FACTORS AFFECTING PARTICIPATION IN LIVESTOCK LEASE AGREEMENTS: A STUDY OF DORPER SHEEP AND JERSEY CATTLE FARMERS IN SOUTH AFRICA

By

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DECLARATION

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ABSTRACT

This dissertation investigates the hypotheses that high transaction costs contribute to relatively low participation rates in livestock leasing in South Africa; and that specific contractual characteristics contribute to minimising total transaction costs of livestock leasing contracts in South African commercial agriculture. Many emerging livestock farming businesses may value the option of leasing-in livestock. Likewise, many established livestock farming businesses are currently undergoing expansion (especially dairy farms) and may also value the option of leasing-in livestock. A reduction in transaction costs and an improvement in efficiency of the livestock lease market could prove beneficial for emerging/expanding livestock farms. Likewise, investors, who anticipate competitive rates of return from investments in livestock, may value the option of owning and leasing-out livestock to suitable farm businesses. Transaction costs in livestock rental contracts include costs of information about contracts, costs of monitoring and enforcing contracts, costs of finding party members to contract with, the costs of risk of an agreement being terminated due to exogenous factors such as land claims, the risk of incomplete contracts and the costs of risk bought about by adverse selection and moral hazard. The magnitude of transaction costs incurred by participants of a livestock leasing contract are a function of how costs and risks are shared between the lessee and lessor, the inclusion of specific contractual clauses, the type of leasing contract, the relationship between party members and additional contractual characteristics.

A census postal survey of two populations of livestock farmers, namely members of the Jersey Breeders' and Dorper Sheep Breeders' Societies of South Africa, was conducted during April and May 2007 to collect data on farmers' perceptions of and their participation in livestock rental contracting agreements. Elicited data were analysed using a multinomial discriminant analysis to identify factors that discriminate between non-participants of the livestock leasing market, lessees of livestock and lessors of livestock. Ordinary least squares regression was used to identify preferred characteristics of livestock lease contracts.

Results of the first analysis suggest that a livestock leasing market does exist in South Africa; however, the market is characterised by high transaction costs. Non-participation in livestock leasing markets amongst survey respondents is partially attributable to the high perceived costs of obtaining market information and establishing and enforcing livestock lease agreements. Findings of the second analysis show that survey respondents, on average, showed a preference for formal agreements, leasing commercial animals for shorter periods and keeping detailed inventories. It is concluded that providing livestock farmers with information about important characteristics of successful livestock lease agreements may reduce transaction costs, and thus reduce market inefficiency in the market.

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INTRODUCTION

Leasing-in factors of production is a means of farming or ranching with more than owned resources (Clark *et al.,* 2002). A lease contract is a joint agreement between two parties: a lessor provides use of a resource to a lessee in return for a rental fee (Kerr, 1996). Lease contracts may be formal written agreements (i.e., a signed contract) or informal (e.g., verbal) agreements. If the lessee incurs fixed cash rent irrespective of yield or production the lease is known as a cash-lease agreement; if the lessee incurs a variable rent specified as a percentage of returns from the asset (e.g., a percentage of turnover or profit) then the lease is known as a share-lease agreement (Barry *et al.,* 2000: 369). Resources commonly leased between agriculturalists include land and machinery (Clark *et al.,* 2002); however, sharing arrangements are becoming more common in livestock acquisitions (Fausett & Dhuyvetter, 1995).

The occurrence of farmland share-rental (share-lease) agreements in South African agriculture was documented as early as 1903 by Oosthuizen (1903, cited by van der Heever, 1940).   These agreements were often (erroneously) described as being partnerships between a lessee and a partner (Wessels, 1922, cited by van der Heever, 1940). Lease agreements may be distinguished from partnership agreements in that partnerships are associations of two or more persons to carry on as co-owners of a business for profit (Barry *et al*., 2000: 658), whereas a lease is a contract whereby an individual acquires the control of an asset from the owner, but does not become a co-owner of the asset (Barry *et al.,* 2000: 655).

Sharecropping is a type of share-lease agreement that has been practised in the United Sates (US), amongst other countries, since the mid 1800's (Crofts, 1995). Sharecropping contracts are a means of dividing profits and risks of producing crops between tenants (supplier of labour and management) and a landlord (supplier of capital) (Manion, 2001). According to Mazumdar (1975), relatively risk-averse tenants are more likely to favour sharecropping leases over cash lease agreements because under sharecropping, production and price risks are shared between the landlord and tenant, whereas under cash lease agreements the tenant alone bears production and price risks. Sharecropping arrangements that provide for a fair distribution of profit and risk can benefit both parties to the contract, especially if there is a high degree of trust between the two parties (Manion, 2001).

Livestock lease agreements encompass a wide range of lease contracts that differ with respect to the distribution of costs, risk and benefits between the lessor and lessee. Sources of variation include (a) how the rent paid by the lessee to the lessor is determined, and (b) how the progeny of the leased livestock are shared between the lessor and the lessee. Rental payments are comprised of a fixed payment or a specified share of returns to the leased livestock. The share of returns may be defined as a proportion of revenue, and may also allow for the sharing of costs. For example, in certain share-lease agreements, revenue is allocated in the same proportion as the parties' contribution to overall costs (Hughes, 1993). In others, however, fixed costs from capital are

contributions made by the party owning the asset (Lawrence, 1991) and variable costs are incurred by the lessee (Clark *et al.,* 2002).

Livestock farming and game ranching sectors in South Africa are currently experiencing substantial restructuring. Drivers of this change include the land reform programme which aims to redistribute 30 percent of commercial farm land to previously disadvantaged South Africans by 2014 (Lyne & Ferrer, 2006); growth in the relative profitability of wildlife tourism during the past 15 years (ABSA, 2003); and as a result of increasing overall costs, relatively larger dairy farms have increased milk production per hectare (Milk Producers' Organisation, 2007). As a consequence, many livestock farming businesses are currently in start-up or expansion phases and may value the option of leasing-in livestock. Likewise, investors (including livestock farmers who have sold or have been dispossessed of farmland through land restitution) who anticipate competitive rates of return from investments in livestock or wildlife may value the option of owning and leasing-out livestock or wildlife to suitable farm businesses.

In 2003, livestock accounted for more than 24 percent of total capital invested in South African agriculture (Statistics South Africa, 2005), and approximately 50 percent for typical beef farms in KwaZulu-Natal (KZN) (Paterson, 2007). The capital requirements for livestock farmers during the establishment or expansion phases of their farm business are large and it is seldom that these farmers satisfy these capital requirements by relying solely on their own capital. These businesses may value options to stock their farms without use of additional debt finance, e.g., through leasing-in livestock (Hughes, 2001)

or instalment sale agreements. According to Paterson (2007), prior to 2004, Stockowners' Cooperative sold livestock using two-year instalment sale agreements. Following the demise of Stockowners' Cooperative during 2004, instalment sale agreements for livestock have become uncommon in South African agriculture (Paterson, 2007). As a result of the absence of instalment sales in South Africa, livestock lease agreements are a means for new or expanding livestock farmers to acquire control of more livestock. A reduction in transaction costs and an improvement in efficiency of the livestock lease market could prove beneficial for emerging/expanding livestock farmers.

Possible sources of transaction costs in the livestock leasing market include the problems of asymmetric information; the costs of establishing and enforcing formal livestock lease agreements; the adverse selection of parties and moral hazard; lessors' property rights of leased livestock being impeded; and the problem of contractual incompleteness. The real-world complexity of contracting requires a systematic approach to contract design (Bogetoft & Olesen, 2002) and information regarding the contracting process should be transparent to all leasing parties. Desirable contracts should be simple, complete and straightforward. However, the design of modern contracts is a remarkably complex task (Bogetoft & Olesen, 2002). Parties designing contracts often neglect contracting theory. Direct costs, risk and risk sharing are crucial aspects of contract design (Serfes, 2005). Adverse selection (pre-contractual opportunism) arises when there is a low level of trust between party members. This low level of trust causes a party member to act in an opportunistic manner. Moral hazard (post-contractual opportunism) comes about when a party receives a contract that gives an expected profit higher than his/her reservation

value (North, 1999). For example, a lessee can display moral hazard by not taking good care of leased dairy cattle during the leasing period.

Reservation values (the minimum rate of return that is required from an investment) may not be met, as high transaction costs result in a lower than required profit for a prospective lessee or lessor. Paterson (2007) observed that in KwaZulu-Natal (KZN) the number of beef farmers seeking to lease-out cattle increased during 2004/05, a period when beef farmers were experiencing relatively low profit margins. Typically, these cattle owners sought cash-lease agreements as a means to transfer income risks to lessees of their cattle. The lessees subsequently became dissatisfied and moved away from leasing-in cattle (Paterson, 2007). This trend reflects that their reservation values were not met under the terms of those lease agreements and that relatively low beef prices prevailed at that time. Similarly, wildlife lease-agreements for white rhino between the Natal Parks Board (lessor) and private sector game ranching businesses (lessees) during the early 1980's were unsuccessful, as the lease-agreements offered by the Natal Parks Board did not meet the reservation values of the prospective lessees (Flamand, 2006). Lease agreements that meet the reservation values of both contracting parties by adequately aligning rewards and risk are more likely to be sustainable over time.

This dissertation investigates farmers' perceptions of and participation in livestock leasing agreements in order to identify constraints, if any, to livestock rental markets in South Africa. In particular, through drawing from new institutional economics (NIE) theory, this study investigates market efficiency of the South African livestock leasing

market. It is hypothesised that transaction costs currently constrain the efficiency of livestock rental markets. Further, the dissertation investigates farmer-preferred contract design attributes and provides recommendations of key characteristics of successful livestock lease agreements in South Africa.

The dissertation is structured as follows: Chapter 1 reviews literature and research involving lease contracting and transaction costs, and uses this to identify potential sources of transaction costs in both the livestock leasing market and the respective contracts. Chapter 2 outlines the research methodologies to be used in this study. Chapter 3 describes the study populations chosen for this study, the data collection process and presents descriptive statistics of the survey respondents. The results of these models are presented and discussed in Chapter 4. The dissertation concludes with conclusions and recommendations.

CHAPTER 1

LITERATURE REVIEW

This chapter presents a review of literature relevant to the study. The first section deals with lease contracting and the risks associated with lease contracting. This is followed by a section reviewing transaction costs that are coupled with establishing and enforcing contracts. The impacts of transaction costs on market efficiency for agricultural resources are then reviewed in Section 1.3. Section 1.4 identifies potential sources of transaction costs in livestock rental markets and a conceptual model of participation in livestock rental markets is provided in Section 1.5. A section that identifies potential sources of transaction costs in livestock rental contracts concludes the chapter.

1.1 Lease Contracting and Risk Sharing

Contracting is a process involving the interaction of incentives, norms and performance outcomes. Because of the institutional and regulatory framework within which the contractual relationships are constituted, the structure of incentives for both contracting parties and the quality of contractual outcomes is affected in various ways (Deakin & Michie, 1997). Contracts are therefore characterised by both physical characteristics and characteristics that protect the owner of the resources' property rights, and are therefore characteristically multidimensional (North, 1999). Lease contracts have three common features – they assign rights/obligations, costs/risk and allocate returns (Lyne, 2007). Contracts that ensure that the lessor's property rights of the leased asset are protected

decrease the transaction costs associated with contracting. For example, Lyne *et al.* (1996) found that transaction costs were reduced when customary rules that enhanced the property rights of the lessor in rental markets for agricultural land in communal areas of southern Africa were reinstated. According to Helmstädter (2003), there are two truths in contracting: the first is uncertainty – an individual cannot predict future events; and the second is complexity – there are many variables in producing a desired outcome.

Leasing, like all other financial transactions in the global economy, represents a market. Lease markets bring together buyers of lease contracts (lessees) and sellers of lease contracts (lessors) (Schallheim, 1994). Both the lessee and the lessor are obliged to meet the requirements that are stipulated in the contract. Failure to do so results in a major or minor breach of contract. According to Schallheim (1994), rent (or lease payments), whether in the form of money or a share of the product, is a requirement for all contracts of lease. However, from an economic perspective, rent could also be a future favour for the lessor by the lessee. Like prices in commodity markets, rent is determined by supply and demand in leasing markets (Schallheim, 1994).

The obligations required of the lessee typically include the following: rent must be paid; good care must be taken of the leased resource; the resource must not be used in any manner other than that stipulated; and on termination of the lease the resource must be returned to the lessor in the same condition as it was received. The lessee must ensure that payment takes place at the proper place and time. Late payments constitute breach of contract (Kerr, 1996). According to Kerr (1996), the lessor is obliged to: (1) make the

resource that is stipulated in the contract available to the lessee; (2) refrain from disturbing the lessee in his/her use of the resource; (3) cover any costs to which he is obliged and (4) pay any necessary taxes on the resource. If the lessor fails to fulfil his obligations, as specified in the lease agreement, then the contract is breached and the lessee is entitled to a remission of the amount of rent paid. Failure by the lessee and lessor in meeting their obligations causes a high level of mistrust. This subsequently increases risks and transaction costs associated with the establishment of future contracts and therefore decreases the likelihood of future lease agreements between the two parties.

Lease contract stipulations determine how risks are transferred or shared between the lessor and lessee. Agriculture is subject to many different types of risks, including price risk, biological risk and institutional risk (Bogetoft & Olesen, 2002; Kirkpatrick *et al.,* 2006). In addition, contracting is characterised by the risks of moral hazard and adverse selection. Adverse selection problems arise under conditions of high *ex-ante* information costs (i.e., the costs of determining the likelihood that a prospective contracting partner is trustworthy before entering into a contract); whereas moral hazard problems arise under conditions of high *ex-post* information costs (i.e., the costs of monitoring contract performance). In cash-leases all risk is transferred to the party leasing-in, whereas in share-leases, risk is shared between the leasing parties. Risk is a cost; therefore, it is important to observe who takes on what risk and the extent to which each party is compensated for taking these risks (Lawerence, 1991). In share-lease agreements, risk can be minimised in two ways, either by minimising the overall risk or by sharing the risk between the two parties. Transaction cost economics assesses contracts in terms of their

ability to minimise suboptimal investments, by examining *ex ante* and *ex post* effects evident in the contracting process. A common belief existing amongst economists is that contracts are designed around a trade-off between risks and incentives (Allen & Lueck, 2002). Consequently, in order to receive a reasonable return, the investor must adopt some level of risk. Robust contracts that lead to a set of reasonable outcomes and constant monitoring are ways of minimising risk (Bogetoft & Olesen, 2002).

