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An actor-oriented approach to analyze post-harvest losses: reducing economic loss in pastoral sheep and goat supply chains from northern Kenya

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# An actor-oriented approach to analyze post-harvest losses: reducing economic loss in pastoral sheep and goat supply chains from northern Kenya

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# Dedication

I dedicate this thesis to my beloved mother, Shakhu Malicha

My loving wife, Adhi

My adorable children, Malich, Shakhu and Tiya

# Acknowledgements

# Summary

Livestock production is crucial to the livelihoods of up to 8 million pastoralists in Kenya and contributes an estimated 35-40% of agricultural Gross Domestic Product (GDP). In particular, sale of small ruminants (sheep and goats) are important for ensuring regular household income to cover day-to-day expenses or for diversifying production when funds are used for the purchase of large ruminants. Despite the importance of livestock marketing in pastoral areas of Kenya, currently livestock trade is not very profitable for pastoralists and local traders. The unfavourable terms of trade along the pastoral livestock supply chains are attributed to many structural challenges, such as, price volatility, information asymmetries, high transaction costs, and weak livestock marketing policies. These result in post-harvest losses (PHLs), in the form of quantity (reduced weight and number), quality (altered physical characteristics) and economic losses (difference between the potential economic benefit and actual economic benefit). Altogether, the aforementioned challenges create unfavourable market conditions that disadvantage both pastoralists and local traders.

In northern Kenya, the interest of development practitioners and researchers to resolve these multiple challenges in pastoral livestock supply chains led to development projects to "link pastoralists to market". In this search for solutions, a common approach was the development of market infrastructures, which were thought to translate into benefits for pastoralists. However, such measures have had little success in addressing problematic situations affecting pastoral livestock marketing. Reasons for such failures can be attributed to limited understanding of how pastoral livestock supply chains function. In particular, little is known about specific activities and relations of inter-connected actors that shape supply chain operations in pastoral contexts. Knowledge on the actors and their activities connecting the 'upstream' (closer to producers) and 'downstream' (closer to terminal market) of the chain is necessary to understand the 'flow' of livestock from pastoral areas, in relation to specific market demands. To account for the importance of the views, interests and values of the actors involved in the sheep and goat supply chains, this thesis used an actor-oriented approach and conceptualized the supply chain as a human activity system.

The broader aim of this thesis is to contribute towards the reduction of post-harvest losses in sheep and goat supply chains in northern Kenya by applying an actor-oriented analysis to improve the understanding of the operation and functioning of this chain. Emphasize is put on the investigation of producers' and traders' perspectives on their activities, relations, information needs and information gaps and their economic performance to identify constraints and improvements that are relevant within their context of activities. Thereby, this thesis also aims at generating knowledge relevant for actions by the government, NGOs and others development organizations in northern Kenya which can contribute to the improvement of pastoral livestock supply chains.

The thesis has three specific objectives:

1. To examine the activity system of traders and to differentiate the roles of different types of local traders in linking pastoralists to markets;

2. To assess relationships between actors in sheep and goat supply chains in northern Kenya, with special attention to information flow along the chain;

3. To analyze economic performance in pastoral sheep and goat supply chains with specific focus on local traders' marketing costs and profits.

Mixed methods (qualitative and quantitative) have been used for data collection and analysis. Field work was conducted over 12 months. Between July 2014 and October 2016 data was collected in lower Laisamis sub-county in southern Marsabit and subsequently worked up along the chain towards the downstream terminal market in Nairobi.

**Objective 1:** To discern the different types of traders and interconnected actors whose activities and relationships shape this supply chain, qualitative techniques for actor identification and initial characterization were used to inform the stakeholder analysis conducted at the beginning of the research. From field observation and initial contacts, the actors who were active in the primary markets and other inter-related actors were identified through the snowball technique. In total, 83 individuals and 19 organizations were identified. Then, a list of 30 active traders was prepared and long-distance traders with a high frequency of trading activities were selected for interviews. Thereafter, information was collected from other categories of traders with whom they were connected. This was complemented with 1 multi-stakeholder meeting and intra-stakeholder meetings with traders (n=8 workshops) and pastoral producers (n=14 workshops) to identify problems associated with specific actor categories. Field observations were recorded for 36 market days in Korr (20), Illaut (9), Merille (3) and Nairobi (4) markets including notes from informal conversations with traders about recent sales experiences. Thereafter, narrative interviews with 20 full-time traders of different categories were used to learn about each of their trading histories, important events in their life stories, their routine activities and interactions with other actors along the chain.

Results revealed the typologies of local traders and the different connections between trader categories. The categories of traders are distinguished by varying demands in travel, labour, working capital, risk exposure, and relations with other actors. The findings also showed the activity links between different actors which can be considered for improving supply chain coordination and to illustrate existing gaps. For example, the missing relations between long-distance traders and clients at terminal markets lead to a lack of information relating to prices, animal specifications and alternative market options, altogether exposing the traders to high demand uncertainty and related economic losses. The activity pattern of the traders also showed the relationships among traders and between them and other actors in small ruminant chains that enable transaction. Overall, the activity and actor orientation in the analysis brought out insights regarding the functioning of the chain, contextualized the activity system of actors and explicated the role of diverse categories of local traders who utilized their social relations to buffer fluctuations in the supply of animals towards different markets and to up-hold trading activities in an uncertain trade environment.

**Objective 2:** In order to understand information flow between actors with different relationships within the chain, specifically producers and local traders, as well as mechanisms of information exchange and gaps in market information, the study used semi-structured interviews to gather information on i) information required to do a specific activity; ii)

sources of information; iii) constraints to market information exchange; and iv) ideas for improving information flow in the supply chain. The producers from different settlements (locations) within the study area were also identified and purposively selected for interviews while all traders who regularly visited local markets were identified and invited for interviews. Together, 15 producers and 25 traders were interviewed. Furthermore, secondary data on weekly prices from March 2012 to December 2015 for four grades of goats at the Kariobangi terminal market in Nairobi were obtained from the Kenya Livestock Marketing Council (KLMC) to analyze the price movements and price spread between grades. Field notes were taken to document observations and informal conversations with traders at the end of the market days. The findings showed the specific information needs of traders to make profit; such as the range of prices in different markets, the extent of competition, grades of animals in high demand, further livestock specifications and livestock supply at the primary and terminal markets. The study showed that long-distance traders had the highest information needs and were most affected by inadequate market information, without which it was difficult to improve the coordination of seller - buyer activities. The analysis of information gaps showed that market information tended to rapidly become irrelevant because of the considerable time lag between when a decision about purchases was made by traders and the actual delivery for sale were observed. Lack of accurate and timely information impedes the efficacy of producers' and local traders' economic decision-making, hence contributing to economic aspects of post-harvest losses. The mismatch between traders' information needs and the information available to them reflects deeper problems with structural relations in the pastoral livestock supply chain. This creates a situation in which relevant and timely information cannot be obtained by long-distance traders, thereby exposing them to post-harvest losses and limiting their possibilities to offer better prices to pastoral producers.

**Objective 3:** To investigate the economic performance of two types of local traders (inter-local market traders and long-distance traders), quantitative data on marketing costs and remaining profits were collected between July 2014 and October 2016, over a period of 12 months. Traders were selected based on the frequency of their trading activities and their ability to keep regular records of each trip. They were trained to systematically record the trip information including i) number of sheep and goats bought and sold; ii) the market of origin and destination; iii) amount of working capital invested per trip; iv) the value of total sales; and v) disaggregated marketing costs. In total, 84 transactions were obtained from long-distance traders (59) and inter-local market traders (25). The resultant marketing costs were analyzed to assess traders' net-profits. Additionally, quantitative data on the number of animals sold on all market days between March 2014 and June 2015 at the Merille and Illaut markets were obtained from the non-profit organization 'Food for the Hungry, Kenya' (FH Kenya).

The analysis of marketing costs and traders' profits revealed that long-distance traders faced greater uncertainty than inter-local market traders. Long-distance traders expended seven times more on marketing costs than inter-local market traders. Per trip, over 60% of the costs were spent on transportation and livestock handling, and an estimated 17% were for statutory permits and illicit payments. The supply seasonality at local markets, fluctuating transport costs and delayed sales at the terminal market varied marketing costs. Against the high investment needed, net-profits of long-distance traders are low. They had low returns on capital investment, ranging from 3 to 6 % (for traders working in partner-

ships of two and three, respectively. However, results show that inter-local market traders achieved a relatively high return on invested capital (estimated at 19%) and higher net-profits per animal. Overall, establishing the low and fluctuating profits provide insights into the precarity of long-distance traders.

This research provides information suitable for reducing post-harvest losses, and particularly its economic aspects, by improving the organization and coordination of pastoral livestock supply chains with potential benefits for the pastoralists and local traders. In conclusion, the systematic analysis of the activities performed by actors, the activities linking them, and their relationships offers insight on how local traders – on the supply side – harness their relationships to primary and secondary actors to up-hold their trading activities in uncertain ecological and economic contexts. Therefore, on the demand side, it is recommended that the relations of local traders to processors and meat wholesalers should be strengthened to improve information exchange so that better decisions can be made to improve margins in the chain. Currently, long-distance traders make high investments against low net-profits, resulting in low returns on capital investment - all in the absence of contracts. Moreover, traders' profits fluctuated widely over the course of a year, with the majority of long-distance traders without stable and assured positive income. Hence, blaming local traders as intermediaries for exploiting pastoralists, misses the point for the supply chains under study. Rather, the current high marketing costs with the simultaneously uncertain selling prices, result in narrow profits and losses in some trips and threaten the sustainability of pastoral small ruminant supply chains in northern Kenya. Therefore, supportive policy measures to reduce the marketing costs would include i) revision of the regulation banning night travel (hence reducing police extortion), ii) decentralization of travel permit issuance, and iii) harmonization of local taxes. Overall, this study demonstrates the precarity of small ruminant livestock traders from pastoral areas and highlights areas where economic aspects of post-harvest losses could be reduced such as through better coordination of activities and strengthening relations that improve information flow from downstream to upstream.

# Zusammenfassung

Die pastorale Nutztierhaltung ist für den Lebensunterhalt von bis zu 8 Millionen Viehhaltern (Pastoralisten) in Kenia von entscheidender Bedeutung und trägt ca. 35-40% zum landwirtschaftlichen Bruttoinlandsprodukt (BNP) bei. Insbesondere der Verkauf von kleinen Wiederkäuern (Schafe und Ziegen) generiert das für die täglichen Haushaltsausgaben nötige Einkommen, oder das entsprechende Kapital für eine Diversifizierung des Viehbestandes durch Anschaffung großer Wiederkäuer. Trotz der Bedeutung der Viehhaltung und Vermarktung in den pastoralen Gebieten Kenias, ist der Handel mit den Tieren für die Pastoralisten und lokalen Händler derzeit wirtschaftlich wenig rentabel. Die ungünstigen Handelsbedingungen entlang der Wertschöpfungsketten für pastorale Nutztiere sind auf vielfältige strukturelle Probleme wie beispielsweise Preis-Volatilität, Informationsasymmetrien, hohe Transaktionskosten und ungünstige Vermarktungspolitiken zurückzuführen. Diese Probleme bedingen verschiedene Arten von Nacherntverlusten, die man in quantitative Verluste (z.B. aufgrund von Gewichtsverlusten), qualitative Verluste (z.B. veränderte Fleischqualität) und ökonomische Verluste (z.B. die Differenz zwischen dem erzielbaren und dem erzielten Gewinn) klassifizieren kann. Insgesamt schaffen die genannten Probleme ungünstige, und für die Pastoralisten sowie die lokalen Händler benachteiligende Marktbedingungen.

Das Interesse von Entwicklungsfachleuten sowie Forschern, diese vielfältigen Probleme in den Wertschöpfungsketten für pastorale Nutztiere in Nordkenia zu beseitigen, hat zu Entwicklungsprojekten mit dem Ziel der „Anbindung von Pastoralisten an Märkte" geführt. In dem andauernden Bestreben nach Lösungen, erhielt vor allem der Ausbau der Marktinfrastruktur große Aufmerksamkeit. Dementsprechende Investitionen sollten zu einer Verbesserung der Gewinne der Pastoralisten führen. Tatsächlich jedoch, sind diese Maßnahmen bei der Adressierung der problematischen Situationen in der pastoralen Nutztiervermarktung nur wenig erfolgreich. Die Ursachen dafür sind auf ein unzureichendes Verständnis über die Funktionsweise der Wertschöpfungsketten für pastorale Nutztiere zurückzuführen. Insbesondere besteht ein mangelndes Verständnis darüber, wie die Wertschöpfungsketten durch die wechselseitig abhängigen Akteure sowie deren Aktivitäten und Beziehungen untereinander entstehen und gestaltet werden. Wissen über die Akteure und deren Aktivitäten im Hinblick auf die Verbindung von „upstream" (näher an den Produzenten) und „downstream" (näher an den Endmarkt) Bereichen der Kette ist nötig, um den „Fluss" von Nutztieren aus den pastoralen Gebieten im Hinblick auf die spezifische Marktnachfrage zu verstehen. Um die Perspektiven, Interessen und Werte, der in der Wertschöpfungskette für Schafe und Ziegen eingebundenen Akteure entsprechend zu berücksichtigen, macht sich diese Dissertation einen akteursorientieren Ansatz zu Nutze und konzeptualisiert die Wertschöpfungskette als menschliches Handlungssystem (human activity system).

Das übergeordnete Ziel der Dissertation ist es, zur Verringerung der Nacherntverluste entlang der Wertschöpfungsketten für Schafe und Ziegen in Nordkenia beizutragen, indem durch einen akteursorientierten Analyseansatz ein besseres Verständnis der Abläufe und Funktionsweisen der Ketten erlangt wird. Hierbei wird ein Schwerpunkt auf die Ermittlung der Perspektiven der Produzenten und Händler in Bezug auf ihre Aktivitäten, ihre Beziehungen untereinander, ihre Informationsbedürfnisse und -lücken sowie ihre ökonomische Leistungsfähigkeit in den Wertschöpfungsketten gelegt, um Hemmnisse und

Verbesserungen, die in ihrem Handlungszusammenhang relevant sind, zu identifizieren. Damit zielt die Dissertation auch darauf ab, handlungsrelevantes Wissen für Regierungs- und Entwicklungsorganisationen in Nordkenia zu generieren, dass zu einer Verbesserung der Wertschöpfungsketten für pastorale Nutztiere beitragen kann.

