the veterinary supplier over the last year?
Never: ☐ Between 1 and 4 occasions: ☐ Between 5 and 12 occasions: ☐ More than 12: ☐

7.18 What are your major problems in production?.....

8. MARKETING INFORMATION

8.1 Please complete the following table regarding poultry product information.

Product Information	**Eggs**		**Cull Birds**		**Broilers**
	Indigenous	**Layer**	**Indigenous**	**Layer**	
Total quantity of eggs/birds sold per year					
Percentage (%) home consumption					
Are eggs graded by weight (Yes/No)			XXXXX	XXXXX	XXXXX
Are eggs sold in an egg box (Yes/No)			XXXXX	XXXXX	XXXXX
Are birds mostly sold slaughtered (Yes/No)	XXXXX	XXXXX			
Are birds slaughtered on farm (Yes/No)	XXXXX	XXXXX			
What age are birds sold (live/slaughtered)	XXXXX	XXXXX			
Are birds weighed before sale (Yes/No)	XXXXX	XXXXX			
Average weight of birds sold	XXXXX	XXXXX			
How long does it take to sell a "batch"?	XXXXX	XXXXX			
Selling price (per dozen or per bird)					
Over what period are eggs/birds sold? Daily, Weekly, Monthly, Irregular sales					

Product Information (continued)	**Eggs**		**Cull Birds**		**Broilers**
	Indigenous	**Layer**	**Indigenous**	**Layer**	
Who mainly buys your eggs/birds?					
Local residents.....	.....	.....	.....	.....	.....
Traders/hawkers.....	.....	.....	.....	.....	.....
Schools/hospitals/hotels.....	.....	.....	.....	.....	.....
Abattoir/processing plant.....	.....	.....	.....	.....	.....
Stores and Retail Outlets.....	.....	.....	.....	.....	.....
Marketing Agent/co-operative.....	.....	.....	.....	.....	.....

8.2 Please complete the following table regarding market information.

Market Information	**Local Resident**	**Traders, Hawkers**	**Schools, Hospital, Hotels**	**Abattoir, Process Plant**	**Stores, Retail Outlets**	**Market Agent Co-op**
Rank the markets in order of importance						
Do you sell **O**n-farm or **D**eliver eggs?						
Do you sell **O**n-farm or **D**eliver birds?						
What is the distance to the purchaser/market (kilometres)?						
Do you have long a standing relationship with the purchaser (**Y**es/**N**o)						
Do you negotiate prices (**Y**es/**N**o)?						
Could you increase your quantity of sales at these markets (**Y**es/**N**o)?						
Do you mostly sell at certain "peak" periods (**Y**es/**N**o)?						
Are you willing to sell eggs/birds on credit (**Y**es/**N**o)?						
Are signed sale contracts used (**Y**es/**N**o)						

8.3 Do you sell eggs/birds in advance? Yes: ☐ No: ☐

8.4 How are advanced sales made? Telephone: ☐ Fax: ☐ Letters in the post: ☐

Customers make new orders when collecting old orders: ☐ Through visitations by customers: ☐

Other: (please specify).....

8.5 Have you ever had difficulties meeting advanced orders? Yes: ☐ No: ☐

8.6 Have you ever had any problems with advanced sales and/or credit sales? Delayed payment: ☐
Dishonoured cheques: ☐ Failure to collect: ☐ Other: (please specify).....

8.7 What means did you first use to resolve these problems? No action taken: ☐ Legal court: ☐
Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐

8.8 What was your last resort to resolve these problems? No further action taken: ☐ Legal court: ☐
Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐ Find new market: ☐

8.9 Were problems successfully resolved? Usually: ☐ Sometimes: ☐ Hardly ever: ☐ Never: ☐

8.10 What are your main marketing or selling constraints? Absence of market information: ☐
Strong competition: ☐ Inability to sell products promptly: ☐ Lack of transport: ☐
Other: (please specify).....

9. GROUP STRUCTURE

9.1 Please complete the following table regarding group dynamics in your poultry activities. A production group is a group of individuals with joint interests in one poultry production activity. A co-operative group is an association of a number of different poultry producing entities.

Group Structure	**Production Group**	**Co-operative Group**
How far away is the poultry farm from your house?		
How far away is the poultry farm from the co-op depot?		
Is there a formal constitution or mission statement (**Y**es/**N**o)?		
Is there a formal membership (or shareholder) list (**Y**es/**N**o)?		
How many members are there?		
Do members have to sign a written contract to join (**Y**es/**N**o)?		
Do members contribute financially to the organisation (**Y**es/**N**o)?		
If Yes, are equal contributions made by each member (**Y**es/**N**o)?		
Do all members participate in daily operations/management (**Y**es/**N**o)		
Is there a designated manager, director or leader (**Y**es/**N**o)?		
If Yes, how long will he/she serve; **I**ndefinitely, **L**ess than two years, **M**ore than two years		
Are new managers, directors, etc **D**emocratically elected or **A**ppointed?		
If democratically elected, is voting **P**roportional to shareholdings or does each member have **O**ne vote?		
How many times have members come together for a meeting over the last year; (**A**) never, (**B**) between 1 and 4 occasions, (**C**) between 5 and 12 occasions, (**D**) more than 12?		