1.2   Transaction Costs of Establishing and Enforcing Contracts

Transaction costs are the implicit and explicit costs involved in a market exchange and in enforcing and monitoring the property rights of the good. Transaction costs are comprised of *ex ante* and *ex post* costs which can be fixed irrespective of the leasing contract or variable between leasing contracts. Fixed costs are unavoidable costs and are fixed irrespective of the leasing contract. Variable costs are costs that vary between leasing contracts and can be avoided. Costs include the costs associated with acquiring information (North, 1999), organising the bidding process (Kirkpatrick *et al.,* 2006), planning, adapting and monitoring the task (Brown *et al.,* 2006) and enforcing and policing contractual terms (North, 1999 and Kirkpatrick *et al.,* 2006). Lyons (1995), for example, in a study of contract use between small input suppliers and larger engineering firms, found that average transaction costs per unit decrease as firm size increases because fixed transaction costs can be spread over a larger output.

A trade-off exists between contract completeness and contract complexity. Contracts must not be too complex, as parties must be able to relate their choice of action to the compensation scheme in the contract. If contracts become too simple this will result in incompleteness, which in return could cause disputes between parties (Bogetoft & Olesen, 2002). Crookes & Lyne (2001) and Gadzikwa (2007) identified that the construction of formal contracts (in comparison to informal contracts) leads to lower transaction costs. Transaction costs can be further minimised by constructing and executing complete contracts (Maher, 1997). Although the concept is simple, writing complete contracts is usually not feasible due to high specification costs, especially in the case where the asset involved is relatively complex (Maher, 1997).

A high level of uncertainty may exist in the contracting process. According to Kemp (2006: 53-54), "uncertainty in legal decision making results from the personal discretion allowed within the working rules of society and the unknown future impacts of these decisions." The formation of formal contracts is a means of reducing uncertainty by facilitating enforcement and subsequently decreasing transaction costs associated with leasing for both the lessee and lessor. The more uncertainty there is, the more individuals are able to influence final outcomes and the larger the transaction costs (Allen & Lueck, 2002). The costs of transacting are typically much higher in less-developed regions, as the legal and regulatory system lacks the formal structure and enforcement that is essential for efficient markets (North, 1999). For example, Nieuwoudt *et al.* (2005) identified that information asymmetries amongst prospective buyers and sellers of water-

rights in the Crocodile River water management area had a negative impact on the number of transactions in the market for permanent transfers of water-use rights.

Uncertainty and the risk of unknown future impacts, throughout the contract's lifespan, often results in contracts being incomplete and can be the fundamental cause of disputes between contractual parties (North, 1999). Incompleteness of classical contracts is as a result of the assumption of zero transaction costs (Furubotn & Richter, 1991) and it being impossible to initially identify all externalities that may cause inter-party disputes (North, 1999). The design of modern contracts is a remarkably complex task (Bogetoft & Olesen, 2002). Classical economic theory of contracting focused on only the *ex ante* costs of establishing contracts and ultimately led to the fabrication of incomplete contracts (Furubotn & Richter, 1991). The classical economic theory of contracting is superseded by neo-classical economic theory of contracting in which *ex post* effects are also taken into consideration (Furubotn & Richter, 1991). Parties designing contracts often neglect contracting theory. Instead, contract design is often based on experience and a process of trial-and-error (Bogetoft & Olesen, 2002). Lyne *et al.* (1996) identified that transaction costs are minimised when more certainty in legal procedures is created. This can be achieved by having third party involvement in contract design. The importance of *ex-post* contracting costs is reflected in Lyons' (1995) finding that trust and complexity were the most significant variables in measuring transaction costs in contracts between small input suppliers and engineering firms.

Renegotiation between parties facilitates flexible contracts, as it enables parties to adjust the contract to changes in the environment (Bogetoft & Olesen, 2002). This is desirable as factors, such as incompleteness of contracts, uncertainty and risk often make it essential for parties to renegotiate contractual terms. The downside of renegotiation is that it may lead to parties demonstrating strategic behaviour, as parties do not act according to the initial contract but rather to the incentives that they expect to receive in the renegotiated contract (Bogetoft & Olesen, 2002).

Contracts should clearly outline rights, obligations, risks and incentives (World Bank, 2007), so that rewards, risk and costs are effectively aligned between party members. When a party is risk-averse, the allocation of risk and reward becomes problematic, as providing risk-averse parties with returns forces them to bear unwanted risk (Holmstrom & Milgrom, 1991). Under conditions where parties with higher degrees of risk aversion are matched with lower risk principles, the relationship between risk and incentives is negative. However, an increase in risk will lower the degree of risk aversion which results in an increase in incentives. As a result, the overall effect of risk on a party's incentive depends on the relative strength of risk and risk aversion (Serfes, 2005).

New contracts often do not align rewards, risk and costs and seem to undergo numerous improvements over time (Bogetoft & Olesen, 2002). For example, when the Natal Parks Board offered to lease white rhino to private landholders during the 1980's, prospective lessees declined the offer on the basis that the costs and risks associated with the agreement were not aligned with rewards. Currently, the Board (Ezemvelo KZN

Wildlife) is leasing black rhino to private landholders through a custodianship agreement. In comparison to the former agreement, the custodianship agreement has managed to better align the lessees' rewards and risk (Flamand, 2006). This was achieved using substantial donor funding to cover transaction costs. It is doubtful whether the reservation values of both parties could be met in the absence of donor funding.

1.3   Impacts of Transaction Costs on Efficiency in Markets for Agricultural Resources

High transaction costs are often a cause of inefficiency in contracting markets (Ménard, 2000). Leasing imposes both pre- and post-contractual costs on both leasing parties. An individual will only enter a contract of lease if the expected benefits from leasing exceed the costs of contracting. Consequently, as transaction costs of contracting rise, the volumes transacted in the lease market will decrease as fewer market participants perceive positive net benefits from entering into lease agreements. Deininger & Jin (2005), for example, found that transaction costs in land rental markets in China inhibited the efficiency with which the market transferred the use of farmland to relatively more productive users. Likewise, in South Africa, Armitage & Nieuwoudt (1999) showed that although the water market tended to transfer water use-rights to relatively more efficient users of water in the Orange River Catchment, uncertainty about water rights transfers amongst farmers was restricting the number of contracts and, hence, market efficiency.

The distribution of transaction costs between contracting parties is an important aspect of contract design (Serfes, 2005). Bogetoft & Olesen (2002) noted that new contracts, in particular, often poorly align rewards and costs (including transaction costs). Poor alignment of rewards and costs reduces the likelihood that a contract will be entered into or renewed (Bogetoft & Olesen, 2002), and thus is a further cause of inefficiency. This is especially the case in relatively new markets and those characterised by information asymmetry between prospective lessors and prospective lessees.

1.4   Sources of Transaction Costs in Livestock Rental Markets

An investigation of the impacts of transaction costs on the efficiency of livestock rental markets in South Africa requires due consideration of sources of transaction costs in the market. In this study it is postulated that the magnitude of transaction costs incurred in a contract is a function of the costs of information, costs of risk and the scale of operation of the respective contracting parties, thus:

$$TC = f \text{ (INFOCST, RISKCST, BIDCST, TPTNSCT, ENFCST, SIZE)} \qquad (1)$$

Where TC is transaction costs incurred by the contracting parties, INFOCST is a vector describing costs of information of each party to the contract, RISKCST is a vector describing the contracting parties' risk preferences and capacities to bear risk, BIDCST is a vector describing the costs of organising the bidding process, TPTNCST is a vector describing costs of translocating leased livestock, ENFCST is a vector describing costs of

policing and enforcing the contract, and SIZE is a vector describing the number of animals leased.

Costs of information reflect the contracting parties' knowledge of the market and their capacity to acquire, assimilate and use information. For example, Fenwick & Lyne (1999) and Makhura (2001) used *level of formal education* as a proxy for market participant' costs of information. Individuals with a higher level of education will have a better capacity to attain and understand information. Costs of information incurred in establishing and subsequently monitoring and enforcing a contract tend to be fixed transaction costs. Information asymmetries in the market, perhaps due to the market being thinly traded, add to market inefficiencies (Nieuwoudt *et al.,* 2005; Makhura, 2001).

Adverse selection and moral hazard are, in essence, problems associated with high costs of information. In the presence of adverse selection and moral hazard, the relative magnitudes of the risks assumed by each contracting party are expected to be lower if the two contracting parties are bound by more than a business relationship, e.g., a bond of friendship or family. In other words, both *ex-ante* and *ex-post* transaction costs tend to be lower if the contract is not an arms-length transaction, *ceteris paribus*.

All other things being equal, costs of risk increase as the contracting parties' levels of risk aversion increase and their capacities to bear risk decreases. Following Barlow (1995), risk averseness of farmers is measured by asking respondents a suite of questions that are

related to their risk preferences. In empirical research, capacity to bear risk is often approximated using an indicator of liquidity (e.g., Fenwick & Lyne, 1999), or income diversification (e.g., Makhura, 2001).

Transport costs are often identified as an important transaction cost in studies of the marketing of farm produce at markets (e.g., Matungul *et al.*, 2001) and access to credit (e.g., Fenwick & Lyne, 1999). Likewise, livestock lease contracts may require the capture and translocation of leased livestock from one property to another. This may require the services of a veterinarian, depending on regulations that govern the translocation of various species of livestock.

The expected costs of policing and enforcing contracts are an important *ex post* transaction cost. Gadzikwa (2007) included a variable measuring contract type. He established that verbal contracts are highly contestable and difficult to enforce. Instead, to lower *ex post* transaction costs, contracts should be written and contractual terms should be renegotiated seasonally.

The size of the contract is an important determinant of total transaction costs as total variable transaction costs increase in direct proportion to the size of the contract. For example, Lyons (1995), Fenwick & Lyne (1999), Matungul *et al.,* (2001) and Makhura (2001) all used the *size of the business,* and Nkhori (2004) used *business wealth,* as a proxy for transaction costs in their respective studies.

1.5   A Conceptual Model of Participation in Livestock Rental Markets

A hypothesis of this study is that if high transaction costs cause market inefficiencies in livestock rental markets, then, *ceteris paribus*, individuals who face relatively higher transaction costs are less likely to partake in livestock lease agreements. Thus,

$$P_i = f \text{ (TC)} = f \text{ (INFOCST, RISKCST, BIDCST, TPTNSCT, ENFCST, SIZE)} \qquad (2)$$

where P_i is the probability that the ith individual is currently party to a livestock lease agreement.

A participant in a livestock lease agreement is either a lessor or a lessee of livestock. The probability that the market participant is a lessor rather than a lessee of livestock is expected to be related to the life cycle of the business, and the individual's expected returns to livestock ownership relative to other investments. Thus,

$$L_i = f \text{ (LCYCLE, CAPOC)}, \qquad (3)$$

Where: L_i is the probability that a party to a livestock lease agreements is a lessor; LCYCLE represents the business's current phase in its life cycle (i.e., start-up, expansion, consolidation or transfer); and CAPOC represents the individual's opportunity cost of investing in livestock. In general, it is expected that an individual who is party to a livestock lease agreement is more likely to be a lessee than a lessor if his business is in

the start-up or expansion phase, and if his opportunity cost of investing in livestock is relatively high.

The current phase of a business life cycle is expected to be related to the age of the principal decision maker of the farm business, the size of the business operation, the financial position of the farm business and exogenous factors affecting the farm business (Barry *et al.*, 2000), as reflected in equation (4):

LCYCLE = *f* (AGE, GRAZHA, LIQD, SOLV, LNDCLM) (4)

Where: LCYCLE represents the business's current phase in its life cycle; AGE represents the age of the principal decision maker of the farm business; GRAZHA represents the area of grazing land; LIQD represents the liquidity of the farm business; SOLV represents the solvency of the farm business; and LNDCLM represents whether the farm business is under any land claims.

1.6 Sources of Transaction Costs in Livestock Rental Contracts

Although livestock leasing is relatively common in New Zealand (Dairy Statistics, 1999) and the US (Tranel, 1996), little on the efficiency of actual livestock lease agreements in South Africa has being documented or reported on in the economic literature. An investigation of transaction costs of actual South African livestock lease agreements requires due consideration of sources of transaction costs in leasing contracts. In this

study, it is postulated that the magnitude of transaction costs (TC) incurred to participants of a livestock leasing contract is a function of the relationship between the two leasing parties (RELA); the duration of the rental contract (LYEAR); the distance between the leasing parties (DIST); the annual cash rental per unit of livestock (CASHR); the type of leasing contract (CONTYPE); whether a third party participated in contract design (LAWY); and whether the property rights of the lessor were protected (PRIGHTS). The following model is therefore postulated:

$$TC = f \text{ (RELA, LYEAR, DIST, CASHR, CONTYPE, LAWY, PRIGHTS)} \qquad (5)$$

The variables LYEAR, DIST, CASHR, CONTYPE and LAWY represent *ex ante* costs, as these costs are incurred before the contract is entered. The RELA variable represents an *ex post* cost. Contractual length is an important attribute for the efficiency of livestock leasing contracts. Most livestock leases are valid for at least one year (Bennett, 1997). In order to increase the probability of an adequate return, livestock share arrangements should be set up to last for at least five years (Edwards, 2005). Lyons (1995) identified that contractual length is an important contributor to transaction costs between small input suppliers and large engineering firms. In markets characterised by high transaction costs, the contracting period is often short-term and highly personalised, as parties involved try to minimise their exposure to moral hazard (Crookes & Lyne, 2001). As a result of moral hazard, impersonal agreements are expected to increase the overall risk of the contract (Crookes & Lyne, 2001).

DIST can affect fixed transaction costs as it is costly and time-consuming travelling long distances when transporting and monitoring animals. Nkhori (2004), Matungul *et al.* (2001), Fenwick & Lyne (1999) and Makhura (2001) identified that market participation of small-scale farmers was affected by their distance from markets. For livestock leasing, closer transaction allows for more frequent monitoring. Information on market prices (annual livestock rentals) can be included by asking respondents their annual rental per head of livestock, and then equating this value as a percentage of the purchase price for a unit of livestock (CASHR).