Die Dissertation hat drei spezifische Ziele:

1. Die Untersuchung des Aktivitätssystems der Händler sowie die Differenzierung der Rollen der unterschiedlichen Typen lokaler Händler bei der Anbindung der Pastoralisten an Märkte;

2. Die Ermittlung und Charakterisierung der Beziehungen zwischen den Akteuren in den Wertschöpfungsketten für Schafe und Ziegen in Nordkenia, mit besonderer Beachtung der Informationsflüsse entlang der Ketten;

3. Die Analyse der ökonomischen Leistungsfähigkeit in den pastoralen Wertschöpfungsketten für Schafe und Ziegen, mit speziellem Fokus auf den Vermarktungskosten und Profiten lokaler Händler.

Die Studie nutzt zur Datenerhebung und –analyse verschiedene Methoden (qualitative und quantitative). Die Feldarbeit erstreckte sich über 12 Monate. Im Zeitraum zwischen Juli 2014 und Oktober 2016 wurden Daten im Lower Laisamis Distrikt in Süd-Marsabit sowie daran anschließend, (abwärts) entlang der Wertschöpfungsketten bis hin zum Endmarkt in Nairobi erhoben.

**Ziel 1:** Für die Identifizierung und anfängliche Charakterisierung der Akteure wurden qualitative Techniken verwendet. Stakeholder-Analyse und narrative Interviews wurden genutzt, um unterschiedliche Typen von Akteuren sowie deren Handlungssysteme und Beziehungen untereinander zu ermitteln und unterscheiden. Auf Basis von Beobachtungen vor Ort und durch erste Kontakte wurden, entsprechend des Schneeballprinzips, aktive Akteure auf den Primärmärkten sowie andere, mit ihnen in Beziehung stehende Akteure, identifiziert. Insgesamt wurden 83 Personen und 19 Organisationen identifiziert. Darauf aufbauend, wurde eine Liste von 30 aktiven Händlern erstellt und diejenigen Händler für Interviews ausgewählt, die die Produktionsregion mit dem Endmarket verbinden („Fernhändler" bzw. „long-distance traders") sowie häufig Transaktionen tätigten. Anschließend wurden Informationen von Personen anderer Händlerkategorien, mit denen erstere verbunden waren, gesammelt. Dies wurde durch einen Stakeholder-Workshop mit gemischten Teilnehmern, sowie durch einzelne Workshops mit Händlern (n=8 Workshops) oder pastoralen Tiererzeugern (n=14 Workshops) ergänzt, um die Probleme spezifischer Akteurskategorien zu identifizieren. An 36 Markttagen wurden Beobachtungen sowie informelle Gespräche mit Händlern auf Märkten in Korr (20), Illaut (9), Merille (3) und Nairobi (4) durchgeführt, um mehr über kürzlich zurückliegende Transaktionen zu erfahren. Anschließend dienten narrative Interviews mit 20 in Vollzeit tätigen Händlern aus unterschiedlichen Kategorien dazu, mehr über die Vergangenheit der Handelsaktivitäten, wichtige Ereignisse in den Biographien, die Routinetätigkeiten sowie Informationen zu Interaktionen zwischen den Akteuren entlang der Wertschöpfungsketten zu erfahren.

Ein erstes wesentliches Ergebnis der Untersuchung stellt die aufgestellte Typologie der lokalen Händler dar, sowie die Ermittlung der unterschiedlichen Verbindungen zwischen den Händlerkategorien. Die Händlerkategorien unterscheiden sich durch unterschiedliche

Ansprüche bezüglich zurückgelegter Distanz, Arbeitskraft, Arbeitskapital, Risiko und Beziehung zu anderen Akteuren. Die Ergebnisse zeigen weiterhin verbindende Aktivitäten der unterschiedlichen Akteure auf, die für eine Verbesserung der Koordination der Wertschöpfungsketten berücksichtigt werden können. Dabei wurden diverse Lücken deutlich. Zum Beispiel führt die fehlende direkte Verbindung zwischen Fernhändlern und Kunden in den Endmärkten zu einer Informationslücke bei Preisen, Tierspezifikationen und alternativen Vermarktungsmöglichkeiten, die die Händler letztendlich einer hohen Nachfrageunsicherheit und damit verbundenen ökonomischen Verlusten aussetzt. Die Tätigkeitsmuster der Händler zeigen die Beziehungen zwischen den Händlern in den Wertschöpfungsketten für kleine Wiederkäuer untereinander, sowie zwischen den Händlern mit anderen Akteuren, die die entsprechende Interaktion ermöglichten. Insgesamt brachte die Handlungs- und Akteursorientierung in der Analyse, Erkenntnisse über die Funktionsweise der Wertschöpfungsketten hervor, setzte das Handlungssystem der Akteure in den entsprechenden Kontext und ermöglichte die Rolle verschiedener Kategorien lokaler Händler zu charakterisieren. Diese nutzten ihre sozialen Beziehungen dazu, Schwankungen auf der Angebotsseite von Tieren für die unterschiedlichen Märkte abzupuffern und ihre Handelsaktivitäten unter unsicheren Handelsbedingungen aufrecht zu erhalten.

**Ziel 2:** Um Informationsbedürfnisse von pastoralen Viehproduzenten und lokalen Händlern, Mechanismen des Informationsaustausches sowie Marktinformationslücken besser verstehen zu können, wurden semi-strukturierte Interviews benutzt, die der Gewinnung von Daten zu i) benötigten Informationen für die Ausübung spezifischer Aktivitäten, ii) Informationsquellen, iii) Hindernissen für den Austausch von Informationen und iv) Ideen zur Verbesserung des Informationsaustauschs in der Wertschöpfungskette dienten. Im Zuge dessen wurden Produzenten an verschiedenen Orten innerhalb der Untersuchungsregion und sämtliche Händler, die regelmäßig lokale Märkte besuchen, identifiziert und gezielt für Interviews ausgewählt. Insgesamt wurden 15 Erzeuger und 25 Händler befragt. Des Weiteren wurden sekundäre Daten zu wöchentlichen Marktpreisen im Zeitraum März 2012 bis Dezember 2015 für vier Handelskategorien von Ziegen für den Kariobangi Endmarkt in Nairobi vom Kenya Livestock Marketing Council (KLMC) genutzt, um Preisbewegungen und Preisdifferenzen zwischen den unterschiedlichen Handelskategorien zu analysieren. Des Weiteren wurden Feldnotizen zu Beobachtungen und informelle Konversationen mit Händlern am Ende von Markttagen angefertigt.

Die Ergebnisse zeigen die spezifischen, für ein erfolgreiches Wirtschaften nötigen Informationsbedürfnisse der Händler; wie zum Beispiel die Spannbreite der Preise in den unterschiedlichen Märkten, das Ausmaß des Wettbewerbs, die Handelskategorien der Tiere mit großer Nachfrage sowie die Spezifikationen und das Angebot an Tieren in den Anfangs- und Endmärkten. Die Studie zeigt, dass die Fernhändler den höchsten Bedarf an Informationen haben und ihnen nur unzureichend Marktinformationen zur Verfügung stehen. Ohne diese ist die Koordination von Verkäufer-Käufer-Aktivitäten schwierig. Die Analyse der Informationslücken zeigt weiterhin, dass Marktinformationen dazu tendieren, sehr schnell an Relevanz zu verlieren. Des Weiteren wurde ein erheblicher Zeitverzug zwischen der Kaufentscheidung durch die Händler und dem eigentlichen Verkauf auf dem Endmarkt beobachtet. Die Abwesenheit akkurater und zeitnaher Informationen behindert eine ökonomisch sinnvolle Entscheidungsfindung der Tierhalter und lokalen Händler und trägt damit zu finanziellen Verlusten im Nacherntebereich bei. Die Diskrepanz zwischen den Informationsbedürfnissen und der den Händlern für Entscheidungen zur Verfügung

stehenden Informationen, spiegelt tiefer liegende strukturelle und relationale Probleme in den Wertschöpfungsketten für pastorale Nutztiere wider. Diese schaffen eine Situation, in der den Fernhändlern relevante und zeitnahe Informationen nicht zugänglich sind und diese somit vielfältigen Risiken und Verlustursachen ausgesetzt sind. Dadurch werden letztlich auch ihre Möglichkeiten limitiert, den pastoralen Produzenten bessere Preisangebote zu machen.

**Ziel 3:** Um die ökonomische Leistungsfähigkeit zweier Typen lokaler Händler (regionale Zwischenmarkt- und Fernhändler) zu untersuchen, wurden zwischen Juli 2014 und Oktober 2016, über den Zeitraum von 12 Monaten, quantitative Daten zu Vermarktungskosten und Einnahmen erhoben. Die Händler wurden auf Basis der Häufigkeit ihrer Handelsaktivitäten sowie ihrer Fähigkeit regelmäßig Buch über ihre Handelsaktivitäten (Transaktionen) zu führen, ausgewählt. Ihnen wurde ein entsprechendes Aufzeichnungsbuch zur Verfügung gestellt und sie wurden darin geschult, systematisch Informationen für jede Transaktion zu sammeln. Dies beinhaltete i) die Anzahl an ge- und verkauften Schafen und Ziegen, ii) den Ursprungs- und Endmarkt, iii) die Höhe des investierten Arbeitskapitals pro Transaktion, iv) den Gesamtverkaufswert und die v) disaggregierten Vermarktungskosten. Insgesamt wurden Information zu 84 Transaktionen von Fernhändlern (59) und Zwischenmarkthändlern (25) gesammelt. Die resultierenden Daten wurden für eine Bewertung der Vermarktungskosten und Nettogewinne der Händler analysiert. Darüber hinaus wurden sekundäre Daten zur Anzahl verkaufter Tiere an allen Markttagen zwischen März 2014 und Juni 2015 in den Märkten in Merille und Illaut genutzt. Diese wurden von der Nichtregierungsorganisation „Food for the Hungry, Kenya" (FH Kenya) zur Verfügung gestellt.

Die Analyse der Vermarktungskosten und der Gewinne der Händler zeigt, dass die Vermarktungskosten zwischen den Wertschöpfungsketten und zwischen den unterschiedlichen Händlertypen schwanken. Die Fernhändler wenden sieben Mal höhere Vermarktungskosten auf als die Zwischenmarkthändler. Über 60% der Kosten entstehen durch Transport und die notwendige Versorgung der Tiere pro Fahrt. Etwa 17% entstehen durch gesetzlich vorgeschriebene Genehmigungen und das Zahlen von "Bestechungsgeldern". Saisonale Schwankungen des Angebots auf den lokalen Märkten, schwankende Transportkosten und Verzögerungen bei den Verkäufen in den Endmärkten verursachen Unterschiede in den Vermarktungskosten. Entgegen des hohen Investitionsbedarfes, sind die Nettogewinne der Fernhändler gering, was wiederum nur niedrige Erträge aus dem investierten Kapital, zwischen 3 und 6%, zur Folge hat. Die Ergebnisse zeigen jedoch auch, dass die Zwischenmarkthändler relativ hohe Kapitalrenditen erreichen (geschätzte 19%) und höhere Nettogewinne pro Tier. Insgesamt zeigt die Untersuchung mit der Ermittlung der geringen und schwankenden Gewinne die prekäre Lage der Fernhändler.

Die in dieser Arbeit durchgeführten Untersuchungen liefern neue Erkenntnisse für die Verbesserung der Wertschöpfungsketten für pastorale Nutztiere in Nordkenia durch die Reduzierung von ökonomischen Verlusten im Nacherntebereich. Diese betreffen insbesondere Möglichkeiten zur Verbesserung der Organisation und Koordination, die zu einer Verbesserung der ökonomischen Situation von lokalen Händler und Pastoralisten beitragen können. Durch die systematische Analyse der von den Akteuren durchgeführten Handlungen, und durch die Identifikation der sie verbindenden Aktivitäten und ihrer Beziehungen zueinander erhält man einen tiefen Einblick, wie sich lokale Händler – auf der

Angebotsseite – ihre Beziehungen zu Primär- und Sekundärakteuren zu Nutze machen, um ihre Handelsaktivitäten in unsicheren ökologischen und ökonomischen Kontexten aufrecht zu erhalten. Auf der Nachfrageseite wird empfohlen, die Beziehungen lokaler Händler mit Fleischverarbeitern und Fleischgroßhändlern, sowie deren Austausch von Informationen mit dem Ziel zu stärken, dass diese bessere Entscheidungen treffen und damit höhere Gewinne realisieren können. Derzeit haben die Fernhändler keine Verträge und tätigen, in Relation zu den geringen Nettogewinnen, hohe Investitionen, was zu geringen Kapitalrenditen führt. Darüber hinaus schwanken die Gewinne der Händler über den Zeitraum eines Jahres stark, wobei die Mehrheit der Fernhändler keine stabilen und eher geringe Erträge erwirtschaftet. Daher ist die oft gemachte Schuldzuweisung, dass Händler als Zwischenmänner Pastoralisten ausnutzen in dem Untersuchungsgebiet nichtzutreffend. Es sind vielmehr die derzeit hohen Vermarktungskosten bei gleichzeitiger Unsicherheit des zu erzielenden Verkaufspreises, die zu geringen Gewinnen und Verlusten bei einigen Fahrten führen und damit die Nachhaltigkeit der Wertschöpfungsketten für pastorale Nutztiere in Nordkenia gefährden. Deshalb könnten unterstützende Politikmaßnahmen für eine Reduzierung der Vermarktungskosten folgendes beinhalten: i) eine Revision des Nachtfahrverbotes für Fernhändler (um so entsprechende „Strafzahlungen" an die Polizei zu reduzieren), ii) eine Dezentralisierung der Ausstellung der Reisepapiere und Genehmigungen und iii) eine Harmonisierung lokaler Steuern. Insgesamt verdeutlicht die vorliegende Untersuchung die prekäre Situation der Händler aus den pastoralen Gebieten und verweist auf relevante Gebiete, in denen ökonomische Verluste im Nacherntebereich reduziert werden können, vor allem in Bereichen der Verbesserung der Koordination und der Stärkung von Beziehungen, die den Informationsfluss entlang der Kette, und insbesondere vom Endmarkt her verbessern.