Group Structure	**Production Group**	**Co-operative Group**
How do you arrange meetings with members in advance; **T**elephone, **F**ax, **L**etters in the post, **P**revious meeting arrange date and venue of next meeting, **V**isitations by specific members, **A**dvertising, **O**ther?		
Are profits shared **E**qually or in proportion to **S**hareholding/investment?		
Are accounts checked externally and visible to all members (**Y**es/**N**o)		
Did an external agent or agency (*e.g.* extension officer, bank, ACAT, accountants, etc.) facilitate the formation of the enterprise (**Y**es/**N**o)?		
How many times have you received advice from this external agent or agency over the last year; (**A**) never, (**B**) between 1 and 4 occasions, (**C**) between 5 and 12 occasions, (**D**) more than 12?		

9.2 Why was it necessary to form a co-operative group or poultry production group? .....

9.3 What problems have you had between group members?.....

9.4 What means did you first use to resolve these problems? No action taken: ☐ Legal court: ☐ Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐

9.5 What was your last resort to resolve these problems? No further action taken: ☐ Legal court: ☐ Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐ Leave the group: ☐

9.6 Were problems successfully resolved? Usually: ☐ Sometimes: ☐ Hardly ever: ☐ Never: ☐

10. FINANCIAL MANAGEMENT INFORMATION

10.1 Please complete the following table regarding credit obtained in the last year for poultry. Columns **A** to **G** respectively represent the following credit sources; family and friends, stokvel or savings club, local money lender, asset supplier, KFC or Land Bank, commercial bank and other sources.

Credit Information	**A** Family	**B** Stokvel	**C** Lender	**D** Supplier	**E** KFC	**F** Bank	**G** Other
Unsuccessful credit applications							
Successful: credit received (Rands)							
Distance travelled from enterprise							
Length of repayment period							
Interest rates							
Was a guarantee required (**Y**es/**N**o)							
Did both parties sign a contract (**Y**es/**N**o)							
Can payments be delayed (**Y**es/**N**o)							

10.2 Please complete the following table regarding financial information and please indicate below whether this is on a per batch or per annum basis.

Financial Information **Per batch: ☐ Per annum: ☐**		**Indigenous Chickens**	**Commercial Layers**	**Commercial Broilers**
Income	Eggs			
	Cull birds			
	Live birds			
	Manure			
Costs	Bird purchases			
	Feed			
	Litter			
	Vaccinations/medicines			
	Heating			
	Labour			
	Management			
	Depreciation/savings			
	Other			

10.3 What daily wage rate do you pay unskilled poultry labour?.....

10.4 How many times have you received technical advice from financiers over the last year?
Never: ☐ Between 1 and 4 occasions: ☐ Between 5 and 12 occasions: ☐ More than 12: ☐

10.5 What problems have you had with financiers? .....

10.6 What means did you first use to resolve these problems? No action taken: ☐ Legal court: ☐
Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐

10.7 What was your last resort to resolve these problems? No further action taken: ☐ Legal court: ☐
Tribal authority: ☐ Negotiation: ☐ Confrontation/harassment: ☐ Find new financier: ☐

10.8 Were problems successfully resolved? Usually: ☐ Sometimes: ☐ Hardly ever: ☐ Never: ☐

10.9 What do you do with cash income? Deposit in post office account: ☐ Deposit in bank account: ☐
Deposit in stokvel/savings club: ☐ Deposit in burial society: ☐ Lend to others: ☐
Buy livestock: ☐ Invest in other assets: ☐ Entrust to someone for safe-keeping: ☐
Re-invest in poultry activities: ☐ Other: (please specify) .....

10.10 If your profit per **"batch"** increased by **R100** what would you **first** use this additional money for?
Schooling: ☐ Transport: ☐ Buildings: ☐ Improving poultry activities: ☐ Food: ☐
Household appliances: ☐ Recreation or holidays: ☐ Clothing: ☐ Medication: ☐ Pay debts: ☐
Increase savings: ☐ Investments: ☐ Other: (please specify) .....

10.11 If your profit per batch increased by a further **R1 000** what would you use this additional money for?
Schooling: □ Transport: □ Buildings: □ Improving poultry activities: □ Food: □
Household appliances: □ Recreation or holidays: □ Clothing: □ Medication: □ Pay debts: □
Increase savings: □ Investments: □ Other: (please specify) .....

10.12 If any application was refused what were the reasons? .....
.....
.....

10.13 If a guarantee was required, please specify the collateral pledged. .....

11. GENERAL OPINIONS

11.1 Why did you choose poultry as an income generating activity? .....
.....
.....

11.2 What opportunities are there for expansion? .....
.....
.....

11.3 What is the most limiting constraint in your current poultry activities? .....
.....
.....
.....

Thank you for your assistance.

Please re-post the questionnaire in the self-addressed pre-paid envelope before 22nd of December.