CONTYPE is a vector describing the type of leasing contract used. Essentially, two variables will be used as proxies to measure the contribution of contract type to transaction costs: namely, CONT_FOR_INFOR (whether the leasing agreement is formal or informal) and CONT_CAS_SHAR (whether the leasing contract was a cash-lease or share-lease). It is likely that indirect costs of transacting can be lessened, if a third party is present and participates in the design of the contract of lease (LAWY), as the risk of uncertainty, moral hazard and opportunism by party members will be lower for the involved parties. A main contributing factor to the lessor's *ex post* transaction costs are whether his property rights of the leased livestock will be protected. Many potential lessors do not lease out livestock as they feel that their property rights will be impeded. A variable describing whether the property rights of the lessor are protected is thus included (PRIGHTS).

In addition to these variables, Table 1 presents variables that are hypothesised to contribute to transaction costs in livestock leasing contracts and that will be used in the postulated model.

Table 1: Hypothesised variables used in the postulated model

Variable	Definition
SHEDAR	1 = Dorper sheep, 0 = Jersey cow
STUCOM	1 = Stud animals, 0 = Commercial animals
NOLEAS	Number of livestock leased (livestock units)
INV	1 = Inventory of leased livestock kept, 0 = No inventory
OWNER	1 = Ownership of leased livestock passed to lessee, 0 = Ownership of leased livestock remains with lessor
ADD	1 = Clause allowing for additional livestock to be added during the leasing period, 0 = No clause
CONREN	1 = Clause allowing for contract renegotiation, 0 = No clause
LNDCLM	1 = Contract takes land claims into account, 0 = Land claims not taken into account
INSUR	Whether leased livestock are insured[+]
TRSPT	Who paid transportation costs of the leased livestock[+]
LIVRIS	Which party member bears the risk of the leased livestock[+]

[+] Refer to Table 2 of this section for definition of these variables.

In comparison to Dorper sheep, dairy cattle are more valuable per head and more management time and resources are needed to sustain competitive productivity (Paterson, 2007). Therefore, rental contracts for Jersey cattle are expected to incur higher *ex post* transaction costs than Dorper sheep. Stud animals are of higher genetic quality and condition than commercial animals, therefore the *ex post* transaction costs associated with a lessor leasing out stud animals and not receiving animals of the same genetic quality and condition at the end of the leasing period, is much higher than a lessor leasing out

commercial animals. Larger numbers of leased livestock allow the leasing parties to benefit from economies of size, as fixed transaction costs can be spread over more units of livestock, resulting in a lower fixed cost per unit of livestock leased. Consequently, leasing contracts with larger numbers of livestock are expected to have lower transaction costs. The INV variable is expected to be important, as keeping a detailed inventory of leased livestock lowers the risk, and therefore *ex post* transactions, of the lessor receiving low genetic quality animals at the end of the leasing period.

Variables assessing whether specific clauses were included in the contractual agreement are expected to be important as these serve to reinstate the rules of the agreement, resulting in protection of the property rights for the lessor and lower transaction costs during the contracting process (*ex post* transaction costs). These variables include OWNER, ADD, CONREN and LNDCLM. If the livestock lessor passes ownership of his livestock to the lessee it is expected that the transaction costs will decrease, as the lessor does not bear the risk of receiving livestock of poor genetic and physical quality at the end of the leasing period. If the option of adding additional livestock during the leasing period is included in the contract, it is expected that the transaction associated with the agreement will be lower, as the costs associated in drafting new contracts is eliminated. The option of contract renewal provides the opportunity for both party members potentially to renew the contract of lease at the end of the leasing period. This lowers the indirect costs of having to search for new party members and lowers the direct costs of having to draft new contracts, resulting in lower transaction costs. Land claims are a reality in South Africa and it is expected that land claims contribute highly to *ex*

post risk in lease agreements. If there is a claim on the lessee's land, the lessor will have a higher probability of losing grazing land for his livestock. If a clause stipulating that the lessor (in the event of a land claim succeeding) has the right to remove his livestock from the lessee's land, the *ex post* transaction costs borne by the lessor are minimised.

The lessor is often exposed to the risk of his property rights being impeded and as a result often bears higher transaction costs. It is anticipated that by keeping a detailed livestock inventory and by insuring leased livestock, any chance of moral hazard or opportunistic behaviour is reduced. In this way, both the lessor and lessee are protected against animal mortality, resulting in overall lower transaction costs. To ensure that the property rights of the lessor are protected, leased livestock should be insured. Insurance of livestock lowers the overall risk of animal mortality that is borne by the lessor and lessee.

The costs associated with the transportation of animals can form a considerable proportion of the overall costs of leasing. A factor contributing to the demise of white rhino lease agreements between Natal Parks Board and private sector game ranches was that the lessee had to cover the costs of animal capture and transportation. Ezemvelo KZN Wildlife currently subsidises the costs of translocating black rhino to private sector game ranching businesses in the Black Rhino Range Expansion Programme. Consequently, before a contract is entered into, an agreement between the parties must be met as to who is responsible for the translocation of livestock to and from the place of lease. Livestock are expensive and comprise a large proportion of the capital invested on commercial livestock farms. As a result, the possibility of livestock mortality is a risk

that all livestock farmers bear. Consequently, a variable describing which party bears the risk of leased livestock (LIVRIS) is expected to be important.

To elicit information on transaction costs in livestock lease contracts in South African commercial agriculture, data must be available on the factors presented in equation (6).

$$TC = f \ (\text{RELA, LYEAR, DIST, CASHR, SHEDAR, STUCOM, NOLEAS, INV,}$$
$$\text{OWNER, ADD, CONREN, LNDCLM, LAWY, PRIGHTS, CONT\_FOR\_INFOR,}$$
$$\text{CONT\_CAS\_SHAR, INSUR, TRSPT, LIVRIS)} \qquad (6)$$

In addition, the variables RELA, INSUR, TRSPT and LIVRIS can be proxied by the variables included in Table 2. These proxy variables take all scenarios into consideration.

Table 2: Proxies for specific independent variables

Variable	Proxy Variable	Definition
RELA	RELA_BUSI	1 = Business relationship between parties, 0 = Other
	RELA_FF	1 = Leasing parties are friends or family, 0 = Other
	RELA_NEI	1 = Leasing parties are neighbours, 0 = Other
INSUR	INSUR_LE	1 = Lessee pays insurance, 0 = Other
	INSUR_LR	1 = Lessor pays insurance, 0 = Other
TRSPT	TRSPT_YN	1 = Leased livestock were transported, 0 = No transportation
	TRSPT_SHAR	1 = Transport costs were shared, 0 = Other
	TRSPT_LE	1 = Lessee bears transport costs, 0 = Other
	TRSPT_LR	1 = Lessor bears transport costs, 0 = Other
LIVRIS	LIVRIS_SHAR	1 = Livestock risk is shared, 0 = Other
	LIVRIS_LE	1 = Lessee bears livestock risk, 0 = Other
	LIVRIS_LR	1 = Lessor bears livestock risk, 0 = Other

1.7   Discussion

This chapter reviews literature and research involving lease contracting and transaction costs and uses this to identify possible sources of transaction costs in livestock rental markets and livestock rental contracts. The review identified that both the lessee and lessor are obliged to meet the requirements that are stipulated in the contract. Failure to do so results in breach of contract. In addition, it is identified that contracting is characterised by both pre- and post-contract opportunism. Additional contributors to transaction costs include uncertainty of future events and contract incompleteness. Renegotiation is an important factor in contracting, as it facilitates flexible contracts. Contract incompleteness often makes it essential for parties to renegotiate contract terms.

Review of past literature on land and water markets shows that uncertainty about water rights transfers and information asymmetries between prospective buyers and sellers of water rights has had a negative impact on the number of transactions in the market. This study postulates that the magnitude of transaction costs incurred in a contract is a function of the costs of information of each party to the contract; the contracting parties' risk preferences and capacities to bear risk; the costs of organising the bidding process; the costs of translocating leased livestock; the costs of policing and enforcing the contract; and the size of the contract. The study further postulates that the magnitude of transaction costs incurred by participants currently involved in a livestock leasing contract is a function of the relationship between the two leasing parties; the duration of the rental contract; the distance between the leasing parties; the annual cash rental per

unit of livestock; the type of leasing contract; whether a third party participated in contract design; and whether the property rights of the lessor were protected. The next chapter proceeds to describe the research methodology to be used in this study.

CHAPTER 2

RESEARCH METHODOLOGY AND MODEL SPECIFICATION

The purpose of this chapter is to describe the methodologies used to test the two hypotheses, namely that transaction costs are currently constraining the efficiency of the livestock leasing market in South African commercial agriculture; and that specific contractual characteristics contribute to minimising total transaction costs of livestock leasing contracts in South African commercial agriculture. Discriminant Analysis (DA) and Ordinary Least Squares (OLS) are used to investigate market efficiency and transaction costs in livestock leasing contracts, respectively. Section 2.1 presents the Discriminant Analysis Model followed by the Ordinary Least Squares Regression model in Section 2.2.

2.1 Discriminant Analysis (DA) Model of Participation in Livestock Lease Agreements

Discriminant analysis (DA) allows the researcher to determine a linear combination of independent variables (linear discriminant function (LDF)) that separate two groups as well as possible (Manly, 1995; Morris, 2006), and then to use the estimated discriminant function to predict group membership of new cases that have not yet being classified to a specific group (Norušis, 1990; Hair *et al.,* 1998). When the study cases are divided into three or more groups, multi-group DA may be used to separate the groups using more

than LDF. A general rule used to determine the number of LDFs is: if there are k groups, then k-1 LDFs are computed (Norušis, 1990).

Nieuwoudt *et al*. (2005) demonstrated the use of multi-group DA for investigating the impact of transaction costs on market efficiency in a study in which water market participants were grouped as sellers of water rights, buyers of water rights, or "neither buyers nor sellers of water rights". This study, in which livestock farmers are categorised as "lessors of livestock", "lessees of livestock" or "neither lessors nor lessees of livestock", follows a similar approach. Because there are three categories of market participants, two LDFs can be extracted (equations (7) and (8)). The first LDF_1 gives the maximum F ratio on a one-way analysis of variance for the variation within and between groups. If the condition that there is no correlation between LDF_1 and LDF_2 is met, LDF_2 (equation (7)) provides the maximum possible F ratio on a one-way analysis of variance within groups (Manly, 1995).

$$LDF_1 = a_{11}X_1 + a_{12}2X_2 + \ldots\ldots a_{1n}X_n \tag{7}$$

$$LDF_2 = a_{21}X_1 + a_{22}2X_2 + \ldots\ldots a_{2n}X_n \tag{8}$$

Where X_i = the ith independent variable ($i = 1, .., n$), and a_{ji} = discriminant weight for the ith independent variable in the jth LDF ($j = 1, 2$). The proposed empirical model for each LDF in this study takes the form of equation (9). Equation (9) hypothesises that a farmer's decision to participate in the livestock leasing market depends on n explanatory

variables, X_i, where $i = 1, .., n$. Following equations (7) and (8), the X_i are explanatory variables that quantify or proxy INFOCST, RISKCST, SIZE, BIDCST, TRANCST, POLCST, LCYCLE and CAPOC.

$$LDF = \Sigma \beta_i X_i \tag{9}$$

In this study 19 explanatory variables were specified in the multi-group DA, as shown in Table 3. These variables were selected to approximate INFOCST, RISKCST, SIZE, BIDCST, TRANCST, POLCST, LCYCLE and CAPOC and the data are expected to be available.

Table 3: Definition of empirical model variables used in the multi-group Discriminant Analysis of participation in livestock lease agreements.

Variable	Definition	Unit	Expected Sign
AGE	Respondent's age	Years	+
EDU	Respondent's formal education (scale 1 - 6)	1=No education; 2=Grade 7 and below; 3=Grade 8-11; 4=Grade 12; 5=Diploma and 6= Degree	+
GRAZHA	Hectares of grazing land	Hectares	+
RENI	Whether respondent rents in land (No = 0; Yes = 1)	Dummy variable	+
RENO	Whether respondent rents out land (No = 0; Yes = 1)	Dummy variable	+
LSUHA	Livestock units per fertilised hectare	Livestock/hectare	+
LNDCLM	Whether farm is under any land claims (No = 0; Yes = 1)	Dummy variable	+
GFI	Gross farm income for the 2006/07 financial year	Rand	+
PGFI	Proportion of gross farm income derived from dairy/sheep farming	Percentage	+
OFE	Off-farm employment (No = 0; Yes = 1)	Dummy variable	+
LIQD	Liquidity ratio	Current assets : current liabilities	+
SOLV	Solvency ratio	Long-term debts : long-term assets	+
HIGHRK	High level of risk involved with livestock leasing	Likert Scale*	+
NEWIDEA	Livestock leasing is a new idea that still needs to develop	Likert Scale*	+
LITINFO	Little information on potential lessees and lessors	Likert Scale*	+
EFLEAS	Costly and time consuming to craft an efficient lease	Likert Scale*	+
RETBEN	Returns from leasing livestock exceed the benefits of ownership	Likert Scale*	+
RISK	Risk index	Likert Scale* (risk index)	+

* Scale of 1- 5, where; 1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree.

The principal farm decision-maker's age (AGE) is included to capture the effects of the farm business life-cycle. In general, it is expected that younger farmers are more willing

to take risks than older farmers, reflecting that, *ceteris paribus*, costs of risk and therefore higher transaction costs are expected to increase with age. Older farmers are, therefore, expected to be less likely to participate in livestock rental markets. However, it is also expected that younger farmers are more likely to have businesses that are in the start-up or growth phases, and therefore are more likely to be lessees of livestock, whereas older farmers' businesses are more likely to be in the consolidation or transfer phases, and therefore more likely to be lessors of livestock. Therefore, it is expected that relatively older farmers who do participate in livestock rental markets are more likely to be lessors of livestock than lessees of livestock, *ceteris paribus*.