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# 1 Introduction and objectives

## 1.1 Introduction

Livestock production is crucial to the livelihoods of up to 200 million pastoralists and agro-pastoralists in arid and semi-arid areas of the world (Rass, 2006). Pastoralism is practiced on an estimated 25% of the global land area and provides 10% of global meat output (Gertel and Le Heron, 2011). An estimated 50 million people in Sub-Saharan Africa (Rass, 2006), and 8 million in Kenya (Davies, 2007), rely on pastoral production for their livelihoods and well-being. Pastoral production is equally recognized for its significant contribution to the national economies of various countries across the globe, as well as to household incomes of producers. For example, pastoralism contributes 10 - 40% of the agricultural Gross Domestic Product (GDP) in East African countries (FAO, 2009) and accounts for over 80% of household income in arid and semi-arid areas of Kenya (IIRR, 2014).

Despite these significant contributions, pastoralists are not advantageously positioned along the supply chain. There are also concerns that they are generally side-lined in policy priorities and related public investments. Therefore, further investigation of pastoral livestock value chains[1] could contribute to better understanding of relevant constraints and opportunities along the chain, and guide efforts to improve the benefits for disparate actors, particularly pastoral producers and local traders, operating in arid and semi-arid regions. Livestock value chains, when functional, play an important role for income generation and overall livelihoods of pastoralists. In particular, marketing of small ruminants (sheep and goats) are important for ensuring regular household income in pastoral communities (Greenough, 2010; Kosgey et al., 2008), e.g. to cover day-to-day expenses, or to acquire cash for buying large ruminants in order to diversify production.

Although livestock traders in northern Kenya play important roles of connecting pastoralists to distant markets, various structural issues that challenge value creation in pastoral livestock value chains were identified in the literature, namely: price volatility (Barrett and Luseno, 2004), weak physical infrastructure and information asymmetries (Bailey et al., 1999), including missing knowledge on demand specification of the buyers and lack of investment, e.g. in roads, butchery equipment and cooling systems. Furthermore, high transaction costs (Barrett, et al. 2006), weak livestock and livestock products marketing policies (McPeak, 2006) and lack of coordination are among other challenges encountered as the chain extends towards terminal markets in Nairobi.

The quest for researchers and practitioners to improve pastoral livestock value chains spans over many years and various academic disciplines. While academic interest in pastoral livestock value chains has grown, particularly since the 1990s, a review of existing literature focused on East Africa reveals that these studies concentrated on two broad areas that largely shaped the development discourse and investments on livestock markets in pastoral areas: i) extent of household-level market integration and ii) assessment of mac-

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[1] The terms 'value chain' and 'supply chain' have some overlap but different focus; both are used in the cited literature. In this thesis, supply chains are used to describe sheep and goat marketing chains

ro-economic conditions. Considering the studies on market integration, previous research, on one hand, focused on marketing behavior of pastoral households and the role of market incentives (Barrett et al., 2006; McPeak, 2006), including the effect of market organization on livestock price distribution (Green et al., 2006). Determinants of livestock prices, such as the influence of animal characteristics, seasonal events and climate-related factors, were also assessed from a macro-economic perspective (Barrett et al., 2003; Radeny et al., 2006). The role of non-price factors, such as herd structures and composition, households' food and expenditure need and climatic factors that influence households' decisions to sell, were also considered (Little et al., 2014). Other pastoral livestock marketing-related research included studies on market information systems (Stuth et al., 2006) and innovations used by cattle traders in northern Kenya in the face of many obstacles in livestock market (Mahmoud, 2006). Very recently, research mapping the structure of beef, sheep and goat meat markets in Nairobi was conducted by (Alarcon et al., 2017) to identify sources of inefficiencies and meat safety risks.

Although these studies have produced valuable information to improve scientific understanding of pastoral livestock marketing in Kenya, information on the supply chain actors, their activities and relationships, is still scarce. This limits comprehension of the ways that pastoral livestock supply chains function; of particular interest are actors and activities that connect those parts of the chain that are closer to producers ('upstream') with those that are closer to terminal markets ('downstream'). These are crucial for understanding the 'flow' of livestock from pastoral areas, in relation to specific market demand and relationships between the actors in these two ends of the chain. The limited success of past efforts to "link pastoralists to markets" in northern Kenya, which were mostly targeted towards enhancing pastoralists' income by improving physical infrastructure, can be attributed to limited contextualization, particularly with regard to the actors' actual needs. As a result, many expensive constructions, such as market structures, fences and loading ramps, are either underutilized or completely abandoned. This demonstrates the need to go beyond economic analyses alone towards the actors' activities and relationships among them. This need to investigate the activities of supply chain actors and the roles of specific social relations among them in fulfilling market transactions was emphasized in only a few previous studies focusing on pastoral livestock value chains in Kenya (Allegretti, 2017; Mahmoud, 2008; Van Ufford and Zaal, 2004).

To understand supply chain functioning in a specific context, the actors' knowledge and interpretations, e.g. of context-specific opportunities and constraints, as well as the interests that influence their decisions, are of specific importance. Hence, an actor-oriented approach is needed that extends the focus beyond the scope of micro- or macro-economic analyses towards understanding the functioning of pastoral livestock supply chains from the perspective of the involved actors. This focus on the perspective of the supply chain actors is important to i) learn about their activities and relationships, ii) identify critical activity links and coordination gaps that may contribute to economic losses along the chain and iii) understand specific constraints that are encountered by diverse actors at different segments of the chain. Particularly for the study of long and complex pastoral livestock supply chains in northern Kenya, which are shaped by diverse actors with different connections to rural and urban spaces, this approach can be expected to result in new and valuable insights.

## 1.2  Objectives

The overall aim of the thesis is to improve understanding of the operation and functioning of sheep and goat (small ruminants) supply chains in northern Kenya, with a focus on traders' perspectives on the activities, relations, information needs, information gaps and their economic performance in connecting pastoralists to markets. The outcome of such analyses are particularly useful in the current context where different investments are made by government and development agencies in northern Kenya to position pastoralists to benefit from market opportunities. Specifically, the study aims to achieve the following objectives:

1. To examine the activity system of traders and to differentiate the roles of different types of local traders in linking pastoralists to markets;

2. To assess relationships between actors in sheep and goat supply chains in northern Kenya, with special attention to information flow along the chain;

3. To analyze economic performance in pastoral sheep and goat supply chains with specific focus on local traders' marketing costs and profits.

# 2 Literature review

## 2.1 Livestock value chains in pastoral systems

Pastoralism refers to a livestock-based production system that uses strategic mobility to utilize heterogeneous rangeland environments (Krätli et al., 2013). Herd diversity is a typical feature of pastoral production systems, where multiple livestock species are kept for different but complementary purposes. For example, pastoralists in arid and semi-arid areas usually keep a mix of livestock species that have different feed requirements and provide different products and functions to households, based on the 'twin objectives' — of meeting both subsistence and income needs. Generally, small ruminants tend to be sold to cover recurrent expenses, while cattle and camels are kept for milk production and sale. Through herd mobility, pastoralists utilize temporally and spatially heterogeneous resources, e.g. water and fodder, to ensure the overall productivity of their herd (Pratt et al., 1997). However, there is also some difference among pastoral regions. Whereas in East Africa, market integration is low among the majority of pastoralists, pastoralists in West Africa tend to have relatively better access to well-developed livestock markets (Ayantunde et al., 2011; Moritz et al., 2009).

In Kenya, pastoral production systems support about 8 million people, with an estimated 14.1 million livestock and 69.3 million USD worth of annual offtake (Davies, 2007). The majority of pastoral communities live in remote arid and semi-arid areas such as northern Kenya, where livestock production accounts for more than two-thirds of household income for over 3 million people (Chantarat et al., 2013). In addition to marketed offtake, the subsistence economy also accounts for other substantial benefits from the local pastoral production system. Based on an assessment of small ruminant production in both smallholder and pastoral systems in Kenya, Kosgey et al. (2008) underscored their importance because of tangible benefits, such as regular cash income generated through selling meat and goat milk, combined with less tangible ones, such as increased resilience, since small ruminants can help to recover herd sizes quickly after severe droughts. While mostly rams are slaughtered during cultural festivals, young female animals are loaned within kinship and non-kinship networks (Greenough, 2010). Several attributes of small ruminants make them favourable in pastoral production environments, including, high reproductive rate (Degen, 2007), tolerance to heat, drought and local diseases (Degen, 2007; Kosgey et al., 2008) and superior meat quality (Juma et al., 2010).

The increased dependence of pastoralists on livestock sales underlines the importance of understanding the structure and operation of pastoral livestock value chains. Livestock value chains are defined as a broad range of activities performed by value chain actors to bring products from production to consumption (Ayele et al., 2012; Rich et al., 2011). Based on spatial characteristics and production systems, (Oosting et al., 2014) distinguished four types of livestock value chains: i) rural–rural chain, mainly dominated by smallholder mixed crop-livestock systems; ii) rural-urban chain which includes pastoral production systems; iii) (peri-)urban-urban chain that predominantly produces livestock for urban markets; and iv) the external-urban chain, which is predominantly export oriented. These chains differ regarding the type of input and output infrastructure, economies of scale and connections to urban markets.

Pastoral livestock value chains are socially embedded networks where the actors discover prices and other market information through direct buyer-seller negotiation (Turner and Williams, 2002) and that rely on relationships between connected actors along the chain. In pastoral livestock value chains, social identifiers such as kinship, family ties and ethnicity, play important roles in the structural organization of the market, minimizing transaction costs and dealing with market risks (Allegretti, 2017; Van Ufford and Zaal, 2004). Analysis of social relations are crucial to understand the functioning of the pastoral livestock value chain, particularly, in a context where most markets are related but not closely integrated (Fafchamps and Gavian, 1996) and are also characterized by weak vertical linkages between livestock producers and other actors along the value chain (Duguma et al., 2012).

## 2.2 Assessing post-harvest losses through livestock value chain analysis

Losses occurring after an animal has been removed from a herd with the purpose of a sale, are categorized as post-harvest losses (PHLs). Livestock trade involves long movements and many intermediate steps between the area of production and the terminal markets, characterized by long journey length, stopovers and delayed sales that contribute to losses along the livestock value chain. Pre-slaughter handling and transportation of livestock are observed to have effects on the carcass and meat quality (Jones et al., 1988), especially when animals are transported over long distances for slaughter. Post-harvest losses in livestock value chains occur in different forms. Losses result from weight losses when animals are trekked "on the hoof" or are transported live over several kilometres. Wythes et al., (1980), explained that livestock transportation over 1,420 km under pasture and water deprivation in northern Australia, decreased livestock body weight by 10%. In a similar example from West Africa, Staatz, (1980), observed that the weight loss of cattle during transit between Ouagadodgou and Abidjan, a distance of 1,150km, was estimated at 9% of their live weight. Losses also result from stress-induced meat quality deterioration on the road as observed in physiological changes in animals, which in turn alter meat quality (Averós et al., 2008; Dalmau et al., 2014), and culminate in loss of income. Furthermore, losses result from livestock mortality and morbidity during transport. Livestock deaths during transportation result from heat stroke, trauma (Norris et al., 2003), asphyxiation (Moore et al., 2014) as well as injury and sickness (Pilcher et al., 2011). Physical losses, associated with spoilage and wastage result from poor handling of meat products (Tarrant, 1989); and economic losses are linked to operational issues leading to PHLs in agri-food chains.

According to Affognon et al., (2015), most losses along the commodity value chains in Sub-Saharan Africa are economic in nature rather than physical product loss. Economic losses, also referred to as market-force losses, are defined as loss caused by market dynamics (e.g. over-supply, drastic price drops, etc.) that force actors along the chain to sell products at prices that are below their expectations (Akande and Diei-Ouadi, 2010). This contributes to low performance of the chain and leads to loss of income and reduced profitability. In agri-food chains, economic losses are attributed to several factors, including fragmented information sharing, weak buyer-supplier relations and lack of efficient demand forecast which together contribute to the mismatch of demand and supply (Shukla

and Jharkharia, 2013). Economic losses also occur when products miss high value market opportunities or are restricted to low value markets (Hodges et al., 2011) and from lack of organization of the actors along the chain and limited knowledge of consumer preferences (Akande and Diei-Ouadi, 2010).

To establish the extent of post-harvest losses and to generate ideas for reducing losses (quantity, quality and economic), scholars and development practitioners have used value chain approach to examine livestock marketing systems (Duguma et al., 2012; Kocho et al., 2011; Rich et al., 2011; van Engelen et al., 2013). Generally, livestock value chain analyses assess how the multiple activities performed by diverse actors along the chain contribute to creating value in the end market, and how the business environment in which different actors operate influences the performance of their activities (van Engelen et al., 2013). The aims of analyzing livestock value chains are twofold: i) to characterize the actors, their activities in the chain and their functions (Bassa and Woldeamanuel, 2015) and ii) to identify marketing constraints and opportunities for improvement in order to position the actors in a way that is advantageous for them (Alarcon et al., 2017; Kocho et al., 2011).

Livestock value chains are analyzed quantitatively and qualitatively. The quantitative analyses examine the cost structure, profitability and competitiveness of various stages of the value chain (Dzanja et al., 2013) as well as alternative policy and management options or investment priorities based on costs and benefit structures (Dizyee et al., 2017). In livestock value chains, quantitative analyses can also generate pertinent information on the number and sources of animals, the seasonal price and demand fluctuations and the actors' profit margin distribution from high end markets (Alarcon et al., 2017). However, quantitative value chain analyses have limited potential to define the structure of relationships, coordination mechanisms among actors and characteristics of diverse actors.

Qualitative analyses, in contrast, are essential to establish sequential activities, the types of actors, their linkages and the power dynamics along the chain (Mayoux and Mackie, 2007; Mutua et al., 2014). They also help to illustrate product flows, the coordination between actors as well as risks and constraints along the livestock meat value chains (Negassa et al., 2012). Qualitative approaches are critiqued, e.g. for their inability to explicitly guide investment decisions (how and where to invest), or to predict the economic outcomes of interventions on different actors (Rich et al., 2011).

However, a combination of quantitative and qualitative approaches can yield information characterizing activities and actors, facts on governance arrangements, and estimates relating to the distribution of margins that accrue to diverse actors along the chain (Negassa et al., 2012). Furthermore, information generated by the combined approach can focus on interactions among diverse actors at different segments of the chain (Rich et al., 2011), or on opportunities and constraints for improving income generation, e.g. for smallholder livestock producers (Kocho et al., 2011).

Especially in agricultural studies, a predominant productivist orientation in food value chain research can be observed, which typically puts the commodity under investigation at the centre of analysis and people at the margin. Such approaches have some shortfalls, including: i) oversimplification of the context in which commodities circulate (Fabinyi 2013; Musvoto et al. 2015); and ii) obscuring the social constructs of activities which are

"created from inherent social and spatial interconnections operating at local, national, and international scales" (Arce and Marsden, 1993, p. 8). This is why integrating qualitative social science approaches into such studies can be particularly valuable to overcome these shortfalls.

Previous pastoral value chain analyses in Kenya have mapped different actors, including livestock producers, traders, transporters, brokers, butchers, meat distributors, retailers, wholesalers and consumers (Farmer and Mbwika, 2012; IIRR, 2014; Sommerville and Draaijer, 2013). The elaborate stages through which the animals are transferred from the pastoral production area to the consumer in urban areas consists of several activities that are sequentially linked (Bassa and Woldeamanuel, 2015). However, despite the distinctive nature of actors' activities within pastoral livestock value chains, overlap in roles and activities occurs as well. For example, a producer can be momentarily involved in small-stock trade or a small-scale trader can concurrently operate a butchery business and serve as an agent for large-scale traders (Nunow, 2000). The need for nuanced pastoral live-stock supply chain analyses draws to attention the importance of understanding the activity systems of the 'involved' actors, and other interrelated actors along the chains.

## 2.3  Supply chains as human activity systems

A supply chain is defined as "a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer" (Mentzer et al., 2001, p. 4). Such inter-dependent activities performed by actors can be characterized as a 'human activity system' (Checkland, 1985). According to Checkland, human activities in such systems are organized in such a way that they fulfil underlying purposes. Scholars using an activity system approach to study supply chains disaggregate the activity systems into sub-components, including system content, which refers to the collection of activities performed, system structure, e.g. how the activities are linked, and system governance, denoting who performs the specific activities in the system (Zott and Amit, 2010).

Other researchers represent supply chains in operational terms by focusing on three complementary flows: commodity (material), capital (cash) and information (knowledge) (Spekman et al., 1998; Stadtler, 2005). The commodity flow focuses on the vertical dimension of the supply chain network structure from producers to consumers (Trienekens, 2011). Capital flow describes the terms of contracts and forms of payments (Tang and Musa, 2011), while information flow includes the knowledge relating to practices and actions, as well as how it is exchanged along the chain (Le Heron et al., 2001).

Thus, when using the human activity system approach to examine flows in supply chains, an actor is not considered as an autonomous entity in the chain, but rather as belonging to a network of actors involved in sequential and linked activities to deliver goods or services to final consumers (Gripsrud et al., 2006). As a result, a supply chain is visualized as a business network where the activity structure of one actor in the chain and its link to the activity structure of other actors determine the overall performance of the chain (Håkansson and Snehota, 1995). The links between the activities in the supply chain determine when and how different activities are performed and reveal the point where coordination is required. Performing functional coordination in supply chains involve joint

planning, resource pooling, real-time order management (Hofmann, 2010) and collaboration through information sharing (Taylor and Fearne, 2009).

Supply chain practitioners usually focus on activity synchronization to enhance coordination, including logistics harmonization, information sharing, collective learning and alignment of incentives (Simatupang and Sridharan, 2001), as well as on building relationships between supply chain partners (Ogulin et al., 2012). Similar to other agri-food supply chains, pastoral livestock supply chains have distinct upstream (producer-end) and downstream (consumer-end) segments, which have disparate actors with linked activities. Due to operational relations between the supply chain segments, coordination of activities between the units becomes a necessary prerequisite to achieve the actors' goals (Simatupang and Sridharan, 2002). Thus, the benefits of actors in the supply chain are contingent on their ability to match their activities with contemporaneous demand and supply.

Supply chain coordination has significant economic benefits to the actors along the chain. Palmer (1996), for example, observed that the development of links between livestock farmers and other market actors in the UK positioned farmers to understand and supply the required meat quality consistently. Palmer affirmed that the activity integration with abattoirs and retailers offered farmers the required commitment, communication and continuity essential for effective business relationships, in addition to offering options to move away from spot markets. These are considered a form of collaborative arrangements that offer more benefits to the involved actors.

Market information is essential for the coordination of supply chain activities (Holweg and Pil, 2008), through strengthening buyer-supplier relationships and improving overall performance of the chain (Hsu et al., 2008). Different supply chain actors require different information to perform activities. Whereas in homogenous products, the price is commonly sought information by the supply chain actors, in more differentiated products, the information needs of the supply chain actors expand to link price information to product characteristics as well as details of key supply chain players (Hobbs and Young, 2000). It is therefore important to identify specific information needs of the supply chain actors along with the primary and secondary actors that could provide the required information in order to reduce the information gaps (Nakandala et al., 2017). Market information is particularly important in agri-food chains because; i) the producers are spatially dispersed, ii) goods are perishable and bulky in nature, iii) the price information is generally incomplete or lagged, and iv) capacity and associated reasons constrain responses to information (Aramyan and Kuiper, 2009).

## 2.4  Actor and activity orientation in agri-food studies

Agri-food system research is complex because of the necessity to consider many social, economic and ecological factors in relation to one another (Darnhofer et al., 2012; 2016), with social relations being of increasing importance to connect spatially dispersed farmers and livestock producers to consumers, e.g. in regional food networks (Jarosz, 2000).

The need to take the perspective of involved actors into account has led to considerable advancement in theoretical approaches of rural development, particularly concerning the interplay between the micro-level (the actors) and macro-level (structure of the supply chains). In this regard, Long, (1990) offers an alternative approach, in which the dynamics

of rural development are understood from an actor-oriented perspective. Long, also distinguished between studies that address the structure of the market and those that address the nature of market exchange. Studies with structural bias were criticized for being too deterministic and for the underlying conceptual assumption of development and social change as a linear process. The perspective offered by an actor-oriented approach emphasizes the consideration of socio-economic realities of the actors (Brenner and Job, 2006) and acknowledges the role of actors in mediating and transforming external intervention to fit their own goals (Long, 2001).

An actor-oriented approach puts people at the centre (Long, 1990) and focuses on information about the actors´ knowledge, their power, interests and values that influence their day to day decisions. Integrating diverse perspectives is necessary to arrive at contextually embedded problem views and to pursue mutually beneficial solutions to improve supply chain management (Maestrini et al., 2016). In transdisciplinary research, the aim is to draw the attention of the researchers towards co-creating knowledge with societal actors, so that it is useful, valid and informative and can be utilized to produce relevant actions. Agricultural studies are often conducted in processes involving diverse actors, akin to what Long (2001) described as social interface, where the life worlds of involved actors intersect and influence each other. Although the actor-oriented approach is couched on the assumption that the desired change occurs when actors are considered as active participants, power differences and social gaps that affect their room for manoeuvre should not be overlooked (Long, 2001).

Scholars following actor-oriented approach commonly examine human activities within the social, relational and institutional environments in which they are embedded (Muller Mirza and Perret-Clermont, 2014; Klein and Juhola, 2014; Yamagata-Lynch, 2010). For example, along the supply chain, the professional human activity systems include livestock rearing, marketing, and meat processing. These are examples of purposeful systems that have been established and maintained by actors through their activities (Argyris and Schön, 1978; Mingers, 2006; Kaufmann et al., 2013). As activities are constitutive of the system, transformations result from actors modifying and creating new activities (Kaufmann and Hülsebusch, 2015; Yamagata-Lynch, 2010). Therefore, an activity system analysis should be conducted in a participatory way, in order to co-create applicable knowledge with the involved actors to evaluate their practices and identify ways how they can change them in order to better achieve their goals (Kaufmann et al., 2013; Restrepo et al., 2016).

Håkansson and Snehota (1995) analysed actor relationships within the frame of business networks. They characterized the nature of interaction between the actors at three levels: i) activity links that define the relationship between different actors; ii) actor bonds that shape how diverse actors along the supply chain are connected; and iii) resource ties that symbolize how actors utilize shared resources like technology, knowledge and other intangible resources from their relationships. Defining the three levels characterizes the nature of relationships between two or more actors. Also, the interconnections between the different levels are important to explain the existing relations and to explore ways of developing more economically effective relationships (Ibid, p. 34).

In this thesis, an actor and activity orientation is used to analyze the activities of different sheep and goat supply chain actors based on their experiences and perspectives, including

their insights on the nature of their relationships with other actors and their room for manoeuvre. In this way, multiple insights are garnered to inform the reduction of post-harvest losses in these pastoral meat value chains, and particularly economic aspects of these losses.

# 3 Materials and methods

## 3.1 Study area

The study area, Laisamis sub-county, located in arid and semi-arid areas in the southern part of Marsabit County, covers an area of 20,290.5 km2 and borders Isiolo and Samburu Counties (see figure 3.1). Laisamis receives long-term mean annual rainfall of 200 to 1000 mm, with the maximum rainfall occurring in the mountainous areas of Mt. Marsabit and Mt. Kulal, while the lowlands receive minimum rainfall. The area experiences a bi-modal rainfall pattern, leading to four seasons: the short and hot dry season starts in January and ends with the long rainy season from March to May; the long dry season commences in June and lasts until November, followed by the short rainy season until the end of December. The temperatures in the area range between 22-39°C.

Laisamis is predominantly home to Rendille pastoralists who rear a mix of livestock species, including camels, cattle, donkeys, sheep and goats. Sheep and goats are widely sold at the local markets to acquire income for regular household needs. With a population of 458,172 sheep and goats, Laisamis sub-county has a relatively higher number of sheep and goats in Marsabit County compared to the other three sub-counties (KNBS, 2010).
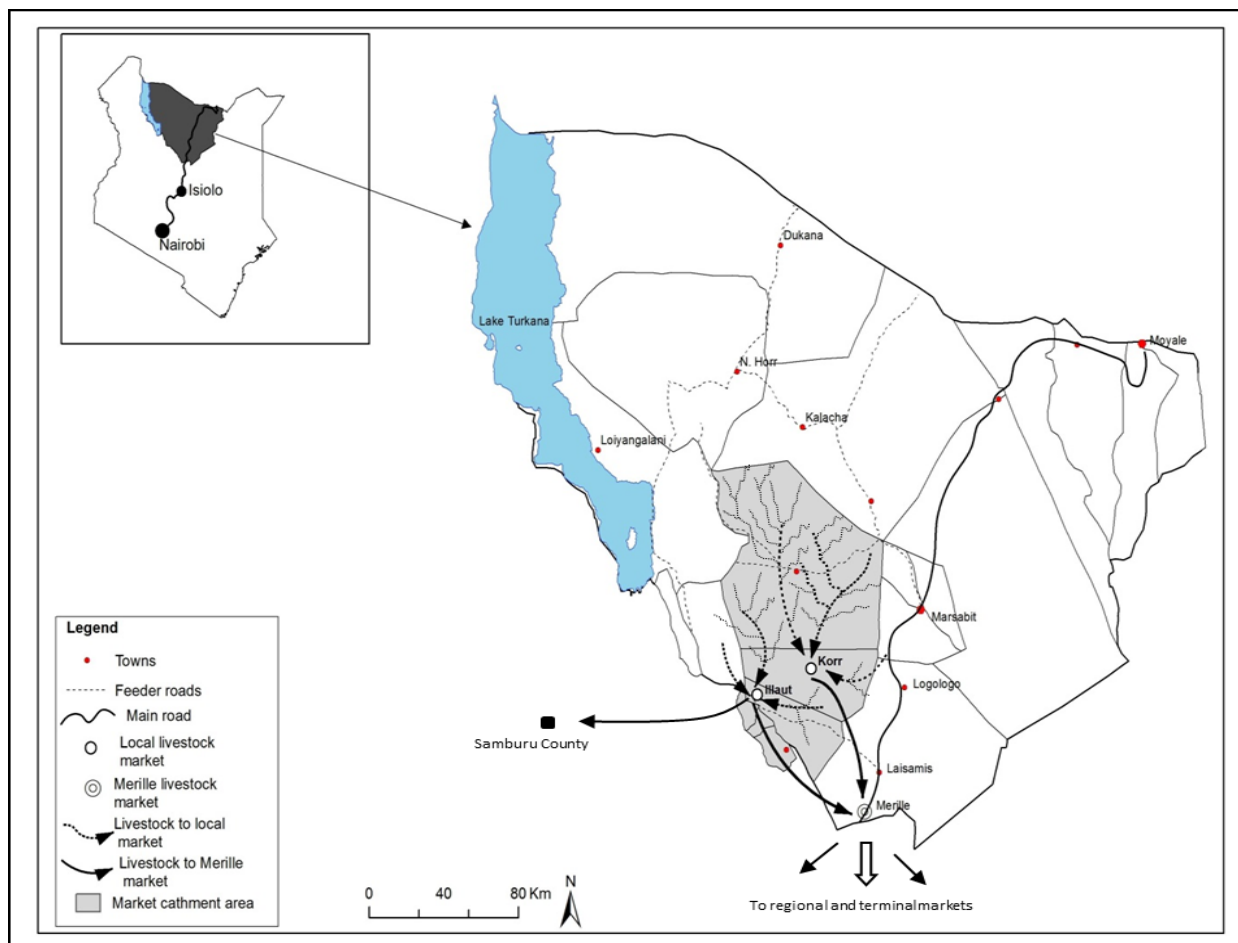


**Figure 3.1: Map of Laisamis sub-county and livestock trading routes**

The pastoralists in Laisamis have higher market participation compared to most other pastoral communities in the county because of the existence of organized local markets. The recently finished north-south road linking Isiolo and Marsabit will improve connectivity to other regional markets such as Isiolo, Archers Post, Meru and terminal markets in Nairobi. However, roads in the lowlands are unpaved and impassable for ordinary vehicles, especially during rainy seasons. The area has sporadic mobile network coverage, mostly around towns in the central lowlands, while the towns along the Isiolo - Marsabit road have better mobile connectivity and more vibrant economic activities than others.