It is expected that a farmers' ability to obtain, assimilate and use information is positively related to the highest levels of formal education he has achieved (EDU). As a consequence, a farmer who has achieved relatively more education is expected to face lower transaction costs in livestock rental markets and is, therefore, more likely to participate in livestock lease agreements. Experience is another important source of information and knowledge. It is expected that previous participation in leasing contracts (e.g., land rental contracts) will improve a farmer's knowledge of the characteristics of successful contracts and the process of establishing and enforcing lease contracts. Consequently, farmers who have participated in land rental markets are expected to be more likely to also participate in livestock rental markets. In this study RENI and RENO are measures of farmers' participation in land rental markets as lessees and lessors respectively.

Average costs of contracting may be reduced by spreading fixed transaction costs over a greater number of livestock, thus increasing likelihood of participation in livestock rental markets. Consequently, a few variables reflecting farm size are included in the model, such as gross farm income (GFI), the area of grazing land operated (GRAZHA), and the number of livestock units per hectare (LSUHA). It is also expected that farm size may be indicative of a farm business's position in its business life cycle. It is expected that farm businesses in the start-up or growth phases (typically smaller scale of operation and relatively low per hectare stocking rates) are more likely to be lessees of livestock, whereas farm businesses in the consolidation or transfer phase (typically larger businesses with relatively higher per hectare stocking rates) are more likely to be lessors of livestock.

The financial position of a farm business is another factor that may be indicative of a farm business's phase in its life cycle. In general, businesses in the start-up and growth phases are more likely to be characterised by low liquidity (LIQD) and solvency (SOLV), and therefore low capacity to bear risk. These businesses are, therefore, more likely to be lessees of livestock.

Exogenous factors may unexpectedly cause farm businesses to move into the transfer phase of the business life cycle. An example of this that is prevalent in South African commercial agriculture is the transfer of farms to new owners through the land restitution process. Consequently, LNDCLM is included in the model to identify farm businesses that are currently under land claim through the land redistribution process.

The capacity for a farm business to bear risk can be proxied by a variable measuring the proportion of gross farm income that is derived by sheep/dairy (PGFI). Diversification of the farm business into other sources of on-farm income is indicated by a relatively lower PGFI score. Diversification is positively related with the capacity to bear risk. An individual's decision to invest is influenced by the risk behaviour of that individual (Gillitt *et al.,* 2005). The risk preference of a farmer is measured by calculating a risk index for each farmer (RISK). Following Barlow (1995), preferences of farmers were measured by asking respondents a suite of questions related to their risk preferences. The average scores for each statement represent an overall risk index. Lower scores represent high risk aversion and higher scores indicate a lower risk aversion (Barlow, 1995).

Farmers' perceptions of the profitability of farming owned livestock relative to the profitability of farming lease-in livestock reflect their expectations of earning capital gains through owning livestock (RETBEN). Farmers who anticipate good capital gains from livestock ownership will be more likely to lease out livestock, whereas farmers who anticipate poor capital gains through owning livestock will be relatively more likely to lease-in livestock. Farmers who perceive the rate of return on livestock ownership to be high relative to their opportunity cost of capital, but are constrained by resource and management constraints from increasing the size of the herds that they farm, are more likely to be lessors of livestock. These farmers may, for example, have relatively less time for managing their livestock due to off-farm employment commitments (OFE).

The costs of crafting an efficient lease agreement (EFLEAS) and searching for a potential lessee or lessor (LITINFO) can capture the costs of acquiring information for livestock lease agreements. A farmer who considers livestock leasing to be an unfamiliar concept (NEWIDEA) or relatively risky (HIGHRK) is unlikely to participate in livestock leasing.

2.2 Ordinary Least Squares (OLS) Regression of Transaction Costs in Livestock Leasing Contracts

Following a similar approach to Crookes & Lyne (2001), an ordinary least squares model is used, where TC is regressed on variables represented in Table 4. By asking respondents who are currently leasing livestock to declare their existing contractual specifications, as well as their preferred specifications, the dependent variable (TC) is proxied by using a variable that compares the variability of actual characteristics of the respondents' lease agreement against the characteristics that are preferred (FAV). FAV is measured on a scale of $1 - 12$. A score of zero indicates that all the preferred contract characteristics differ from the actual contract characteristics (unfavourable contract), and a score of 12 indicates that preferred and actual contract characteristics are the same (favourable contract). Respondents with high variability between actual and preferred characteristics experience high transaction costs, whereas respondents with low variability have low transaction costs. The FAV variable will be regressed on variables presented in Table 3. Livestock leasing contracts that are currently in existence or that were terminated no later than January 2006 will be used in this model. The objective of

this technique is to determine the extent to which various contracting characteristics contribute to a higher probability of contract inefficiency.

Table 4: Definition of variables used in the ordinary least squares model.

Variable	Definition	Expected sign
Dependent variable		
FAV	Score = 0 – 12, where 0 = unfavourable contract, 12 favourable contract	N/A
Independent variables		
RELA_FF	1 = Leasing parties are friends or family, 0 otherwise	+
RELA_NEI	1 = Leasing parties are neighbours, 0 otherwise	+
LYEAR	Duration of the livestock lease agreement	-
DIST	Distance between party members	-
CASHR	Annual cash rental (expressed as a percentage of livestock value)	*A priori* unknown
SHEDAR	1 = Dorper Sheep, 0 = Jersey cow	+
STUCOM	1 = Stud animals, 0 = Commercial animals	-
NOLEAS	Number of livestock leased	+
INV	1 = Inventory of leased livestock kept, 0 = No inventory	+
OWNER	1 = Ownership of leased livestock passed to lessee, 0 = Ownership of leased livestock remains with the lessor	+
ADD	1 = Clause allowing for additional livestock to be added during the leasing period, 0 = No clause	+
CONREN	1 = Clause allowing for contract renegotiation, 0 = No clause	+
LNDCLM	1 = Contract takes land claims into account, 0 = Land claims not taken into account	+
LAWY	1 = Participation by third party in contract design, 0 = No third party participation	+
PRIGHTS	1 = Property rights of the lessor protected, 0 otherwise	+
CONT_FOR_INFOR	1 = Formal contract, 0 = Informal contract	+
CONT_CAS_SHAR	1 = Share lease, 0 = Cash lease	-
INSUR_LE	1 = Lessee pays insurance, 0 otherwise	+
INSUR_LR	1 = Lessor pays insurance, 0 otherwise	-
TRSPT_YN	1 = Leased livestock were transported, 0 = No transportation	-
TRSPT_SHAR	1 = Transport costs were shared, 0 otherwise	+
TRSPT_LE	1 = Lessee bears transport costs, 0 otherwise	-
TRSPT_LR	1 = Lessor bears transport costs, 0 otherwise	+
LIVRIS_SHAR	1 = Livestock risk is shared, 0 otherwise	+
LIVRIS_LE	1 = Lessee bears livestock risk, 0 otherwise	-
LIVRIS_LR	1 = Lessor bears livestock risk, 0 otherwise	+

The first two explanatory variables describe the relationship between leasing parties and are all expected to carry positive β_i coefficients. Contracting parties have more to protect than only a business relationship; they have to reduce the chances of moral hazard. Party members having *a priori* information regarding the other leasing party will result in lower adverse selection problems. However, as the level of trust decreases, a smaller positive correlation is expected. It is expected that LYEAR and transaction costs will be negatively correlated, as the South African livestock leasing market is characterised by some level of uncertainty. Therefore, shorter leasing contracts minimise the exposure time that parties are vulnerable to a fixed agreement. As a result of monitoring and enforcement costs, it is expected that the DIST variable will have a negative coefficient. *A priori,* the relationship between CASHR and transaction costs is unknown. As a result of dairy cattle requiring more management time, it is expected that the SHEDAR variable will have a positive coefficient. Due to the higher monetary value of stud animals, leasing contracts associated with stud animals will have higher transaction costs. For this reason, it is anticipated that the STUCOM variable will have a negative coefficient. Because transaction costs per unit of livestock can be minimised by spreading the costs over relatively larger number of livestock, the NOLEAS variable is expected to have a positive coefficient.

The inclusion of a detailed inventory is expected to contribute to protecting the property rights of the lessor, and is therefore likely to possess a positive coefficient. However, if ownership of leased livestock is passed to the lessee, the risk of the lessor receiving poor genetic quality animals at the end of the leasing period is reduced, suggesting that the

OWNER variable will have a positive value. The clauses for adding additional livestock during the lease contract (ADD), contract renegotiation (CONREN) and the risk of land claims (LNDCLM) are expected to lower contractual transaction costs and consequently are assumed to have positive coefficients.

The greater investment of knowledge and understanding into contract design by including third party participation is expected to lower transaction costs. Consequently, it is anticipated that third party participation and transaction costs are negatively correlated, suggesting a positive estimation for the LAWY variable. When the lessor property rights are protected, the transaction costs associated with livestock leasing are expected to decrease. Hence the coefficient for the PRIGHTS variable is expected to be positive. Cash agreements have lower monitoring costs than share agreements: consequently, it is anticipated that formal cash leasing contracts will characterise agreements with lower transaction costs. CONT_FOR_INFOR and CONT_CAS_SHAR are, therefore, expected to have positive and negative coefficients, respectively.

It is anticipated that insurance premiums are paid by the lessee, as insurance premiums form part of the overall management costs of the leased livestock. The INSUR_LE and INSUR_LR are likely to have positive and negative coefficients, respectively. When leasing parties are not neighbours it is expected that the costs of transportation will either be shared or paid by the lessor. Consequently, the variables TRPST_YN and TRSPT_LE are expected to have negative values and TRSPT_SHAR and TRSPT_LR are likely to have positive values. *A priori* expectations assume that livestock risk will be borne by

the lessor or shared between the leasing parties. *A priori* it is assumed that the LIVRIS_SHAR and LIVRIS_LR variables will have positive coefficients and LIVRIS_LE will have a negative coefficient.

CHAPTER 3

DATA COLLECTION AND DESCRIPTIVE STATISTICS

This chapter explains the reasons for selecting the study sample populations from which data were collected, and then describes the approaches taken to collect the relevant data. Section 3.2 then provides descriptive statistics of the survey respondents.

3.1 Data Collection

Initially, an attempt to source copies of livestock lease contracts to analyse as case study purposes was made. However, current livestock leasing participants felt that a great deal of time and money had been invested in producing the contracts and as a result were reluctant to provide copies. The empirical analyses presented are based on a postal survey of 395 and 438 registered members of the Jersey Breeders' Society of South Africa and Dorper Sheep Breeders' Society of South Africa, respectively. Registered members receiving the questionnaire were randomly distributed throughout South Africa. These study populations were selected for the following reasons:

1. These two societies supported the objectives of the research project and agreed to make their membership lists available to the researchers;

2. The dairy sector is likely to have relatively high rates of livestock leasing compared to other livestock sectors in South Africa (Oldfield, 2007; Lowry, 2007 and Aveling, 2007);

3. According to van Heerden (2006), there has been evidence of several sheep farmers leasing sheep in the Eastern Cape, South Africa.

The nature of dairy and sheep farming is conceptually different and for this reason different questionnaires were sent to the two study populations. The differences arise in the description of the livestock type and the description of the lease type (sharemilking and bull leases are included in the questionnaire for dairy farmers). The questionnaire for members of the Dorper Breeders' Society of South Africa and members of the Jersey Breeders' Society of South Africa are presented in Appendix A and Appendix B respectively. An English and Afrikaans (van der Berg, 2007) questionnaire was provided to survey respondents in order to minimise language bias.

A pilot survey was conducted on two farmers who were *a priori* known to engage in livestock leasing (one lessor and one lessee), one farmer who is a non-participant in livestock rental markets, and two dairy consultants. The aim of the pilot survey was to establish whether the questions were easily and correctly understood and whether farmers would respond to the survey. In general, respondents to the pilot survey were satisfied with the questionnaire. They cautioned that to the best of their knowledge livestock leasing is currently uncommon in South Africa, although many livestock farmers have at some stage participated in livestock leasing arrangements. Furthermore, all pilot survey respondents were of the opinion that there is currently a growing interest in livestock leasing amongst South Africans livestock farmers, and expressed their support for the study.

The survey was designed to collect data for estimation of the variables that were identified by the review of methodologies and used in the multi-group DA (Table 3, Section 2.1.1) and the OLS (Table 4, Section 2.1.2). Variables were selected on the basis of being potentially important factors for eliciting information about farmers' perceptions of livestock leasing agreements, as well as investors' relative opportunity cost of investing in these types of livestock agreements. In addition, variables were selected on the basis of being potentially important factors for eliciting information on transaction costs in livestock lease contracts in South African commercial agriculture.

Of the 833 questionnaires sent out, initially 78 were returned (9.4 percent response rate), of which only three were fully completed. To increase the number of fully completed questionnaires, 34 respondents (of the 78 that returned their questionnaires) who had provided a contact number were contacted telephonically and urged to fully complete the questionnaire. Further, questionnaires were collected from 14 respondents who failed to complete the initially posted questionnaire and who reside in KwaZulu-Natal. Finally, a reminder letter urging respondents to fully complete and return the questionnaire was sent to all respondents who had not yet replied. The final number of questionnaires returned was 99 (11.88 percent response rate), of which 83 are usable. From this 47 respondents were non-participants (NP), 21 respondents were lessees, 14 respondents were lessors and one respondent's participatory group was unknown. The low response rate to this survey implies the possibility of selection bias. In particular, it is expected that NPs in livestock lease agreements are under-represented. This problem often arises in postal

surveys and is a result of respondents only replying if they have a vested interest in the topic. The results from this study describe the group of survey respondents, from the Dorper Sheep Breeders' Society of South Africa and the Jersey Breeders' of South Africa, and are not representative of all livestock farmers in South Africa.

3.2   Descriptive Statistics

The following section provides descriptive statistics of the respondents from the two study populations. Section 3.2.1 provides descriptive statistics of all the respondents (participants and non-participants of livestock leasing) and Section 3.2.2 provides descriptive statistics of livestock leasing participants together with their contractual characteristics.

3.2.1   Characteristics of all Respondents

Table 5 summarises the participatory activities of farmers (n = 60) that *responded to the postal questionnaire and whose locality is known*. The highest response rates are from respondents who reside in KwaZulu-Natal (34.0 percent) and Mpumalanga (13.7 percent). In addition, KwaZulu-Natal had the highest participant response rate (lessees = 5, lessors = 4), followed by the Northern Cape (lessees = 4, lessors= 2). Limpopo had no responses. KwaZulu-Natal and Northern Cape had the highest response rate from dairy and sheep farmers respectively. Overall, 30 percent and 70 percent of the returned questionnaires are from sheep and dairy farmers respectively, of which participant and

non-participant responses are relatively equal. The distribution of respondents does not match the distribution of the study populations.