## 3.2  Data collection and analysis

In this research, the data on the type of actors, their activities, and the relationships in the value chain was collected from the pastoral producers and various types of local traders who were active in Korr and Illaut primary markets in Marsabit south. It further covered the connections along the chain towards downstream terminal markets in Nairobi. The data was collected, interruptedly, over 12 months of fieldwork, conducted in the period between July 2014 and October 2016 (see table 1). Mixed methods (qualitative and quantitative) used for data collection and analysis are elaborated below and in respective study.

**Table 1: Summary of data collection methods**

| Methods | Timeline |
|---|---|
| Actor identification | July - August 2014 |
| Field observations: 36 market days | July - August 2015 |
| Informal dialogues with traders | July - August 2015 |
| Semi-structured interviews: producers (15), traders (25) | July - November 2015 |
| Focus Group Discussions: traders (6), producers (12) | August 2015 |
| Narrative interviews: full   time traders (20) | August - December 2015 |
| Multi  stakeholder and intra  stakeholder meetings: traders (8), producers (14) | August 2015 - January 2016 |
| Transaction records of traders: 84 transactions (59 LDT, 25 IMT) | July 2014 - October 2016 |

*LDT: long-distance traders, IMT: inter-local market traders

**Study 1**

In this study, data was collected between July 2014 and January 2016. Qualitative techniques for stakeholder analysis were conducted to identify and characterize the supply chain actors following the steps in figure 3.2.



**Step 1: Selection of a human activity system for research focus**
e.g. a particular food supply chain

**Step 2: Actor identification and initial characterization**
Identifying actors and their roles, objectives and scope of action in the human activity system
Reflecting on social difference

**Step 3: Formulation of a specific problem or issue to be addressed in the research**
To increase benefits to the actors in small ruminants supply chains through improved information flow and coordination of market activities

**Step 4: Stakeholder identification & characterization**
Who has a 'stake' with regard to the problem/issue and why?
Who has power, knowledge and resources?
What are the relationships between stakeholders?

**Step 5: Selection of participants**
Which stakeholders should participate in the research project?

**Step 6: Stakeholder integration in the research process**

**Figure 3.2: Stakeholder analysis steps (adapted from Lelea et al., 2014, p. 4)**

Through field observation and initial contacts at the local markets, the actors who were active in the primary markets were identified and other connected actors were established through the 'snowball technique'. In total, 83 individuals and 19 organizations were identified. At the preliminary stage of the fieldwork, a list of 30 active traders was prepared and the full time long-distance traders with high frequency of trading activities were selected for interview. Thereafter, information was collected from other categories of traders with whom they were linked.

The data collection consisted of

1) Multi-stakeholder and intra-stakeholder[2] meetings with traders (n=8) and pastoral producers (n=14) to identify problems associated with specific actor categories;

2) Field observations on 36 market days in Korr (20), Illaut (9), Merille (3) and Nairobi (4) markets;

3) Informal dialogue with traders to learn about recent developments in the market and their sales experiences; and

4) Narrative interviews (Schuetze, 1977; Bauer, 1996) with 20 full-time traders of different categories were used to learn about the respondent's trading history, important events in their life story, their routine activities and interactions between actors along the chain.

A thematic coding based on the actor categories, activities of the actors and relationships in the chain was developed. Each category further contains sub-codes. This coding was applied to the transcripts and all written materials using RQDA® qualitative data analysis software.

**Study 2**

The data for this study was collected between July 2015 and November 2015. Semi-structured interviews were conducted with producers and local traders to collect information on i) information required to do a specific activity; ii) sources of information; iii) constraints to market information exchange; and iv) ideas for improving information flow in the value chain. In total, 15 producers and 25 traders were interviewed. All traders who regularly visited local markets were identified and invited for interviews. At the markets, producers from different settlements (locations) within the study area were also identified and purposively selected for interviews. Subsequent interviewees were identified through the snowball technique. Interviews lasted on average approximately 45 minutes. These interviews were complemented by other methods such as narrative interviews with 4 traders to identify their information needs and gaps. Furthermore, secondary data on weekly prices from March 2012 to December 2015 for four grades of goats at the Kariobangi terminal market in Nairobi from March 2012 to December 2015 were obtained from Kenya Livestock Marketing Council (KLMC). Additional written materials were obtained from observations and informal conversations with the traders and registered in field notes at the end of the market days. Eight audio records from the individual semi-structured interviews were fully transcribed, complemented by four narrative interviews and field notes.

For data analysis, a thematic coding frame was developed with four main categories relating to the study: activities, information needs, information sources and gaps. Each category further contains sub-codes. This coding framework was applied to the transcripts and all written materials using RQDA® qualitative data analysis software.

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[2] Intra-stakeholder groups consist of participants from one stakeholder category only (e.g. traders only or producers only).

**Study 3**

The quantitative data used in this study were collected between July 2014 and October 2016, over a period of 12 months. The traders were selected based on the frequency of their trading activities and their ability to keep regular records of the trips. The traders were trained to systematically record the data per trip in a booklet. Overall, 84 transactions were obtained from long-distance traders (59) and inter-local market traders (25). These contained data on i) number of sheep and goats bought and sold; ii) the market of origin and destination; iii) amount of working capital invested per trip; iv) the value of total sales; and v) disaggregated marketing costs. In addition, secondary data on the number of animals sold at the Merille and Illaut markets were obtained from the non-profit organization 'Food for the Hungry, Kenya' (FH Kenya). This information was collected for all market days between March 2014 and June 2015 and was used to analyze the sales at both markets. A budgetary analysis was conducted to calculate marketing costs and traders' profits from the data (formulas are presented in Chapter 6).

Table 2 gives an overview of the research aim of each study that is part of this thesis including research questions, data collection and methods of analysis*.

**Table 2 : Summary of the research structure, data collection and analysis**

| Research purpose | Research questions | Data collection | Data analysis |
|---|---|---|---|
| **Article 1: Manoeuvring through difficult terrain: how local traders link pastoralists to markets** | | | |
| To examine the activity system of traders and to differentiate the roles of different types of local traders in linking pastoralists to markets. | What are the types of local traders and their roles in sheep and goats supply chains? What are the activities performed by the actors and their interactions? | Stakeholder analysis<br><br>Narrative interviews<br><br>Stakeholder meetings<br><br>Focus group discussions<br><br>Field observations | Content analysis<br><br>Coding based on the actor categories, actors' activities and relationships in the chain<br><br>Analysis of text resulting from full transcriptions of 15 narrative interviews |
| **Article 2: Making decisions without reliable information: the struggle of local traders in the pastoral meat supply chain** | | | |
| To assess relationships between actors in sheep and goat supply chains in northern Kenya, with special attention to information flow along the chain; | What is the market information needed by actors to perform activities in the supply chain? How do the actors obtain their market information? And what are the existing market information gaps that constrain marketing decisions? | Semi-structured interviews with livestock producers and different categories of traders<br><br>Observation at livestock markets<br><br>Field observations<br><br>Narrative interviews<br><br>Secondary data (weekly prices in Nairobi market for 2012-2015) | Content analysis<br><br>Four categories of thematic coding: activities,<br><br>information needs, information sources and information gaps<br><br>Analysis of text from Full transcriptions of 8 interviews, 4 narrative interviews and field notes |

| Article 3: Elusive Profits: Understanding economic performance of local traders in the pastoral small ruminant supply chain in Northern Kenya | | | |
|---|---|---|---|
| To analyze economic performance in pastoral sheep and goat supply chains with specific focus on local traders' marketing costs and profits. | What are the marketing costs and profits along different marketing chains and for different trader categories? | Transaction records of the traders on the number of sheep and goats bought and sold, the market of origin and destination, amount of working capital investment per trip, the value of total sales and marketing costs | Budgetary analysis to determine the marketing costs and the net-profits · |

\* Elaborated information is provided in each respective chapter.

## 3.3  Thesis outline

These first three chapters of this thesis introduce the study background and aim, literature review and methods for data collection and analysis. The subsequent part of the thesis is structured as follows: in chapter 4-7, results of the study are presented, with each chapter dedicated to a specific objective of the study. Chapter 4 examines the activity system of traders and differentiates the roles of different types of local traders as they streamline the flow of sheep and goats to different markets. Market information flow, specific information needs of the producers and local traders and information gaps constraining marketing decisions of producers and local traders are assessed in Chapter 5. In Chapter 6, the profitability of small ruminant trade is assessed by calculating marketing costs and net-profit of the long-distance traders and inter-local market traders. A general discussion of the results and conclusion is presented in the final chapter of the thesis (Chapter 7).

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# 4 Maneuvering through difficult terrain: how local traders link pastoralists to markets[3]

## Abstract

Trade in livestock is the major source of income for pastoralists, traders, brokers, transporters and other actors in pastoral meat supply chains. Projects to "link pastoralists to markets" in rural northern Kenya, place an emphasis on pastoral producers without adequate understanding of other inter-related actors whose activities and relations make up the connection to primary, secondary, regional and terminal markets. In this article, sheep and goat supply chains originating in Marsabit south are analysed as a human activity system composed by the actions of supply chain actors and shaped by the relations between them. The geographically confined areas from which local markets receive the supply of sheep and goats are conceptualised as a "producer catchment area" depicted as finely branched tributaries through which livestock are moved towards terminal markets. A stakeholder analysis resulted in the identification of six categories of local traders who connect with other actors in both local and long-distance supply chains to sustain the movement of sheep and goats to markets. The categories of traders are distinguished by different demands in travel, labour, working capital, risk exposures, and relations with other actors. In order to deal with variable and uncertain supply, local traders harness their social relations with other actors in the supply chain. However, local traders are at the highest risk for loss due to fluctuations in demand at the terminal market, as they depend on market information through brokers and lack relations to clients at the terminal market. This research demonstrates how systematic analysis of activities performed by actors, the interconnected activities linking them, and their relationships can offer insight for improved supply chain coordination.

## Keywords

pastoral livestock production; goats; supply chain; northern Kenya; activity links; actor network

## 4.1 Introduction

Rural northern Kenya is part of the Arid and Semi-Arid Lands (ASALs) where communities rely on pastoral livestock production for their livelihoods. With intimate knowledge of their rangelands, the pastoral communities manage their landscape to enhance livestock production, through strategic mobility to take advantage of patchy and ephemeral rangeland resources (Wario, et al 2016; Kratli et al. 2013).

The importance of livestock trade in light of poverty reduction and food security goals has attracted considerable academic research in northern Kenya, particularly from the 1990s

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onwards (Kerven 1992; Ensminger 1996; Barrett, et al 2006; Barrett et al. 1998; McPeak and Little 2006; Barrett and Reardon 2007; Mahmoud 2008; Iruata, et al. 2015; Rich et al. 2011; Bailey, at al 1999).

Although well-functioning livestock markets can offer opportunities for better returns and reduced vulnerability among pastoral households, this is not without challenges. Multiple structural issues affecting livestock trade have been identified such as high transaction costs (Barrett, et al. 2006; Bailey, et al. 1999; Ensminger 1996), information asymmetries and weak physical infrastructure (Bailey, et al 1999; Barrett, et al. 2006), and weak live-stock marketing policy (McPeak 2006). Recommendations include better market coordi-nation through improved market information on animal-characteristics (Stuth et al. 2006; Radeny et al., 2006) and timing of market days or auctions (Green et al. 2006).

These challenges and various government and international development interest to re-solve them, gave way to development projects s in northern Kenya to "link pastoralists to market", particularly, in recent context of shifting donor priority away from food aid and direct-cash transfers. An example of a project with activity in northern Kenya is a USAID-sponsored development program (worth 20 million USD) launched in 2013, "Re-silience and Economic Growth in the Arid Lands–Accelerated Growth"[4].

However, the success of these projects to link pastoralists to markets remains limited. They tend to fail in both macro and micro dimensions; from the 'macro' due to limited contextualisation of how the livestock supply chain functions in the broader political economy, and from the 'micro' due to lack of understanding of the specific activities of actors and relations between pastoralists and local traders who shape the supply chains. The emphasis on marketization must be embedded within the broader social context in which both formal and informal exchange create an interplay of social and material prac-tices that ultimately constitute economic processes within pastoral systems (Gertel and Le Heron, 2011).

Livestock traders play a key role in linking the communal subsistence and market econo-my in pastoral areas (Konaka 2001, p.63). In the past, livestock traders in Kenya were mainly from the Somali ethnic group, operating in both the northern and southern range-lands. Only more recently members from the local ethnic groups became traders, such as Maasai traders in Kajiado (Quarles van Ufford and Zaal 2004, p.128). Based on a histori-cal review, Quarles van Ufford and Zaal (2004) found that shared ethnicity and social group among these Maasai traders are used as social and cultural capital to build cattle trade network based on trust. Similarly, based on empirical research with Burji cattle trad-ers in Moyale, Marsabit County, Mahmoud (2008, 2011) found that trust is leveraged in social relations to enable them cope with diverse trade risks. He identified trust-based re-lationships, individually-based trading partnerships; informal cash transfer systems and membership in livestock trader associations as strategies used by the traders. Based on an-thropological fieldwork with Samburu traders, Konaka (2001) differentiated 'market trad-ers' who are mainly from the Kikuyu ethnic group and 'local traders' from the Samburu. Among four strategies for profitability identified among these local traders was a tem-poral shift between the herding and trading activities to minimize losses during different

climatic seasons and varied market conditions (Konaka 2001). Most studies of pastoral livestock traders focus on the cattle traders, including the recent study of (Little et al, 2014). Focused specifically on sheep traders in Kajiado, Mtimet et al. (2014) evaluated decision-making and found that breed was considered to be the most important attribute for profitability. Among their conclusions, they asserted that, "traders' role is vital in the development of the value chain" (Mtimet et al. 2014, p. 71).