Table 5: Enterprise type and participatory activity and locality of survey respondents (n = 60) by province, South Africa, 2007

		Lessee	Lessor	Non-participant	Total number of responses	Response rate of respective study populations (%)
KwaZulu-Natal		5	4	7	16	34.0
	Dairy	5	4	5	14	32.6
	Sheep	-	-	2	2	50.0
North West		1	-	2	3	7.3
	Dairy	1	-	2	3	7.3
	Sheep	-	-	-	-	0
Western Cape		3	2	7	12	5.7
	Dairy	2	2	6	10	7.3
	Sheep	1	-	1	2	2.8
Eastern Cape		3	2	3	8	7.5
	Dairy	2	2	1	5	10.0
	Sheep	1	-	2	3	5.3
Limpopo		-	-	-	-	0
	Dairy	-	-	-	-	0
	Sheep	-	-	-	-	0
Gauteng		1	-	-	1	2.5
	Dairy	1	-	-	1	4.4
	Sheep	-	-	-	-	0
Free State		-	-	1	1	0.8
	Dairy	-	-	1	1	1.2
	Sheep	-	-	-	-	0
Mpumalanga		2	2	3	7	13.7
	Dairy	2	2	3	7	24.1
	Sheep	-	-	-	-	0
Northern Cape		4	2	6	12	6.8
	Dairy	-	-	1	1	11.1
	Sheep	4	2	5	11	6.6
Total		19	12	29	60	

Table 6 shows the personal characteristics of respondents for the three groups – lessees, lessors and NP. The average age of NPs and lessors is 51.80 and 51.93 respectively and

lessees are somewhat lower at 49. Although not much different, it is expected that the average age of lessees would be less than lessors, as leasing-in is a way in which young emerging farmers can acquire the use of an asset without having to commit to large capital expenses or instalment sales. The level of formal education is measured on a scale of 1 to 6, where 1 - no education, 2 - grade 7 and below, 3 – grade 8 to 11, 4 – grade 12, 5 – diploma and 6 – a degree. All respondents have an average education of approximately 5 (diploma), but lessors have a slightly higher education value of 5.21 compared to NPs and lessees, who have values of 4.94 and 4.86, respectively. On average, lessors have had less time in livestock farming than lessees (17.79 years and 20.14 years, respectively) and NPs have the highest number of years in livestock farming (24.38 years). The lessors' relatively low mean time in livestock farming can be attributed to the fact that many lessors are not livestock farmers themselves, and lease-out all owned livestock to lessees that have the required skills and resources. The numbers of sheep/dairy animals are represented by a standard unit, known as livestock units (LSU). The equation used to calculate LSU is represented by equation (10). It is an equivalent to a 450 kg animal that consumes 10 kg of dry matter per day. The amount of dry matter consumed by herbivores is equal to 10 percent of their metabolic weight, which is obtained from their weight $^{0.75}$ (Smith, 2006).

$$1 \ LSU = \frac{m^{0.75}}{450^{0.75}} \tag{10}$$

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[1] Where; m = average mass of a Jersey cow – 408.24 kg (Embryo Plus 2002) and Dorper sheep – 80 kg (Alberto Sheep Breeders Association 2007). Therefore, the LSUs for a Jersey cow and Dorper Sheep are 0.93 LSU and 0.27 LSU respectively.

NPs have a mean of 417.9 LSU. This value is higher than the means for lessees and lessors, which are 390.5 LSU and 137.5 LSU, respectively. A similar trend is observed with the amount of grazing land. NPs have a mean area of grazing land of 4906.2 ha, compared to lessees and lessors who have 2146.7 ha and 1358.6 ha of grazing land, respectively. Sheep farmers, from all three participatory groups, have relatively more land than dairy farmers. The larger area of grazing land for sheep farmers can be attributed to the fact that many sheep farmers farm in relatively more arid areas, and as a result more grazing land is needed to sustain a livestock unit. This theory proves true in that there are relatively less LSU/ha on sheep farms. Lessees have a mean value of 2.2 LSU/ha. This value is higher than the mean value for lessors (0.2 LSU/ha). These trends are expected because, as a result of lessees having a larger mean grazing area, livestock is leased-in to increase livestock numbers to benefit from economies of size. Lessors have relatively less land than the other participatory groups and the majority of their livestock are leased-out (lessors only have 0.2 LSU/ha). This could suggest that several lessors are not farmers, but rather are outside investors perceiving leasing as an investment.

Table 6: Mean personal characteristics of survey respondents, South Africa, 2007

		Non-participant n = 47	Lessee n = 21	Lessor n = 14
Age		51.8	49.3	51.9
Education		4.9	4.9	5.2
Years in livestock farming		24.4	20.1	17.8
Livestock Units (LSU)		417.9	390.5	137.5
	Dairy	354.7	432.7	136.3
	Sheep	509.9	312.0	142.0
Grazing land (ha)		4906.2	2146.7	1358.6
	Dairy	919.3	473.2	111.4
	Sheep	10524.1	5254.7	5100.0
Renting in land (percent)		6.5	47.1	8.3
Renting out land (percent)		4.4	11.8	16.7
Livestock units per hectare (LSU/ha)		2.4	2.2	0.2
	Dairy	3.7	3.3	0.3
	Sheep	0.5	0.05	0.03
Probability of land claim (percent)		6.5	5.9	9.1

In comparison to the other two groups, lessees have the highest percentage of renting in land (47 percent). The percentages for lessors and NPs renting in land are 8.33 percent and 6.52 percent, respectively. The proportion of respondents renting out land is lowest for NPs (4.4 percent) followed by lessees (11.8 percent) and lessors (16.7 percent). The higher proportion of land leasing by lessees and lessors of livestock is consistent with *a priori* expectations of transaction costs. Transaction costs are potentially lower for respondents who are involved with leasing land as they are potentially more familiar with leasing contracts. Few respondents had claims on their land. Only 5.9 percent, 9.1 percent and 6.5 percent of lessees, lessors and NPs respectively had claims on their land at the time of the survey. However, the land restitution process is currently incomplete, so this figure may increase.

In Table 7, the mean farm financial characteristics of respondents are presented. On average, lessees have the highest gross farm income (GFI) (R 3 million) followed by lessors (R 2.4 million) and NPs (R 2.4 million). Overall, sheep farmers earn less than dairy farmers. However, Dorper sheep lessors earn relatively more than Jersey cattle lessors. The overall proportion of GFI that is derived primarily from sheep and dairy is highest for lessees (87.6 percent), followed by NPs and lessors whose respective means are 83 percent and 73 percent. The lower proportion of gross farm income derived from the total for sheep and dairy for lessors can be attributed to the lessors having a relatively larger percentage of off-farm income (23.1 percent) and a relatively lower percentage of sheep/dairy being a primary source of on-farm income (63.6 percent). Lessors of dairy cattle have a higher percentage of off-farm income than lessors of sheep (zero percent). This indicates that lessors who are outside investors are investing more into dairy rather than sheep. The proportions of respondents with alternative sources of on-farm income were 53.9 percent for NPs, 45 percent for lessees, and 63.3 percent for lessors. Lessees involved in dairy farming do not have off-farm income, whereas lessees involved with sheep farming do (42.9 percent). Because dairy cows have to be milked twice daily, dairy farming requires more management time than sheep farming; consequently, dairy farmers have a higher opportunity cost of time. In addition, lessees from the dairy sample population are less likely to have an alternative source of on-farm income (30.8 percent probability) than lessees from the sheep farmers' sample population (71.4 percent probability). Sheep/dairy account for 90 percent of the lessees' on-farm income and as a result lessees have a lower percentage of off-farm income (15 percent) and a higher proportion of gross farm income derived from sheep/dairy (87.6 percent).

Table 7: Mean farm financial characteristics of survey respondents, South Africa, 2007

	Non-participant (n = 47)	Lessee (n = 21)	Lessor (n = 14)
Gross farm income (millions of Rands)	2.4	3.0	2.4
Dairy	3.3	4.0	2.9
Sheep	1.0	1.6	1.2
Proportion gross farm income derived from sheep/dairy (percent)	83.0	87.6	73.0
Dairy	80.0	83.5	64.3
Sheep	87.9	95.0	93.3
Percentage of respondents with alternative sources of on-farm income	53.9	45.0	63.6
Dairy	50.0	30.8	62.5
Sheep	60.0	71.4	66.7
Sheep/dairy primary source of on-farm income (percent)	79.6	90.0	63.6
Dairy	68.8	84.6	62.5
Sheep	95.5	100	66.7
Off-farm income (percent)	13.0	15.0	23.1
Dairy	18.8	0	30
Sheep	4.6	42.9	0
Liquidity ratio (percent)	157.3	83.4	56.6
Dairy	128.8	111.3	58.0
Sheep	197.6	32.2	53.3
Solvency ratio (percent)	10.6	38.0	26.5
Dairy	13.4	52.9	32.1
Sheep	6.9	13.2	13.3

Lessees and lessors have a lower mean liquidity with ratios of 83.4 percent and 56.6 percent respectively. A similar trend is noticed with the solvency ratio. NPs are the most solvent of the three groups (10.6 percent) and lessees and lessors have solvency ratios of 38 percent and 26.5 percent respectively. Sheep farmers in all three participatory groups are more solvent than dairy farmers; however in the short-run, sheep farmers leasing-in sheep are less liquid than dairy farmers leasing-in cattle.

Table 8 presents the mean values of the three groups of respondents' perceptions towards livestock leasing. Respondents recorded each one of their five perceptions on a Likert scale ranging from 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = neutral/undecided, 4 = agree and 5 = strongly agree. NPs and lessors perceived livestock leasing to have the highest level of risk (4.1 and 3.8 respectively) followed by lessees (3.2). It is expected that lessors will attach a higher risk premium to livestock leasing, as the lessor bears a larger risk of his property rights for leased livestock being impeded. The perception of high risk by NPs could be due to high transaction costs. In comparison to lessees and lessors, NPs agree that livestock leasing is a new idea that still needs to develop (3.6) and that it is costly and time-consuming to craft an efficient lease agreement (3.1). On average, lessors and NPs have the strongest positive response (4.2), to the statement that there is little information on potential lessees and lessors, and lessees perceived the most information (3.8). Lessors and NPs have the strongest perception that the returns from leasing livestock exceed the benefits of ownership (3.1) (and lessees the weakest – 2.6), however all three participatory groups have relatively neutral mean values.

In comparison to participants from the dairy leasing market, participants from the sheep leasing market are more inclined in perceiving livestock leasing to have higher risk and little information on potential lessees and lessors. In addition, sheep leasing participants agree more with the statements that livestock leasing is a new idea that still needs to develop, and that it is costly and time-consuming to craft an efficient lease agreement.

Table 8: Mean values for survey respondent's perceptions of livestock leasing, South Africa, 2007

	Non-participant n = 35	Lessee n = 21	Lessor n = 13
1). High level of risk in livestock leasing	4.1	3.2	3.8
Dairy	4.1	2.8	3.8
Sheep	4.0	3.9	3.5
2). New idea that still needs to develop	3.6	3.4	3.2
Dairy	3.6	3.2	3.1
Sheep	3.5	3.9	4.0
3). Little information on potential lessees and lessors	4.2	3.8	4.2
Dairy	4.3	3.5	4.2
Sheep	4.0	4.1	4.0
4). Costly and time consuming to craft an efficient lease agreement	3.1	2.3	2.5
Dairy	3.0	1.9	2.5
Sheep	3.4	3.0	2.5
5). Returns from leasing-in livestock exceed the benefits of ownership	3.1	2.6	3.1
Dairy	3.2	2.3	3.2
Sheep	2.8	3.3	2.5

Value included in the table are means of Likert scale values ranging from 1 (strongly disagree) to 5 (strongly agree)

The descriptive statistics for the risk indices are included in Table 9. The mean risk index has a low variability across the three leasing participant groups. Lessors have the highest mean risk index (3.79), followed by lessees (3.6) and NPs (3.51). However, the range between maximum and minimum values across the three groups varies considerably. NPs have the largest range (4), whereas lessors have the smallest range (2). This implies that lessees and lessors tend to be more risk-preferring relative to NPs.

Table 9: Descriptive statistics for risk indices of survey respondents, South Africa, 2007

	Non-participant	Lessee	Lessor
Mean*	3.51	3.60	3.79
Minimum	1	2	3
Maximum	5	5	5
Range	4	3	2

* Measured on a Likert scale ranging from 1 to 5, where
1 (strongly risk averse), 2 (risk averse), 3 (neutral),
4 (risk preferring) and 5 (strongly risk preferring)

3.2.2 Characteristics of Livestock Leasing Participants

This part of the study will only focus on respondents who are participants in the livestock leasing market. Leasing characteristics that comprise lessees' and lessors' actual livestock leasing contracts are included in Table 10. These characteristics represent each respondent's largest, most recent leasing contract, and there was no evidence of overlapping contracts between lessees and lessors. Respondents from the Jersey Breeders' Society of South Africa (dairy farmers) and Dorper Sheep Breeders' Society of South Africa (sheep farmers) both have average lease durations of approximately five years (dairy farmers – 5.7 and sheep farmers – 4.6). The mean number of livestock units leased by dairy farmers is 129.5 and, for sheep farmers, 138.5 livestock units. The average distance between party members is below 130 km for both dairy (58.3 km) and sheep farmers (124.6 km). This relatively low distance between leasing parties is expected – nearer transactions reduce the direct costs of animal transportation and the indirect costs of monitoring. Disputes during the contractual period were experienced by 13 percent of dairy farmers and 11 percent of sheep farmers. About 78 percent of sheep

farmers and 67 percent of dairy farmers perceive the rules of the contract to be efficiently enforced.

Table 10: Mean characteristics of livestock lease agreements of survey respondents, South Africa, 2007

	Dairy	Sheep
	(n = 25)	(n = 10)
Duration of lease (years)	5.7	4.6
Number of livestock units leased	129.5	138.5
Distance between leasing parties (km)	58.3	124.6
Dispute arose during the leasing period (%)	13.0	11.0
Rules well enforced in contract (%)	67.0	78.1

The type of livestock leased (commercial or stud) is presented in Table 11. From the 35 livestock leasing participants, 89 percent of dairy farmers leased stud animals and 50 percent of sheep farmers leased commercial animals.

Table 11: Percentage of livestock leasing participants leasing stud or commercial animals, South Africa, 2007

	Dairy	Sheep
	(n = 25)	(n = 10)
Stud (%)	89	50
Commercial (%)	11	50

Table 12 includes the actualities and preferences of actual livestock leasing contracts for dairy and sheep farmers. Ownership of livestock is currently passed on in 38 percent and 33 percent of dairy and sheep farmers' leasing contracts respectively; however, a higher

50 percent and 38 percent, respectively, would prefer to have ownership passed on. All dairy farmers and 88 percent of sheep farmers prefer inventories of leased livestock to be kept, yet not all current livestock leases maintain inventories (96 and 67 percent of dairy and sheep farmers respectively keep inventories).

The option of adding additional livestock is included in 63 percent and 56 percent of dairy and sheep farmers' leasing contracts respectively. However, a larger proportion (68 percent – dairy farmers and 63 percent – sheep farmers) of these respondents would prefer having the option in the contract. All sheep farmers and 83 percent of dairy farmers' contracts include the option of contract renewal; 91 percent of dairy farmers would prefer having the clause in their contract. Third party participation in contract design is preferred by the majority of respondents from the two participatory groups (dairy farmers – 73 percent and sheep farmers – 88 percent), but just 56 percent of sheep farmers and 63 percent of dairy farmers included a third party in contractual design.

A low four percent of dairy farmers and 33 percent of sheep farmers took the risk of land claims into account in their contracts. However, 32 percent of dairy farmers and 38 percent of sheep farmers would prefer the risk of land claims to be accounted for in the contract. Although not shown in table 12, all respondents from the two participatory groups would prefer the property rights of the lessor to be protected and all dairy and sheep farmers proclaim that the lessors' property rights are protected.

Table 12: Mean actual and preferred characteristics of leasing contracts of survey respondents, South Africa, 2007

		Dairy	Sheep
		(n = 25)	(n = 10)
Ownership past between parties (%)	Actual	38	33
	Preferred	50	38
Inventory kept (%)	Actual	96	67
	Preferred	100	88
Option of adding additional cattle (%)	Actual	63	56
	Preferred	68	63
Option for contract renewal (%)	Actual	83	100
	Preferred	91	100
Participation of third party in contract design (%)	Actual	63	56
	Preferred	73	88
Land claims taken into account (%)	Actual	4	33
	Preferred	32	38
Annual cash rental (%)	Actual	89	50
	Preferred	11	50

Table 13 provides the percentage of respondents and their respective livestock type for actual and preferred characteristics of leasing contracts. Although not shown in table 13, the most popular contract type that is utilised and preferred by dairy and sheep farmers is cash agreements (68.2 percent and 85.7 percent, respectively). The actual contract type for dairy and sheep farmers respectively is 8.3 percent and 22.2 percent informal contracts; however, for the preferred contract type the amount of informal contracts decreases to zero percent and 11.1 percent respectively.

Nearly 80 percent of sheep farmers and 54.6 percent of dairy farmers regard their inter-party relationship as being between friends/family. A leasing relationship between friends/family (i.e., not an arms-length transaction) is preferred by dairy and sheep farmers. Dairy and sheep farmers have a reduced preferred relationship between

neighbours of 13.6 percent and 11.1 percent, respectively (actual – dairy farmers = 22.7 percent and sheep farmers = 11.1 percent). Livestock insurance for leased livestock is identified as being infeasible and is not paid by 45.8 percent of dairy farmers. However, 55.6 percent of sheep farmers pay insurance premiums on leased livestock to the lessee. Less than 50 percent of dairy farmers would prefer to pay insurance on leased livestock and 31.8 percent would prefer to have no insurance. Fifty percent of sheep farmers would prefer the lessee to pay insurance premiums and 50 percent would prefer no insurance at all. Many respondents mentioned that insuring leased livestock is infeasible and that the costs of insurance outweigh the benefits. The majority of dairy and sheep farmers require and prefer the lessee to pay for animal transportation.

About 54 percent of dairy farmers and 66.7 percent of sheep farmers maintain that the lessee bears all livestock risk. Most leasing participants (dairy farmers – 54.5 percent and sheep farmers – 75 percent) would prefer the lessee to bear all livestock risk. The annual cash rental for dairy cows and sheep is approximately 11 percent and three percent of the animal value, respectively.

Although there is evidence of variation between actual and preferred contractual characteristics, this variation is not normally distributed (refer to Figure 1). Instead, the distribution is skewed towards minimal variability between actual and preferred contractual characteristics. Approximately a third of respondents vary minimally from what is actually in their current leasing contracts. Where preferences do vary from actual stipulations, only one or two characteristics are impacted on.

Table 13: Percentage of respondents and their respective participant groups for actual/perceived and preferred characteristics of leasing contracts, South Africa, 2007

	Dairy		Sheep	
	(n = 25)		(n = 10)	
	Actual	Preferred	Actual	Preferred
Percentage of respondents having formal and informal contracts				
Formal (written contract)	91.7	100.0	77.8	87.5
Informal (verbal contract)	8.3	0	22.2	11.1
Relationship between leasing parties (percentage of respondents)				
Friends/Family	54.6	63.6	77.8	75
Neighbours	22.7	13.6	11.1	0
Business	22.7	22.7	11.1	25.0
Percentage of respondents who pay livestock insurance				
Lessee	41.7	54.5	55.6	50.0
Lessor	12.5	13.6	0	0
None	45.8	31.8	44.4	50.0
Percentage of respondents who pay for animal transportation				
None	25.0	18.2	22.2	12.5
Lessee	54.2	54.5	77.8	87.5
Lessor	8.3	13.6	0	0
Shared	12.5	13.6	0	0
Percentage of respondents who bear livestock risk				
Lessee	54.2	54.5	66.7	75.0
Lessor	29.2	22.7	22.2	25
Shared	16.7	22.7	11.1	0
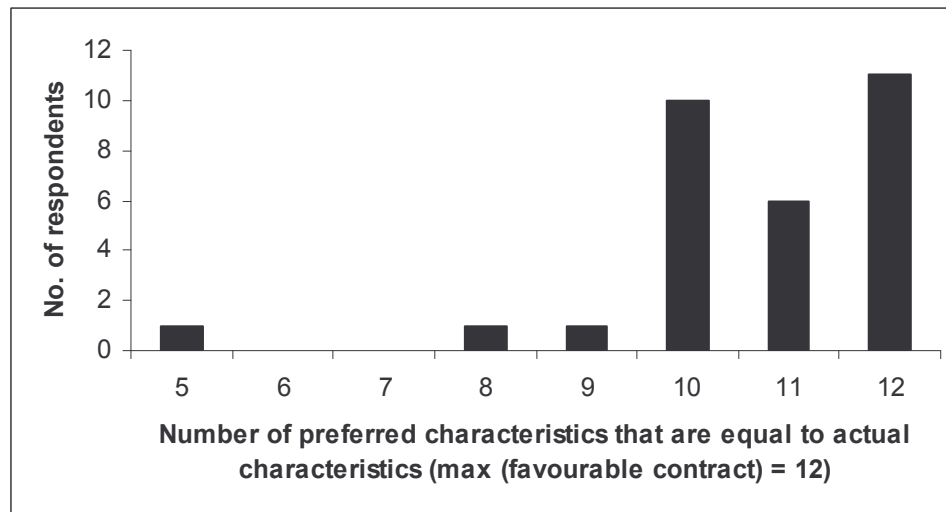
Figure 1: Aggregate actual versus preferred contract characteristics of livestock lease agreements of survey respondents, South Africa, 2007.

3.3   Discussion

These descriptive statistics suggest that there is outside investment into livestock leasing, especially for dairy. Further, lessors tend to have less grazing land and allocate less time to managing their livestock herd. Non-participants perceive there to be high risks involved in livestock leasing and consider crafting an efficient livestock leasing agreement to be costly and time-consuming. Livestock leasing participants are more solvent than non-participants and tend to be more involved in land rental contracts. Descriptive statistics of livestock leasing participants suggest that cash agreements are more popular and are preferred by most respondents. Some participants have informal contracts; however, the majority of these participants would prefer formal contracts. Further, descriptive statistics show that livestock lease agreements generally extend for a period of approximately five years and participants currently leasing from neighbours

would prefer not to. Rather, respondents would prefer to lease with friends and/or family. Contract clauses preferred by participants include allowing for additional livestock to be added during the contract of lease, taking the risk of land claims into account and allowing for leased livestock ownership to be passed from lessor to lessee. Finally, it is apparent that all direct and indirect costs associated with livestock leasing, such as the costs of livestock insurance, transportation and risk, are borne by the lessee.

CHAPTER 4

EMPIRICAL RESULTS AND DISCUSSION

This chapter presents the empirical findings of the study together with a discussion. Results are presented in the sequence prescribed by the methodology in Chapter 2: the impact of transaction costs on the efficiency of livestock rental markets in South Africa is analysed and discussed in Section 4.1, followed by the results of an empirical evaluation of the sources of transaction costs in leasing contracts in Section 4.2.

4.1   Discriminant Analysis (DA) Model

A multi-group DA model estimated using all 20 variables presented in Table 3 had a poor statistical fit due to the small sample size and possible multicollinearity problems. Variables that did not contribute significantly to the statistical fit of the model (SHEDAR, NEWIDEA, EDU, LSUHA, GFI, OFE and RISK) were excluded from the analysis and the model was re-estimated. The estimated discriminant functions are presented in Table 14. LDF1 accounts for 77.7 percent of the variation in the data and LDF2 for 22.3 percent. The percentage of correct classification for each group is 79.3 percent for NPs, 53.3 percent for lessees and 62.5 percent for lessors. An overall correct classification of 69.2 percent shows a reasonable explanatory power.

Table 14: Standardised discriminant functions distinguishing livestock lessees, lessors and non-participants of the livestock leasing market, South Africa, 2007.

Interpreted indices	Standardised coefficients		F-value
	LDF1	LDF2	
GRAZHA	-0.233	-0.146	1.188
RENI	0.852	-0.190	11.002*
RENO	0.511	0.598	1.869***
LNDCLM	-0.048	0.419	1.099
PGFI	-0.186	-0.470	2.167**
SOLV	0.075	0.154	1.133
HIGHRK	-0.353	-0.344	2.231**
LITINFO	0.059	0.457	1.801***
EFLEAS	-0.333	0.239	2.230**
RETBEN	-0.256	0.022	2.161**
Wilk's Lambda	0.399**	0.783	
% of variance	77.7	22.3	
Group centroids			
Non-participant	-0.808	-0.140	
Lessee	1.342	-0.357	
Lessor	0.413	1.178	

* denotes statistical significance at 1 percent level of probability
** denotes statistical significance at the 15 percent level of probability
*** denotes statistical significance at the 20 percent level of probability

Results from the first discriminant function (LDF1) shows that LDF1 discriminates between participants and NPs (refer to Table 14). NPs are less likely to be involved in land rental contracts and they perceive it to be costly and time-consuming to craft efficient livestock lease contracts. In addition, NPs perceive that livestock leasing is risky; however, they feel that the expected returns from leasing exceed the benefits from ownership. The second discriminant function (LDF2) discriminates between lessees and lessors (refer to Table 14). It shows that lessors that have a higher probability of having a land claim on their land are more likely to be renting-out land. Further, lessors possess less grazing land than lessees and their proportion of gross farm-income derived from the livestock type leased is relatively low. Wilk's Lambda is a statistical criteria that is used

to evaluate the statistical significance of the discriminating power of the discriminant functions (Hair *et al.,* 1998: 262) and LDF1 is statistically significant at the one percent level of probability.

The most statistically significant variable discriminating between the three participatory groups is whether the livestock farmer is currently involved in leasing-in land (RENI). Livestock farmers who are currently involved in land rental agreements tend to be participants in the livestock leasing market. The coefficient for LDF1 representing renting-in land indicates that lessees of livestock are leasing-in land. However, the coefficient for LDF2 representing renting-in land shows that NPs are more likely to be leasing-in land than lessors. Respectively, LDF1 and LDF2 identify that lessees and lessors are more likely to rent-out land than NPs. This suggests that livestock leasing participants are expected to be participating in the land-rental market. The index PGFI measures the proportion of gross farm income that is derived from dairy/sheep farming and is significant at the 15 percent level of probability. NPs have a higher proportion of their gross farm income derived from sheep/dairy farming. The respondents' perception of the level of risk involved with livestock leasing is significant at the 15 percent level of probability and can play a key role in discriminating between the three groups of survey respondents. In comparison to livestock leasing participants, NPs perceive livestock leasing to have higher risk. The coefficient for LDF1 representing the index RETBEN shows that NPs (in comparison to lessees) perceive the returns from livestock leasing to exceed the benefits of livestock ownership. However, NPs feel that the transaction costs involved in leasing are too high, in that it is assumed to be costly and time-consuming to

craft an efficient lease agreement. Lessors also feel that it is costly and time consuming to craft an efficient lease agreement; however, they perceive that the returns from livestock leasing exceed the benefits derived from ownership. The coefficient for LDF1 and LDF2 representing LITINFO is significant at the 20 percent level of probability and indicates that in comparison to NPs, participants perceive that there is too little information on potential lessees and lessors in the livestock leasing market.

The negative coefficient representing GRAZHA for LDF1 implies that NPs have more hectares of grazing land than lessees and lessors, and likewise, the coefficient for LDF2 implies that lessors will have less grazing land than lessees. GRAZHA is not a statistically significant variable. Land claims (LNDCLM) are not a good discriminant variable for distinguishing between lessees and NPs. However, it has a relatively large positive coefficient for LDF2, implying that lessors tend to have land claims on their land. SOLV is the second most statistically insignificant variable in the analysis, yet the coefficient in LDF1 and LDF2 shows that lessees and lessors tend to be more solvent than NPs.