Previous studies in pastoral regions of Kenya have focused on either a specific market or on a segment of the pastoral livestock supply chain without considering the connections of the entire chain. To address this gap, the aim of this paper is to examine the activity system of traders and to differentiate the roles of different types of local traders in linking pastoralists to markets. We identify activities performed by different categories of traders and their relationships with other actors that both facilitate and sustain the activities. This study shows how the chain is currently functioning and reveals key challenges identified by different chain actors.

## 4.2  Theoretical framework

For our action research to be scientifically grounded, we needed a theoretical framework that place an emphasis on the views of the people with whom we would collaborate in order to identify improvements that they considered actionable in their specific context. We chose an actor-oriented approach to system theory with an emphasis on the activities and relations that link different supply chain actors into a functioning system.

System theory is used to analyse the interactions between parts in order to understand the relations that form an entity (Von Bertalanffy 1972; Chikere and Nwoka 2015). Checkland, 1985, describes a human activity system as composed of interacting activities performed by individuals and groups of individuals. Human activity systems are established and maintained by human actors through their activities (Argyris and Schön, 1978; Mingers, 2006; Kaufmann et al., 2013). Human activity systems specific to professions in the livestock supply chain include, livestock rearing (i.e. the activity system of a livestock producer), trading (i.e. the activity system of a trader), etc.  A supply chain represents a complex network of business entities linked across production and consumption boundaries (Liu and Guan, 2014) spanning across rural and urban areas. When considering such business entities as professional activity systems, the supply chain can be analysed as a human activity system (Vrijhoef and Ridder 2007; Rigby et al. 2000).

An actor-oriented perspective lends itself to bringing forward the views, interests and values of the actors involved in a system to identify the room of manoeuvre that they perceive within the structure. According to Giddens (1984), actors draw from specific structural rules and resources to produce social systems. Within these, we find, for example business networks composed of actors and sets of political-economic structures that influence market rules. Building on Giddens' argument, Long combined structural and actor perspectives to develop an actor-oriented approach (Long 1990; Long 2001), with a focus on the agency of the involved actors. An actor-oriented approach places emphasis on the central role of human action and understanding of the "lifeworlds of different social groups" (Long 2001, p.23), thereby drawing attention to: i) how  actors are organized in social groups and networks (Long 2001), ii) actor strategies and choices to interpret

choices in complex negotiations between individuals and groups with different interests (Long 1990), iii) the structural factors that constrain or enable choices pursued by actors (Long, 1992 in Long 2001). In the supply chain, each actor has a specific social-economic position, function and interest such as in their production and marketing activities (Osei-Amponsah and Visser, 2016). Drawing on stakeholder theory, we have differentiated actors into primary actors whose activities directly constitute the system (these actors have their hands on the product) and secondary actors who influence the room of maneouvre of the primary actors.

However, each actor operates in connection with others to create a network that defines the types of relationships and exchange that emerge (Long 2001). Håkansson and Snehota (1995) have connected the activity system with closely related aspects of the actor relationship across business networks. They conceptualized markets-as-networks by integrating actors and activities for analysis of business relationships, as three layers including: activity links, resource ties and actor bonds. Their emphasis is on the importance of understanding the interconnections between the different layers to explore the possibility for developing more economically effective links, ties and bonds (Ibid, p. 34).

Human activities can be analysed as relationally embedded within social and institutional contexts (Muller and Perret-Clermont, 2014; Klein and Juhola, 2014). As a purposive system, human activity systems bring to the forefront actions undertaken by people within a particular context with specific motives and goals (Restrepo, et al. 2016; Argyris et al. 1985). Activity system analysis conducted with participatory tools can lead to a learning process in which involved actors evaluate their practices and identify ways that they can change their work to meet their goals (Yamagata-Lynch, 2010a; Restrepo et al., 2016). Hence, the outcome can be applied to improve practice. As activities are constitutive of systems, transformations can result from actors modifying and creating new practices (Scribner, 1997, p. 16 in Yamagata-Lynch, 2010b; Kaufmann and Hülsebusch, 2015). The approach also enables an understanding of the systemic contradictions and tensions which are couched in social-cultural practices which can be difficult to identify and describe with other methods.

Against this theoretical background, understanding a supply chain requires research on a specific business context, the involved actors, and how and when various activities are performed. These activities are shaped by the interdependencies between activities and the relationships among actors.

## 4.3  Material and methods

### 4.3.1  Study area

This research was carried out in northern Kenya, situated in the lowlands of Laisamis sub-county, in the southern part of Marsabit County bordering Samburu County (Figure 4.1). The climatic conditions in Marsabit County is characterised by bimodal rainfall, leading to four seasons: the short and hot dry season, starts in January and ends with the long rainy season from March to May; the long dry season commences in June and lasts until November; followed by the short rainy season until the end of December. However, the seasonal patterns have become more erratic leading to frequent failure of rainy seasons.

The area experiences an annual average temperature of 20.1°C. (County Government of Marsabit, 2013)

The new highway linking Marsabit and Isiolo towns will ease the movement of livestock to regional and terminal markets. However, the lowland roads remain unpaved and impassable during rainy seasons, especially for non-four-wheel drive vehicles. Towns along the Isiolo - Marsabit highway, have more economic activity and are better connected to mobile network coverage than other towns in the region.
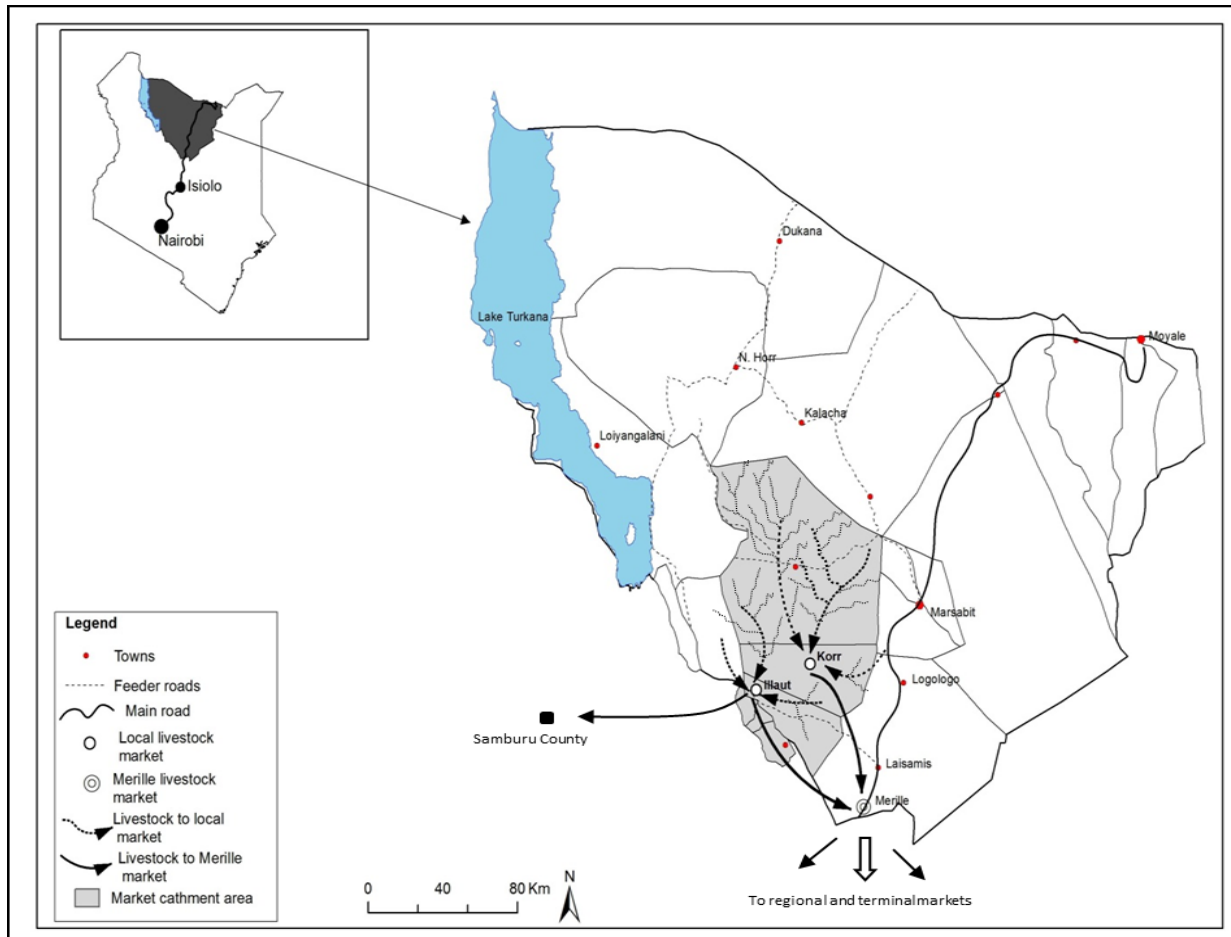


**Figure 4.1: Study area**

Laisamis sub-county has a land area of 20,290.5 km2 and is home for Rendille and Ariaal (bilingual in Samburu and Rendille) pastoralists who rely on livestock production. Compared to other areas in Marsabit County, the population of sheep and goats in Laisamis sub-county is relatively high with more than 458, 172 (County Government of Marsabit, 2013, p.69). Sheep and goats are widely traded in local markets for income to meet regular household needs. Because of relatively vibrant local markets in Laisamis sub-county (Chabari and Njoroge 2015, p. 36) the Rendille have high livestock sales compared to other pastoral groups in Marsabit. However, until ten years ago most livestock trade in the area was done by traders from the Burji ethnic group and so the increase in Rendille local traders has changed the social relations in a process that is still unfolding and will be further explained in our results and discussion.

## 4.3.2 Data collection

We collected information on the type of actors, their activities, and the relationships between them. We started with data collection required for a stakeholder analysis (Lelea et al. 2014). We followed the steps in figure 4.2, selecting first the sheep and goats supply chain as a human activity system on which our study focuses, followed by identification and characterisation of primary actors who perform specific functions in the supply chain. In this second step, we commenced with the literature review from which we identified an initial list of 83 individuals and 19 organizations working in the sheep and goat supply chains.

During exploratory research, July - August 2014, the names and contact details of individuals in different actor groups were gathered starting with observation and initial contact at the markets. A snowball technique was used to investigate other connected actors. Stakeholder identification along the supply chain started from "upstream", i.e. the pastoral producer areas and then followed "downstream" up to the terminal market in Nairobi. In order to see whether important actors were omitted, one multi-stakeholder meeting with 28 stakeholders that included livestock producers, local traders, local butchers, local brokers and representative from livestock marketing groups, county government and non-governmental organisations was conducted.

In the third step, intra-stakeholder[5] meetings were conducted with traders (8 workshops) and producers (14 workshops) to identify problems related to specific actor category. Thereafter secondary actors with an interest and influence on the specific problem in livestock marketing were identified. After the identification of the actors, the finals steps were the selection and integration of participants in the research collaboration.

Through this process, we identified 14 preliminary actor categories, including pastoral producers, local traders, brokers (livestock & lorry), transporters, research institutions, financial institutions, county governments, Non-Governmental Organizations (NGOs), butchers, meat distributors, market committees, meat processors, meat exporters, and consumers.

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[5] Intra-stakeholder groups consist of participants from one stakeholder category only (e.g. traders).

| Step 1: Selection of a human activity system for research focus |
| :---: |
| e.g. a particular food supply chain |

| Step 2: Actor identification and initial characterization | |
| :---: | :---: |
| Identifying actors and their roles, objectives and scope of action in the human activity system | Reflecting on social difference |

| Step 3: Formulation of a specific problem or issue to be addressed in the research |
| :---: |
| To increase benefits to the actors in small ruminants supply chains through improved information flow and coordination of market activities |

| Step 4: Stakeholder identification & characterization | | |
| :---: | :---: | :---: |
| Who has a 'stake' with regard to the problem/issue and why? | Who has power, knowledge and resources? | What are the relationships between stakeholders? |

| Step 5: Selection of participants |
| :---: |
| Which stakeholders should participate in the research project? |

| Step 6: Stakeholder integration in the research process |
| :---: |

**Figure 4.2: Stakeholder analysis steps** (adapted from Lelea et al., 2014, p. 4)

From June 2015 until January 2016, we collected qualitative data on traders' activities and relationships. Field observation was done on 36 market days, including Korr (20), Ilaut (9), Merille (3) and Nairobi (4) markets. During the visits, observations were made about trade practices, interactions between actors and the collaboration between different traders in undertaking their activities. The informal talks with traders also helped us to understand traders' recent sales experience, and new development in the market. These observations and conversations were registered in field notes at the end of the market days.

Through these regular visits to local markets, we established rapport with a number of traders who provided information to generate a list of 30 active traders in Marsabit South. We began our interviews with full time long-distance traders who were recognised in their pastoral community for having a high frequency of trading activities. At a later stage, information was collected from other categories of traders with whom they are linked. Overall, 20 interviews were conducted with different categories of traders (Table 3), including all 14 long-distance traders in Korr and Ilaut, 1 rearing-trader, 3 itinerant traders, and 2 inter-local market traders.

Interviews made were of narrative structure (Schuetze, 1977; Bauer, 1996). With this method, we learned the respondent's trading history as they recounted important events in their trading life from the day of their entry into the trade. Thereafter follow-up questions detailed their routine activities and relationships with other actors along the chain.

These individual interviews were complemented by three focus group discussions (FGD) which brought together different traders, market officials, local brokers and livestock producers at their respective chains in Ilaut and Korr town. In these groups, they discussed livestock marketing activities, problems and relationships in their marketing chains. All

group sessions and interviews where recorded with an audio recorder and 15 interviews were fully transcribed.