Descriptive results show that outside investment in the livestock leasing market is higher for dairy than it is for sheep. Investment in the dairy leasing sector by outside investors could be as a result of the following reasons: (1) Dairy farmers have higher GFI than sheep farmers; (2) a more frequent income can be earned from dairy than sheep, as dairy lessors can earn a share of the dairy income produced; and (3) milk is a staple product

and has a more inelastic demand than mutton. As a result, the demand for milk is more certain than the demand for mutton (Paterson, 2007).

The percentage of GFI that is derived by sheep/dairy is a useful indicator of the time that a farmer allocates to sheep/dairy. Therefore, lessors will tend to allocate less time to managing their livestock herd. This result is expected because one of the main advantages of leasing-out livestock is that more time and money can be allocated to business operations with higher returns. Moreover, the lessor might have a vested interest in livestock but may lack the necessary livestock husbandry or business management skills; leasing-out is an alternative to hiring in suitable management (Jones, 2003). Consistent with *a priori* expectations, the trend that as a result of less livestock investment, lessors have less grazing land is evident; however, this is not statistically significant. Relative to the other two groups, a high proportion of lessors rent-out excess grazing land to farm businesses that require land for increased livestock volumes.

Results from the discriminant analysis show that NPs perceive livestock leasing to yield returns that exceed the benefits of livestock ownership. However, they perceive there to be high risks and transaction costs involved in livestock leasing. NPs consider crafting an efficient livestock leasing contract to be costly and time consuming. Livestock leasing participants have experience and knowledge of the actualities of livestock leasing. They feel that information on potential lessees and lessors is a scarce resource and that the indirect costs of searching for and identifying a favourable lessee/lessor are too high.

The evidence of high transaction costs in contract design is furthermore apparent in that a large proportion of lessees and lessors are involved in land rental contracts. The knowledge gained from land rental contracts allows respondents involved in these rental contracts to become familiar with the fundamentals of leasing contracts. In addition, respondents using third party participation in land rental contracts will have access to third party assistance in the crafting of livestock leasing contracts. Added knowledge and the skills from third party assistance lower the indirect costs of contract design and as a result lower the overall transaction costs of leasing livestock.

Leasing is a financially beneficial option for adding control of resources with minimum financial disturbance. It also avoids lower liquidity and high leverage (Barry *et al*., 2000). Although not statistically significant, this study complements the findings of Barry *et al.* (2000) in that lessees and lessors were found to be more solvent than NPs. South African commercial farms require large-scale capital investments and as a result, borrowing of capital from individuals or firms is almost inevitable (South African Government, 2007). The acquisition of livestock through hire purchase increases the fixed capital costs for a farm business through its vulnerable stages of emergence or expansion. Livestock leasing allows farmers to increase solvency and lower overall financial risk, by both decreasing the number of livestock purchased through hire purchase and increasing the number of livestock leased-in.

4.2   Ordinary Least Squares (OLS) Regression

An ordinary least squares model estimated using all 27 explanatory variables presented in Table 4 had a poor statistical fit due to insufficient degrees of freedom and possible multicollinearity problems.   Variables that did not contribute significantly to the statistical fit of the model were then excluded from the analysis and the model re-estimated. The estimated regression model is presented in Table 15.

Table 15: Regression coefficients estimated for participants of the livestock leasing market, South Africa, 2007

	Unstandardised Coefficients	Standardised Coefficients				
Dependent variable						
VAR						
Variable	B	Beta	Std. Error	t-value	Sig.	VIF
(constant)	7.365		1.025	7.182	0.000	
SHEDAR	0.638	0.202	0.465	1.470	0.157	1.459
LYEAR	-0.224	-0.399	0.068	-3.272	0.004*	1.150
STUCOM	-0.882	-.0378	0.309	-2.851	0.010*	1.362
DIST	0.002	0.176	0.001	1.428	0.169	1.173
INV	2.001	0.437	0.626	3.197	0.005*	1.450
LAWY	0.506	0.166	0.376	1.347	0.193	1.171
CONT_FOR_INFOR	3.194	0.689	0.591	5.405	0.000*	1.258
Adjusted R^2	0.651					
Durbin-Watson	2.146					
F-value	8.203					
Overall sig.	0.000*					
DF	27					

Notes: *denotes statistical significance at the 1 percent level of probability

The signs of the estimated coefficients are all consistent with *a priori* expectations and most coefficients are statistically significant at the one percent level of probability. The adjusted R ^{2} statistic measures the *goodness of fit* of the fitted regression line to the data set (Gujarati, 2003). In this study, the adjusted R^2 value is 0.651, showing that the model has a good explanatory power. Multicollinearity is not a problem as the VIF for each variable is below ten. While not statistically significant, the positive coefficient for the SHEDAR variable implies that sheep leasing leads to more efficiency than livestock leasing contracts. The LYEAR variable has a negative coefficient and is significant at the one percent level of probability. This negative coefficient suggests that livestock leasing contracts with a shorter duration tend to be more efficient. The coefficient for the STUCOM variable is significant at the one percent level of probability and suggests that lease agreements for commercial animals are more likely to be efficient than those for stud animals.

The INV variable is significant at the one percent level of probability and the positive coefficient suggests that the likelihood of an efficient leasing contract increases if a detailed inventory of leased livestock is kept. The coefficient for LAWY is not statistically significant, however; the positive coefficient shows that leasing contracts crafted by lawyers leads to more efficient leasing contracts. The variable discerning between formal and informal contracts (CONT_FOR_INFOR) is the most statistically significant variable in the model. The variable suggests that the establishment of formal leasing contracts (in comparison to informal/verbal contracts) has the largest positive correlation to efficient leasing contracts.

Descriptive statistics show that livestock lease agreements generally extend for a period of approximately five years. However, empirical model results show that a shorter leasing duration tends to be associated with more efficient contracts. Shorter lease agreements minimise the exposure time of lessees and lessor to factors of risk such as moral hazard and opportunism. Shorter leasing times do not necessarily mean that contracts have to be re-drafted. If parties choose to renew the contract of lease, a clause allowing for contract renewal results in lower contract re-drafting costs.

Additional clauses preferred by respondents include allowing for additional livestock to be added during the contract of lease, taking the risk of land claims into account and allowing for leased livestock ownership to be passed from lessor to lessee. Land claims are a relatively recent risk borne by South African commercial farmers. The higher rate of preferences to actualities of including the risk of land claims in the contract can be attributed to parties not yet considering the potential impact of land claims on livestock leasing. Although not statistically significant, there is substantial evidence of ownership of leased livestock being transferred between parties. The transfer of ownership could potentially benefit both leasing parties. The lessor would benefit as the risk of receiving animals of poor genetic quality from the lessee at the end of the leasing period is minimised. The lessee would benefit in that he would acquire the leased animals at the end of the leasing period. If ownership was transferred, annual cash rents would tend towards annual instalments and an appropriate instalment amount would have to be calculated.

The evidence of high transaction costs is furthermore apparent in that a large proportion of respondents currently leasing from neighbours, would prefer not to. Respondents would rather prefer a leasing relationship between friends and or family. The selection of formal versus informal contracts is the most statistically significant variable in the ordinary least squares regression and shows that the creation of formal contracts results in a more efficient leasing arrangement. Descriptive statistics show that some respondents have informal contracts; however, the majority of these respondents would prefer formal contracts. Formal contracts provide a higher assurance that the lessor's property rights will be secured and that the lessee will have full use rights of the asset leased. Cash lease agreements are more popular and are preferred by most respondents. A potential reason for cash agreements being most widely used is that they carry lower administrative costs, as the lessor only receives fixed annual cash rent per unit of livestock, whereas share agreements divide costs and revenue in predefined proportions.

Contractual stipulations that are characterised as being a direct or indirect cost have to be allocated to either party. Although not statistically significant, it is apparent that all direct and indirect costs associated with livestock leasing are borne by the lessee. The direct cost of transporting leased livestock to or from the place of lease is borne by the lessee. This allocation of costs is different to that of the Black Rhino Range Expansion Project, where the Board bears transportation costs of leased black rhino. Potentially, the cause for this is that the costs involved in transporting livestock are not comparable to that of wildlife. The transportation of wildlife is governed by rules and regulations, whereas for

livestock transportation, no stringent rules and regulations are imposed. In addition to transportation costs, the lessee is more likely to bear the indirect cost of risk of leased livestock. Although a large proportion of leased livestock are not insured as it is deemed non-beneficial, many of the respondents would prefer livestock insurance and for the lessee to carry this cost.

The variable differentiating between sheep and dairy in the ordinary least squares regression is not statistically significant. Nevertheless, it shows that in comparison to dairy leasing, leasing sheep leads to more efficient contracts. This relationship is expected as dairy cattle have a higher monetary value and require more management time. As the value of the leased asset increases, so the cost of enforcing property rights of the asset increases, consequently increasing transaction costs. In comparison to commercial animals, more stud animals are leased. However, the variable distinguishing between stud and commercial animals in the model (STUCOM) is statistically significant at the one percent level of probability and shows that leasing commercial animals minimises transaction costs and tends towards more efficient contracts.

Variables describing whether a detailed inventory of leased livestock was kept and whether a third party participated in contract design are included in the model. The inventory variable is significant at the one percent level of probability and shows that leasing arrangements where a detailed inventory is kept tend to be more efficient. Updated and well-managed inventories are a critical component in all livestock leasing arrangements. They ensure that the share of livestock is equitable in share agreements

and lower the lessor's risk of receiving animals of poor genetic and physical quality. The third party participation variable is not statistically significant; however, an expected trend explains that more efficient leasing contracts are expected if a third party participation in contract design is evident. Respondents prefer third party participation, as it lowers the probability of contractual upset during the leasing period. However, third party participation increases the direct costs of contracting and as a result, many respondents attempt to design contracts independently.

CONCLUSIONS AND RECOMMENDATIONS

A survey of 833 registered members from the Jersey Breeders' Society of South Africa and Dorper Sheep Breeders' Society of South Africa conducted in 2007 found that a leasing market for livestock does exist in South Africa. However, noticeable differences in characteristics used to discriminate between lessees of livestock, lessors of livestock and non-participants (NPs) of the livestock leasing market imply that livestock leasing markets are not efficient. In addition, the study found that certain contractual characteristics are essential in ensuring that overall transaction costs in livestock leasing contracts in South African commercial agriculture are kept to a minimum.

NPs perceive livestock leasing as a financially feasible alternative of either acquiring control or liberating control of livestock; however, they perceive that establishing an efficient leasing contract is both time-consuming and costly. The evidence of contractual design being costly and complex is further apparent in that a large proportion of livestock leasing participants are gaining insight into livestock leasing contracts by currently being involved in land rental contracts. In addition, the study shows that formal livestock lease agreements; the leasing of commercial animals for shorter periods; and the keeping of detailed inventories of leased livestock correlate to relatively lower transaction costs. These factors result in more efficient livestock leasing contracts. Additionally, the majority of participants prefer leasing arrangements between family and/or friends. Furthermore, participants prefer contracts that include a clause allowing for the possibility of the transfer of ownership of leased livestock, contract renewal, the option of

adding additional livestock during the leasing period, and where provision for the risk of land claims has been made. Formal cash agreements where a third party participated in contract design are additional characteristics preferred by participants. Finally, descriptive statistics show that lessors typically have little participation in managing leased livestock. This is borne out by the fact that direct and indirect costs of leasing, namely the cost of insuring, transporting and the risk of leased livestock, are in most instances borne by the lessee.

Transaction costs for individuals can be minimised by (1) identifying and providing information on potential lessees and lessors (information could include the location of the individual, the type and number of livestock to be leased and the desired contractual period); and (2) providing brief templates of various livestock leasing options and providing the important common characteristics that have to be included in these respective contracts.

The problem of asymmetric information can be potentially resolved by developing better contracts that tend towards contractual completeness. This can be achieved by providing existing and potential livestock leasing parties with relevant contracting information (examples of contractual clauses that encompass desirable contract characteristics and that provide for contractual completeness). Further, clauses reducing the transaction costs of contractual renegotiation should be included in the contract. However, it must be emphasised that each contract must be personalised to meet the objectives of the contracting parties. Such information can be included in popular agricultural media, or

distributed through channels used by agricultural societies to liaise with their members (newsletters, society meetings, etc.).

Investment into the South African livestock industry, from investors that are not primarily livestock farmers, is evident from this study. These outside investors are mainly leasing-out dairy cattle, as they expect the returns to be higher from dairy than sheep. Transaction costs for these lessors can be decreased by including clauses in the contract that ensure that the property rights of the lessor are protected.

SUMMARY

A lease contract is a joint agreement between two parties: a lessor provides use of a resource to a lessee in return for a rental fee. Resources commonly leased between agriculturalists include land and machinery; however, sharing arrangements are becoming more common in livestock acquisitions. Livestock lease agreements encompass a wide range of lease contracts that differ with respect to the distribution of costs, risk and benefits between the lessor and lessee. Many livestock farming businesses in South Africa are emerging or expanding and may value the option of leasing-in livestock. Likewise, investors who anticipate competitive rates of return from investments in livestock may value the option of owning and leasing-out livestock to suitable farm businesses. A reduction in transaction costs and an improvement in efficiency of the livestock lease market could prove beneficial for emerging/expanding livestock farmers. This study hypothesises that transaction costs currently constrain the efficiency of livestock rental markets and that specific contractual characteristics contribute to minimising total transaction costs of livestock leasing contracts in South African commercial agriculture.

The study reviews literature and research involving lease contracting and transaction costs and uses this to identify possible sources of transaction costs in livestock rental markets and livestock rental contracts. The literature review identified that contracting is characterised by both pre- and post contract opportunism. Additional contributors to transaction costs include uncertainty of future events and contract incompleteness.

This study postulates that the magnitude of transaction costs incurred in a contract is a function of the costs of information of each party to the contract; the contracting parties' risk preferences and capacities to bear risk; the costs of organising the bidding process; the costs of translocating leased livestock; the costs of policing and enforcing the contract; and the size of the contract. The study further postulates that the magnitude of transaction costs incurred by participants currently involved in a livestock leasing contract is a function of the relationship between the two leasing parties; the duration of the rental contract; the distance between the leasing parties; the annual cash rental per unit of livestock; the type of leasing contract; whether a third party participated in contract design; and whether the property rights of the lessor are protected.

A multinomial discriminant analysis (DA) and an ordinary least squares (OLS) regression are used to test the respective hypotheses. A DA is used to identify factors that discriminate between non-participants of the livestock leasing market, lessees of livestock and lessors of livestock. In the OLS regression, the dependent variable compares the variability of actual characteristics of respondent lease agreements against the characteristics that are preferred. The dependent variable proxies transaction costs and is regressed on variables representing contractual characteristics. The objective of this technique is to determine the extent to which various contracting characteristics contribute to a higher probability of contract inefficiency.

Both econometric models were estimated using primary data based on a postal survey of 395 and 438 registered members of the Jersey Breeders' Society of South Africa and the

Dorper Sheep Breeders' Society of South Africa respectively. A response rate of 11.88 percent (of which 83 were usable) was achieved. Descriptive characteristics of respondents show that non-participants perceive there to be high risks involved in livestock leasing and consider crafting an efficient livestock leasing agreement to be costly and time-consuming. Investment into the South African livestock industry (especially into the dairy industry), from investors that are not primarily livestock farmers, is evident from this study. Further, descriptive statistics show that livestock lease agreements extend for a period of approximately five years and that participants would prefer to lease with friends and family than neighbours. Some agreements are informal; however, the majority of participants in informal agreements would prefer formal contracts. Finally, it is apparent that all direct and indirect costs associated with livestock leasing are borne by the lessee.

Results from the DA demonstrate that the livestock leasing market in South Africa is characterised by high transaction costs. High transaction costs are apparent in that a large proportion of livestock leasing participants have gained knowledge from being involved in land rental contracts, and that the majority of non-participants perceive it to be time-consuming and costly to establish efficient livestock leasing contracts. Results from the OLS regression show that formal livestock lease agreements, leasing commercial animals for shorter periods, and the keeping of detailed inventories of leased livestock lead to relatively lower transaction costs.

Transaction costs for current and prospective livestock leasing participants can be minimised by (1) identifying and providing information on potential lessees and lessors, and (2) providing brief templates of various livestock leasing options and indicating the important common characteristics that have to be included in these respective contracts. The problem of contract incompleteness can be resolved by providing existing and potential livestock leasing parties with relevant contracting information (such as examples of contractual clauses that encompass desirable contract characteristics and that provide for contractual completeness). Such information can be included in popular agricultural media, or distributed through channels used by agricultural societies to liaise with their members, such as newsletters, society meetings, etc. Transaction costs for lessors, such as investors that are not primarily livestock farmers, can be decreased by including clauses in the contract that ensure that the property rights of the lessor are protected.

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APPENDIX A

SURVEY QUESTIONNAIRE USED FOR MEMBERS OF THE

DORPER SHEEP BREEDERS' SOCIETY OF SOUTH AFRICA

UNIVERSITY OF KWAZULU-NATAL

SCHOOL OF AGRICULTURAL SCIENCES AND AGRIBUSINESS

DISCIPLINE OF AGRICULTURAL ECONOMICS

QUESTIONNAIRE:

LIVESTOCK LEASING BY SOUTH AFRICAN LIVESTOCK FARMERS

This questionnaire is to be answered by the **principal decision maker** of the livestock business.

ALL RESPONSES WILL BE KEPT STRICTLY CONFIDENTIAL

EVEN IF YOU HAVE NOT COMPLETED ALL THE QUESTIONS PLEASE CAN YOU RETURN THE QUESTIONNAIRE.

PLEASE RETURN THE QUESTIONNAIRE BEFORE THE 31st May 2007

- Have you participated in livestock leasing before?

Yes	No

1. Personal Information.

1.1. What is your age? _____

1.2. Formal education (please tick appropriate box)

1	No education	
2	Grade 7 (standard 5) and below	
3	Grade 8 -11 (standard 6 -9)	
4	Grade 12 (matric)	
5	Diploma	
6	Degree	

1.3. How many years have you participated in sheep farming? _____

1.4. How many sheep do you currently have on the farm? _____

1.5. How many hectares of grazing land do you currently have? _____ ha

1.6. Do you rent-in or rent-out grazing land?

	Yes/no	Hectares
Rent-in		
Rent-out		

1.7. How many sheep do you have per fertilised hectare? _____

1.8. Is your farm under any land claims? _____

2. Farm Financial Characteristics:

2.1 Please indicate your Gross farm income (turnover) for the 2006/07 financial year?
   R_____

2.2 What proportion of this Gross farm income was derived from sheep farming?

   _____

2.3 Is sheep the only source of on-farm income or are their other sources, if so what?

   _____

2.4 Is sheep farming your primary farm enterprise (Y/N)? _____

2.5 Do you have any off-farm employment (Y/N)? _____

   If so, what is the alternative employment?

   _____

   ____

2.5. What is your **current assets** (debtors, cash on hand, livestock, production inputs

etc.) to **current liabilities** (creditors, bank overdrafts etc.) ratio of the farm
business (current assets/current liabilities x 100)? _____%

2.6. What is the **debt** (mortgages, instalments, accounts payable, overdrafts etc.) to
asset (fixed, medium term and current assets) ratio of the farm business
(debts/assets x 100)? _____%

3. Leasing Characteristics.

The following questions regard sheep leasing characteristics and **must only be answered
by sheep leasing participants**. The answers to these questions must be for your *largest
most recent sheep lease contract*.

1	For what years was/is the contract active (e.g.: 1997 - 2000)?		
2	Were/Are you the lessee or lessor?		
3	Were/Are the animals leased stud or commercial animals?		
4	How many sheep were/are leased?		
5	What is the distance between leasing parties?		km
6	Were there disputes that arised during the contractual period (Y/N)?		
7	If there were disputes were these disputes resolved (Y/N)?		
8	Were/Are the rules of the contract well enforced (Y/N)?		
9	Were/Are all terms adding to an efficient lease agreement included in the contract (Y/N)?		

4. Characteristics of Lease Agreements.

The following questions relate to the characteristics of sheep lease agreements. Participants are required to answer the questions under the columns headed **actual** (answers to key contractual terms must relate to your *largest most recent sheep lease contract*) and **preferred** (the preferred contract and contractual terms). Non-participants are required to answer the questions under the columns headed **perceived** (the perceived contract and contractual terms) and **preferred**.

		Actual	Perceived	Preferred
1	Contract type (Cash, share, ram or informal)?			
	Contractual terms			
2	Relationship between leasing parties?			
3	Ownership of leased sheep passed from lessor to lessee (Y/N)?			
4	Inventory of leased sheep is kept (Y/N)?			
5	Option of adding additional sheep during the leasing period included in contract (Y/N)?			
6	Option of contract renewal included in contract (Y/N)?			
7	Who pays insurance premiums for leased sheep?			
8	Participation from a third party in contract design (Y/N)?			
9	Who pays animal transportation costs?			
10	Contract takes the risk of land claims into account (Y/N)?			
11	The lessor's property rights are protected (Y/N)?			
12	Who bears the risk of leased sheep?			
	Cash lease agreements			
13	Monthly cash rent per sheep?			
14	Who incurs management costs?			
	Share lease agreement			
15	In what proportion is revenue shared?			
16	In what proportion are costs shared?			

5. How Do You Perceive Livestock Leasing?

With the above contractual terms in mind, the following questions are related to your subjective views towards leasing sheep. Please score the following from a scale of 1 – 5, where 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree and 5 = Strongly agree.

1	I feel that there is a high level of risk involved with sheep leasing.	1	2	3	4	5
2	I feel that sheep leasing is a new idea that still needs to develop.	1	2	3	4	5
3	I feel that there is little information on potential lessees and lessors.	1	2	3	4	5
4	I feel that it is costly and time consuming to craft an efficient lease agreement.	1	2	3	4	5
5	I feel that the returns in leasing sheep exceed the benefits of sheep ownership.	1	2	3	4	5

6. Risk Preference.

Please score the following from a scale of 1 – 5, where 1 = Strongly disagree 2 = Disagree 3 = Undecided 4 = Agree and 5 = Strongly agree.

1	I regard myself as an individual who takes larger risks than the average farmer.	1	2	3	4	5
2	I would rather take more of a chance on making a large profit than resorting to a smaller but less risky profit.	1	2	3	4	5
3	It is better for a farmer to take risks when he knows that his chance of success is relatively high.	1	2	3	4	5
4	Farmers who are willing to take chances are financially better off.	1	2	3	4	5

If you have participated in livestock leasing on your farm and would like to participate in a case-study please leave your name and contact details below

Name:_____ Telephone: (W)_____
(Cell)_____

Email: _____

THANK YOU FOR PARTICIPATING IN THE SURVEY

APPENDIX B

SURVEY QUESTIONNAIRE USED FOR MEMBERS OF THE

JERSEY BREEDERS' SOCIETY OF SOUTH AFRICA

UNIVERSITY OF KWAZULU-NATAL

SCHOOL OF AGRICULTURAL SCIENCES AND AGRIBUSINESS

DISCIPLINE OF AGRICULTURAL ECONOMICS

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EVEN IF YOU HAVE NOT COMPLETED ALL THE QUESTIONS PLEASE CAN YOU RETURN THE QUESTIONNAIRE.

PLEASE RETURN THE QUESTIONNAIRE BEFORE THE 31st May 2007

- Have you participated in livestock leasing before?

Yes	No

1. Personal Information.

1.9. What is your age? _____

1.10. Formal education (please tick appropriate box)

1	No education	
2	Grade 7 (standard 5) and below	
3	Grade 8 -11 (standard 6 -9)	
4	Grade 12 (matric)	
5	Diploma	
6	Degree	

1.11. How many years have you participated in dairy farming? _____

1.12. How many dairy cattle do you currently have on the farm? _____

1.13. How many hectares of grazing land do you currently have? _____ ha

1.14. Do you rent-in or rent-out grazing land?

	Yes/no	Hectares
Rent-in		
Rent-out		

1.15. How many dairy cattle do you have per fertilised hectare? _____

1.16. Is your farm under any land claims? _____

2. Farm Financial Characteristics:

2.6 Please indicate your Gross farm income (turnover) for the 2006/07 financial year?

   R_____

2.7 What proportion of this Gross farm income was derived from dairy farming?

   _____

2.8 Is dairy the only source of on-farm income or are their other sources, if so what?

   _____

2.9 Is dairy farming your primary farm enterprise (Y/N)? _____

2.10 Do you have any off-farm employment (Y/N)? _____

    If so, what is the alternative employment?

   _____

   _____

2.5. What is your **current assets** (debtors, cash on hand, livestock, production inputs etc.) to **current liabilities** (creditors, bank overdrafts etc.) ratio of the farm business (current assets/current liabilities x 100)? _____%

2.6. What is the **debt** (mortgages, instalments, accounts payable, overdrafts etc.) to **asset** (fixed, medium term and current assets) ratio of the farm business (debts/assets x 100)? _____%

3. Leasing Characteristics.

The following questions regard dairy leasing characteristics and **must only be answered by dairy leasing participants**. The answers to these questions must be for your *largest most recent dairy lease contract*.

1	For what years was/is the contract active (e.g.: 1997 - 2000)?	
2	Were/Are you the lessee or lessor?	
3	Were/Are the animals leased stud or commercial animals?	
4	How many dairy cattle were/are leased?	
5	What is the distance between leasing parties?	km
6	Were there disputes that arose during the contractual period (Y/N)?	
7	If there were disputes were these disputes resolved (Y/N)?	
8	Were/Are the rules of the contract well enforced (Y/N)?	
9	Were/Are all terms adding to an efficient lease agreement included in the contract (Y/N)?	

4. Characteristics of Lease Agreements.

The following questions relate to the characteristics of dairy lease agreements. Participants are required to answer the questions under the columns headed **actual** (answers to key contractual terms must relate to your *largest most recent dairy lease contract*) and **preferred** (the preferred contract and contractual terms). Non-participants are required to answer the questions under the columns headed **perceived** (the perceived contract and contractual terms) and **preferred**.

		Actual	Perceived	Preferred
1	Contract type (Cash, share, sharemilking, bull or informal)?			
	Contractual terms			
2	Relationship between leasing parties?			
3	Ownership of leased dairy cattle passed from lessor to lessee (Y/N)?			
4	Inventory of leased dairy cattle is kept (Y/N)?			
5	Option of adding additional dairy cattle during the leasing period included in contract (Y/N)?			
6	Option of contract renewal included in contract (Y/N)?			
7	Who pays insurance premiums for leased dairy cattle?			
8	Participation from a third party in contract design (Y/N)?			
9	Who pays animal transportation costs?			
10	Contract takes the risk of land claims into account (Y/N)?			
11	The lessor's property rights are protected (Y/N)?			
12	Who bears the risk of leased dairy cattle?			
	Cash lease agreements			
13	Monthly cash rent per dairy cow?			
14	Who incurs management costs?			
	Share lease agreement			
15	In what proportion is revenue shared?			
16	In what proportion are costs shared?			

5. How Do You Perceive Livestock Leasing?

With the above contractual terms in mind, the following questions are related to your subjective views towards leasing dairy cattle. Please score the following from a scale of 1 – 5, where 1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree and 5 = Strongly agree.

1	I feel that there is a high level of risk involved with dairy cattle leasing.	1	2	3	4	5
2	I feel that dairy leasing is a new idea that still needs to develop.	1	2	3	4	5
3	I feel that there is little information on potential lessees and lessors.	1	2	3	4	5
4	I feel that it is costly and time consuming to craft an efficient lease agreement.	1	2	3	4	5
5	I feel that the returns in leasing dairy cattle exceed the benefits of ownership.	1	2	3	4	5

6. Risk Preference.

Please score the following from a scale of 1 – 5, where 1 = Strongly disagree 2 = Disagree 3 = Undecided 4 = Agree and 5 = Strongly agree.

1	I regard myself as an individual who takes larger risks than the average farmer.	1	2	3	4	5
2	I would rather take more of a chance on making a large profit than resorting to a smaller but less risky profit.	1	2	3	4	5
3	It is better for a farmer to take risks when he knows that his chance of success is relatively high.	1	2	3	4	5
4	Farmers who are willing to take chances are financially better off.	1	2	3	4	5

If you have participated in livestock leasing on your farm and would like to participate in a case-study please leave your name and contact details below

Name: _____ Telephone: (W) _____ (Cell) _____

Email: _____

THANK YOU FOR PARTICIPATING IN THE SURVEY