## 4.4 Results and discussion

### 4.4.1 Characterising the sheep and goat supply chains in Marsabit south

The aim of this section is to characterise the current sheep and goat supply chains in Marsabit south. Within Marsabit south, two types of supply chains can be distinguished i) local chains which include the local markets and their corresponding producer catchment areas and ii) the long-distance chain which connects local markets to the terminal market in Nairobi. The structure of these supply chains is similar to those in other pastoral areas with poor connections to urban areas (Nunow, 2000; Turner and Williams, 2002). In our research, we categorised livestock markets based on geographical location starting in livestock production areas with the local markets that are differentiated as primary and secondary markets. Regional and terminal markets are located away from these producer areas.

**The local chains**

As reported in interviews, local traders may purchase goats directly from individual homesteads in villages, at water points and grazing areas. The three local markets within the administrative boundary of Marsabit south include two primary markets in Ilaut and Korr, and one secondary market in Merille. The primary markets are part of a 'tributary' within the producer catchment area and can serve as first selling points for pastoral producers and as collection points for local traders. The secondary market in Merille draws sales from a wider area in Marsabit south.

These local markets differ by livestock species traded. The Korr market is exclusively focused on the sheep and goat trade. While the Ilaut market predominantly has small ruminants, occasionally there are also cattle and camels. Cattle or camels are usually bought by pastoral producers for herd reproduction and, in a few instances; local traders will acquire them to barter sheep or goats in future. At the secondary market in Merille cattle, camels, small ruminants and donkeys are traded. It serves as a collection point for external traders who originate outside Marsabit south to purchase and transport livestock to other regional markets in Isiolo, Meru and Archers Post (within a radius of 300 km) or to the terminal market in Nairobi (600 km).

The local markets in Ilaut and Korr are held on different days, accommodating the itineraries of local traders and improving the number of participating producers. The market day in Ilaut is every first Tuesday of a fortnight while in Korr it is every Saturday.

**The long-distance chain**

In contrast to the traders who commonly trekked "on the hoof" (which is the term used when livestock and accompanying herders walk long-distances) to local markets or occasionally to markets in a neighbouring county, traders taking livestock to a market requiring long-distance travel usually do so by truck. These traders must then have enough

sheep and goats to fill a truck (150 are indicated on the movement permit needed for trucking), as there is a fixed price for the permit and the lorry, irrespective of the number of animals.

The secondary market in Merille is used by both local traders from the producer catchment area, as well as by external traders and is an important last point in which trucks must be filled before making the 600 km journey to Nairobi. Merille has a strategic location resulting in high numbers of animals transacted at the market because i) it is easy to access with lorries along a major north-south road connecting to Isiolo and then further south to Nairobi ii) is situated at the confluence of two counties (Marsabit and Samburu) and in proximity to the dry season grazing areas.

## 4.4.2  Categorising local traders

The movements of sheep and goats between markets are facilitated by different categories of local traders (Table 3). These traders are differentiated based on the distances covered and their purchasing and selling points, as well as by the amount of working capital required and risk exposure influencing their strategies.

**Table 3: Categories of local traders**

| Trader category | Purchasing from | Selling to | Strategy |
|---|---|---|---|
| Itinerant traders (I) | Pastoral producers at homesteads, water points or grazing areas | Local long-distance traders at primary markets or external traders at the secondary market | Trek across vast areas in groups to take advantage of price differentials between local markets and pastoralist homesteads, villages or water points. In Korr and Ilaut, there are about 6-8 itinerant traders associated with each market. They also engage in barter trade when they meet a herd owner who may want to exchange, for example, a donkey for goats. |
| Rearing-traders (II) | Pastoral producers at homesteads, water points or grazing areas | External traders at the Merille market who generally have direct links to buyers | Buy similar sizes of immature goats at an average price during dry seasons and rear them for a period of time to sell either once or twice a year after they gain weight and mature. |
| Butcher-traders (III) | Pastoral producers at local markets | Households, schools and restaurants | Buy relatively few but reliable numbers of sheep and goats every market day. The 5 butchers in Korr share premises and slaughter in an organized rotation, with each butcher allocated a specific day. |
| Stationary traders (IV) | Pastoral producers at local markets | Long-distance traders | Purchase animals very early on market days and resell them at a later hour in the same market. When they fail to recoup their purchase prices, they may graze the animals for a week or two before selling again in the same market. |
| Inter-local market traders (V) | Pastoral producers at local markets | External traders at either the Merille market or other regional markets | Take advantage of price differences between local markets. They link pastoral producers to external traders mostly in the Merille market or at the Lolguniani and Latakwen market in Samburu County. |
| Long-distance traders (VI) | Pastoral producers at local markets and directly from traders I, IV & V | Nairobi traders and clients via the broker (at the Kariobangi market in Nairobi) | Depending on the season, participate in taking about 2-4 trucks per month to Nairobi. Of the total 14 long-distance traders, most work in groups of 3-4, while only 3 work alone. |

Although long-distance traders may choose to employ strategies associated with other categories of traders, the converse is not difficult because of higher working capital required to enter the long-distance trade. Examples of how long-distance traders mix categories include, using the strategy of an itinerant trader when price differences between villages and local markets are attractive, buying sheep and goats to rear as part of their herd like a rearing-trader and operating butchery as second business line. Such combinations of trading strategies are important for long-distance traders, because of the precarity.

Local traders are part of an activity pattern that requires sequential coordination of activities (Håkansson and Snehota, 1995, p. 5). They move animals while purchasing them at specific locations (markets, water points, and homesteads) and at certain times (market days or agreed timing at fixed points), thus concentrate a spatially dispersed supply. The different transactions carried out by a variety of traders at the village level, local markets and the onward flow of sheep and goats to regional and terminal markets is represented in figure 4.3 as a finely branched net showing the point at which each trader is active and the broadening thickness of the tributaries depicting the increase in volume of the flow of animals from primary to terminal markets. Nevertheless, these varied connections are typically abstracted as a linear chain in most livestock marketing literature (IIRR, 2014; Juma et al. 2010; Pavanello, 2010).
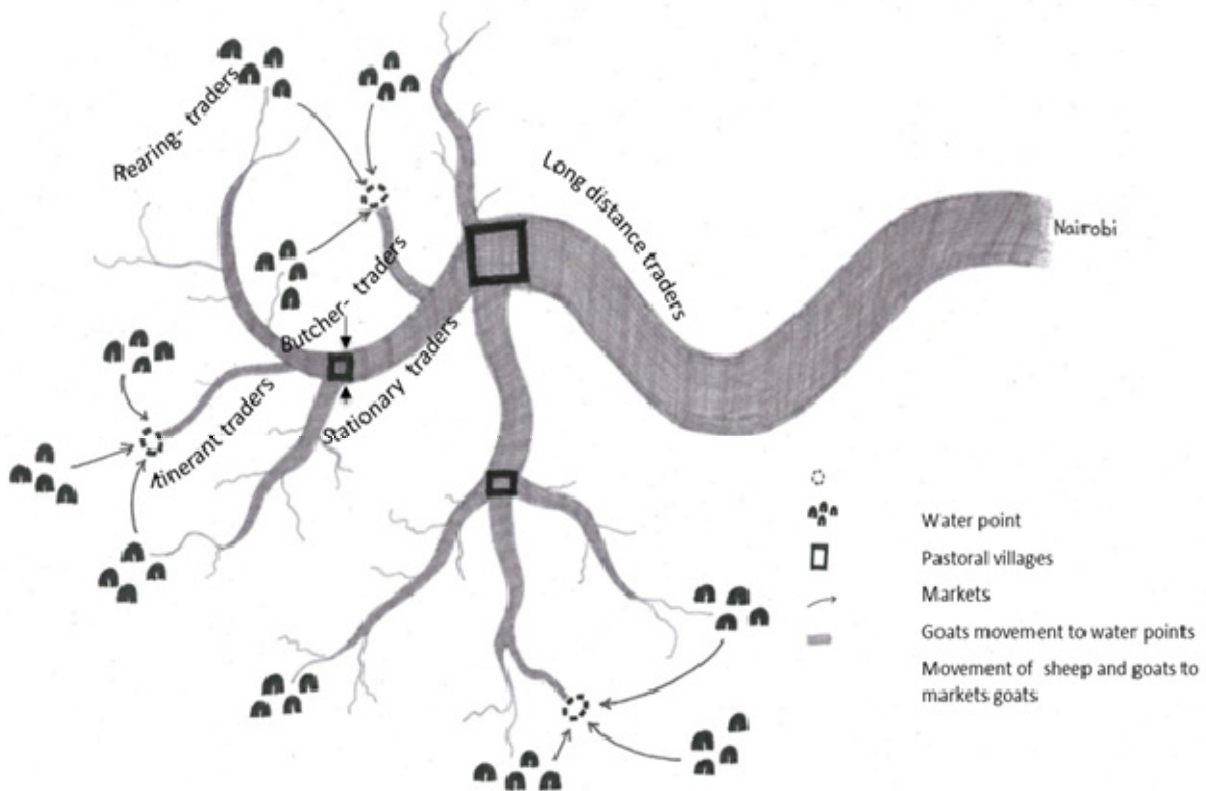


**Figure 4.3: Movement of sheep and goats from producer catchments to primary, secondary and terminal markets**

### Central role of local traders in the sheep and goat supply chains

Local traders occupy a central position in these trade networks in order to mobilise the movements of sheep and goats from producers to consumers. Figure 4.4 is illustrative of

connections between actors in the local chains and the link between primary, secondary, and terminal markets.
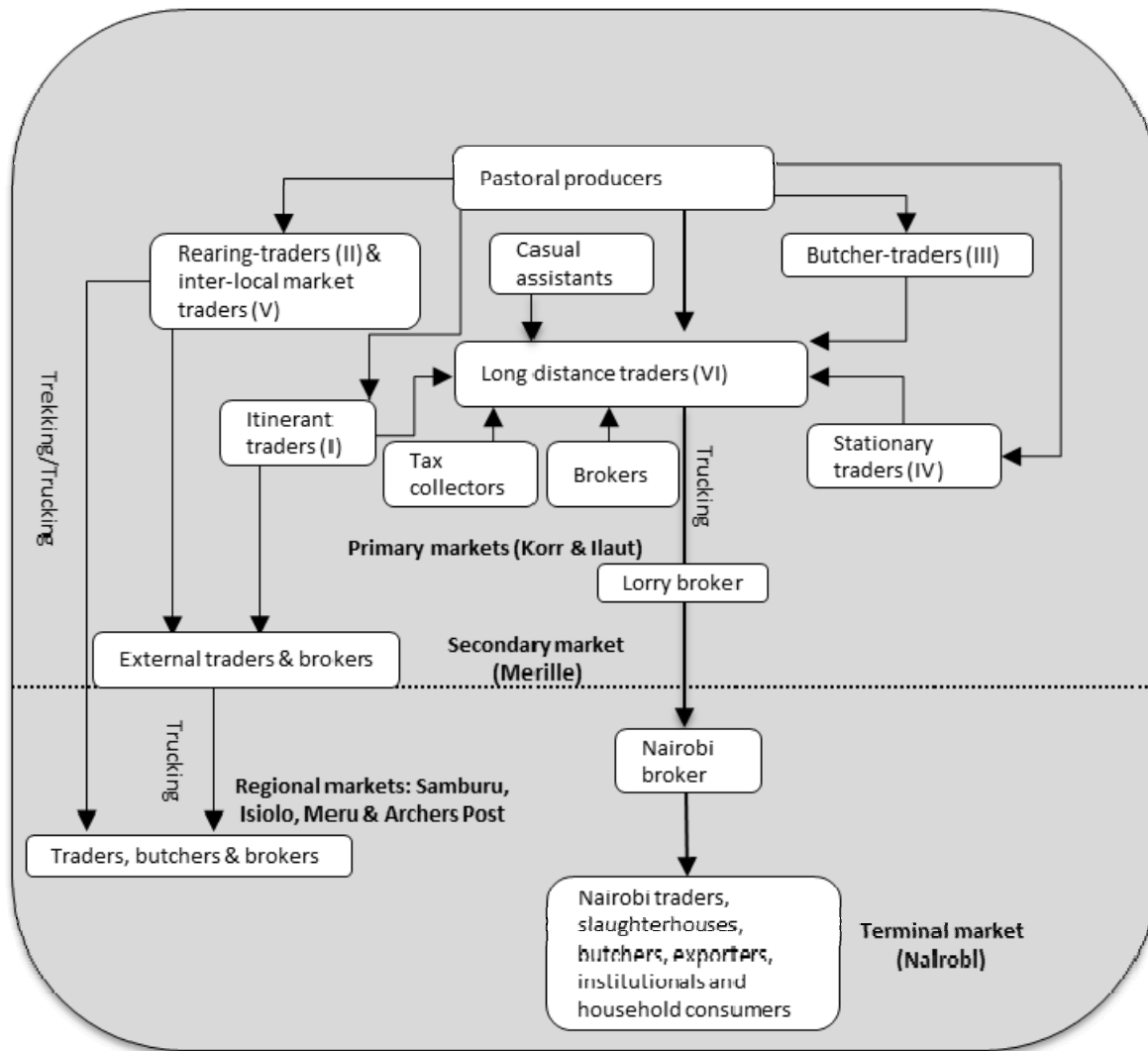


**Figure 4.4: Sheep and goat supply chains in Marsabit South**

Figure 4.4 also shows the positions of different traders and their connections to other actors. The information in this figure complements the findings discussed in table 3. Pastoral producers interact with all the different types of traders. A long-distance trader commissions a lorry broker to organize transportation. Upon delivery, a Nairobi-based broker organizes the final sale to different clients. However, the situation differs when pastoral communities have better connections to urban consumers. For example, the Maasai pastoralists from Kajiado who are relatively near Nairobi have more transportation options including refrigerated trucks and links to butchers and abattoirs (Zaal and Ton 1995)

## 4.4.3  Activities of local traders

In this section, we present common activities undertaken by local traders in the six categories and highlight differences among them. The activities are listed according to the stages of their tasks and sub-activities are explained using quotes from the traders (table 4).

**Table 4: Description of the activities of local traders**

| Stage of Activity | Description of Sub-Activities | Trader categories |
|---|---|---|
| Purchase | Choosing the purchase area: *"When I purchase, I talk to people to get the information I want e.g. when I hear that there is a Manyatta [village] that doesn't have food and would likely sell their goats[6], I rush there"* (IT81, Ilaut). | I&II |
| | Assessing the quality and quantity of goats on offer: *"First, I make a market lap and get the information…"* (IT81, Ilaut). | I-VI |
| | Selecting sheep and goats: *"I usually look for the goats I want, assess their sizes, collect them together and call the owners to agree on the price"* (IT81, Ilaut). | I-VI |
| | Bargaining**:** *"I bought my first goat from a lady seller with an opening offer of 2700 Ksh. but I offered 1700, and then I moved up to 1800, and then she also dropped to 2500. Then I moved up again to 2000 for my final offer but she was not content. I told her I will add 100 on top and I walked away. Then she called me back and I bought the goat at 2100"* (L45, Korr). | I-VI |
| | Branding the animal and leading it to a separate pen in the market: *"We mark the goats as we purchase them…"* (L45, Korr). | III-VI |
| | Paying tax collectors. | I-VI |
| Movement & herding | Trekking 'on the hoof' to a collection point: *"...My colleague buying in the Ilaut market engages a herder who will trek the goats for one day to reach Korr and we pay him an agreed sum for the service on arrival"* (L45, Korr). | I, II, V & VI |
| | Herding and watering at the collection point, awaiting market days or transportation*: "As I buy, there is a herder who grazes them in the fields until we fill the lorry"* (L46, Korr). | I, II, V & VI |
| | Trekking the sheep and goats to the markets in Merille and Samburu County: *"After getting the required number of goats, I sometimes trek from Latakwen to Merille… which is 4 days of walking."* (IT81) | I, II & V |
| Transport | Contacting a Marsabit-based lorry broker: *"The lorry broker organises for us by telephoning the lorry owner or driver who just returned from their trip"* (L45, Korr). | VI |
| | Contacting end buyers or brokers, *"We have a common broker and every trader communicates with him, so he knows when they are on their way for prior arrangements"* (L47, Korr). | VI |

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[6] The pastoral producers and traders use the term goats to refer to both sheep and goats.

| | | |
|---|---|---|
| | Acquiring transit and health permits for the transportation: *"We ask the lorry owner to get the permit for transporting the goats to Nairobi and also pay for the health permit issued by the veterinary officer"* (L45, Korr). | VI |
| | Hiring sand loaders: *"When the lorry arrives, we engage two people who will put a small amount of sand in the lorry and we pay them a fixed amount for the labour"* (L45, Korr). | VI |
| | Calling a Nairobi based broker to inform him about travel plans. | VI |
| | Engaging a 'specialized' herder to watch over the animals in transit: *"There is a herder who will be with the goats until we reach Nairobi market. We usually pay him fixed amount"* (L45, Korr). | VI |
| Sale – at the Merille market | Contacting buyers in Merille prior to travel: *"I sell my goats directly to one client in Merille - a Burji trader. I call him and when he says, "Yes", I make a personal visit to the market to cross-check prices and also to show the sizes of my goats to him. Then I come back and trek to Merille"* (RT11). | I, II & V |
| | Assembling goats in one location supervised by traders. | I, II & V |
| | Negotiating with buyers and concluding the sale (occasionally through a local broker). | I, II & V |
| | Paying tax collectors. | I, II & V |
| Sale – at the Nairobi market | Paying market entry fee | VI |
| | Engaging a broker: *"After offloading the goats at the Nairobi market, we have a broker who helps us sell them. We pay him a fixed amount after the final sale"* (L45, Korr). | VI |
| | Organising with the broker to hire a herder: *"If we haven´t sold the goats by evening, we get a shelter where we pay an overnight fee per goat and the following day the goats have to be grazed by a paid herder"* (L45, Korr). | VI |
| | Reconciling accounting with the broker and confirming payment of funds prior to return travel: *"After I have counted the total sales, I sit with my broker to know my expenses, and then I give the broker and any person I have travelled with, their respective cash until I am through with all the deductions. After that, I either deposit my balance in M-Pesa or travel back with it"* (L46, Korr). | VI |

Activities of local traders are linked to those of other actors in the supply chain. 'Primary actors' are presented along with interconnected activities (table 5) that are embedded in the wider activity pattern spanning several actors (primary and secondary) in the supply chain. The activity links show both sequential and parallel activities that can be explored as part of: a larger series of activities necessary to enhance supply chain coordination (Håkansson and Snehota, 1995). Activity linking can be strengthened through reciprocal adjustment of activities to strike an economically advantageous position (Håkansson and Snehota, 1995, p. 60).

Currently, coordination of activities are formalised by trading at agreed upon locations and times on market days. Other additional and strategic coordination is not institutionalised, but mainly depends on personal arrangements of individual actors. However, according to traders, linking purchasing activities with sales would improve their decision making at purchase, because if the requirements of the terminal market clients were known at the time of purchasing livestock, they could undertake their activities efficiently and profitably.

In the absence of fixed contracts, there is short time validity of market information due to day to day price fluctuations at the terminal market. As it takes a minimum of five days to amass sufficient goats to fill a lorry along with the necessary permits, traders are subject to risk.

Despite the vast area, varying and unreliable offers, fluctuation of profits, and additional uncertainties and risks (such as droughts, epidemics and insecurity), the local traders manage to up-hold their trading activities, which is effectuated by relationships they have with other actors. However, their ability to continue is threatened by the strain of these fluctuations.

"I go and find there are no buyers in the market, so I am forced to sleep several days around the marketplace incurring costs such as paying accommodation fees at the lodge, grazing charges for animals to stay overnight, animal feed while waiting for the market and so many other petty costs. In such a situation, the expenditure is high. I was saying to myself, if I could have any other option such as another job, I could have left this business. But this is the only option I have so I am still in this business..." (L47, Korr).

**Table 5: Activity pattern of the sheep and goat supply chains**

| Primary actors | Pastoral producers | Local traders | Lorry broker | Lorry owner | Nairobi broker |
|---|---|---|---|---|---|
| **Activities** | 1. Herding & animal care<br>2. Walking the animal to the market<br>3. Negotiating & selling | 4. Assessing sheep and goats on offer<br>5. Negotiating & purchasing<br>6. Branding, paying taxes and moving to collection point<br>7. Walking to the destination market<br>8. Transporting by truck<br>9. Engaging herder to accompany the herd<br>10. Selling at end market | 11. Sourcing for lorry in Marsabit town<br>12. Negotiating transport charges<br>13. Paying & acquiring transit and health permit | 14. Agreeing with the traders<br>15. Loading sand<br>16. Loading goats<br>17. Transporting to terminal market | 18. Counting, recording & pricing goats<br>19. Negotiating with buyers<br>20. Engaging herder to watch over unsold goats<br>21. Collecting unpaid debts and accounting to the trader |
| **Secondary actors** | 1. NGOs & county government<br>2. Other producers<br>3. Local brokers & tax collectors | 4. Fellow traders<br>5. Casual assistants<br>6. Tax collectors, Herders<br>7. Fellow traders<br>8. Lorry broker<br>9. Herder<br>10. End market broker | 11. Lorry owner<br>12. Lorry owner<br>13. County government- revenue office and veterinary office | 14. Lorry broker<br>15. Casual assistants<br>16. Herder assisting in the lorry<br>17. Lorry driver | 18. Fellow brokers<br>19. Nairobi traders (butchers, hotels, bars, exporters etc.)<br>20. Herders<br>21. Nairobi traders |

⟷ Activities interconnecting two actors

→ Actor´s activity pattern

Number 1 – 21 Relates to corresponding activity number of connected primary actor

The strength of activity links directly influences the performance of the overall supply chain. As the efficiency of two actors (companies) in a relationship is inter-dependent influencing both of their profit margins (Håkansson and Snehota, 1995), in the example of local traders tightening either transportation or information exchange links can lead to mutual benefit. Therefore, the focus of table 5 is to establish activity interlinkages between the actors in the supply chain. This is an important step for improving the room of manoeuvre of the involved primary actors. The secondary actors whose activities influence the primary actors are indicated in third row of the table.

### 4.4.4 Actor relationships

In this section, we analyse the relationships between different local traders and actors in the sheep and goat supply chains. The interconnected activities (table 5) span those in the producer catchment area until the Nairobi broker. Respective relationships are built over time, the strengths of which have an implication on the quality of interconnected activities. Below, the different relationships between local traders and other actors are explained.

**Local traders – Pastoral producers**

The relationship between a local trader and a pastoral producer may start on a market day with a bid, counter bid and final offer. Since most producers repeatedly come to the same market over the course of a year, they develop contacts with particular traders. Relationships might develop such that on a market day, a pastoral producer might contact a particular local trader to be considered for an early sale. Outside market days, this relationship is used by the traders when sourcing for more goats to fill a truck. This relationship can be vital in a context of a spatially dispersed goat supply and scarce supply information.

This relationship can go beyond a market transaction when other types of 'emergency support' are offered. When a strong relation is built up, a trader can advance credit to a pastoral producer. This applies when the producers have their herd located in distant dry season grazing areas. In such circumstances, the trader might lend the producer cash to be reimbursed later with an equivalent number of sheep or goats. Due to close clan or tribal ties, such borrowing is based on trust and may involve clan elders to assure recovery.

*"In the past, we used to only sell to external traders [from non-Rendille ethnic groups], often with many challenges - language barriers, limited room for bargaining better prices. Now, with the entry of Rendille traders, we have leeway to push them to give us better offers since they understand our background situations. Even in the case that our animals are far away and we have pressing need like medical, we can get a loan from traders from our village and pay them back later. This was not possible before"* (FGD with producers, Namarei).

In the local chain, pastoral producers and different categories of traders share ethnic identity. This is a rather recent development, as up to around the year 2005, trade in the area was dominated by Burji traders from Marsabit central. The change is explained by local traders as now being able `to benefit their own people´, a sign of ethnic-based solidarity. Belonging to the same community also increases the options for recourse when a problem arises. The practical possibility of connections from the actors' networks combined with a

strong bond based on common ethnic identity helps them to manoeuvre in the challenging terrain. For instance, long-distance traders draw on relationships with itinerant traders and producers to deal with supply uncertainty and with the broker in Nairobi to deal with demand uncertainty. Ethnicity and trust were also central to traders´ livestock trading strategies in other research (Quarles van Ufford and Zaal, 2004; Quarles van Ufford, 1999).

However, relationships are not always positive despite common ethnic identity. Some producers describe the local traders as manipulative in terms of prices at local markets. Recently as the number of local traders increased, external traders ceased coming to the Ilaut and Korr markets.

*"During wet seasons, we have the choice of postponing sales but in dry seasons, we are under pressing need to sell. In such situations, there is naturally a high supply of sheep and goats in the local market, with only few local traders. This results in traders giving low prices… or declining to buy from us altogether. Since we have a pressing problem that cannot wait, we finally sell at the terms favourable to local traders..."* (Producer, Namarei).

**Long-distance traders – Itinerant traders**

Long-distance traders develop relations with itinerant traders who sell high numbers of sheep and goats in the local market or at their homestead. Establishing relations with itinerant traders is beneficial to long-distance traders because they can quickly amass the required animals and thus reduce the effort and time needed to fill a lorry. Long-distance traders seldom depend on brokers at local markets for information on who is willing to sell. Maintaining regular contacts with a group of itinerant traders, results in established relations whereby the long-distance traders can contact the itinerant traders before market days to view the animals and make early purchases. This is common especially when the latter has a reputation for selling a high quantity and quality goats. Through this relationship, the trader can pass information regarding the types of goats to be bought by the itinerant trader for a subsequent market day. However, the increase in the number of local markets and regularly occurring market days has reduced the reliance on itinerant traders. Itinerant traders also prefer selling on market days to improve chances of profitable sales by choosing between different traders.

**Long-distance traders – Butcher-traders**

Local traders have established reciprocal relationships with local butchers who slaughter sheep and sell to pastoral households in and around towns. For instance, when a long-distance trader learns that there are low prices in the terminal market, he may make choice to leave some animals with the butcher to slaughter and receive the money after the meat is sold. Also, in a situation where an animal has been injured during loading and is unlikely to reach the terminal market alive, the local traders will sell through the local butcher. The butcher can benefit from this relation by occasionally asking the long-distance trader to transport sheep and goats to the Nairobi market and sell them on their behalf. This is done to diversify the butcher's business.

**Long-distance traders – Casual assistants**

Some activities of long-distance traders require casual labour, such as to assist in the market, when loading the animals and during transportation. These assistants can be recruited through relatives (or extended kinship), traders, producers, or tax collectors. The level of trust required to select a suitable person depends on the task. For instance, selecting the person to trek animals requires a high degree of trust. In such a case a member of the extended family or someone from the same clan is selected. In contrast, when activities are performed in the presence of traders such as in the markets, then a lower degree of trust is required and the person can be recruited from any available assistant at the market. Generally, the ease of building relationships at the local chains between different actors and the local traders within local chains ease their purchase activities.

**Long-distance traders – Lorry broker**

Long-distance traders must establish and maintain relations with a lorry broker or lorry driver who are important links to lorry owners that are all based in Marsabit town. All long-distance traders establish relationships with a lorry broker who performs paid specialised services such as providing information on available lorries, transport fees, lorry drivers and then establishes prior agreements with lorry owners for transport from the local market to Nairobi. The lorry broker may also organise for the required transit- and animal health-permits when this is not done through the lorry owner.

*"First I purchased goats from the Korr market and the number was insufficient to fill a truck. So, I went to the Ilaut market to buy more. After I had acquired the number that is equivalent to one truck, I communicated with a lorry broker in Marsabit town to order a lorry and permit to transport the goats"* (L47, Korr).

Alternatively, some traders establish relationships with a lorry driver after repeated engagements and such established relations have an organisational advantage to the trader to respond in time when information about 'good prices' is communicated by brokers based at the terminal market in Nairobi.

**Long-distance traders – Nairobi brokers**

The Nairobi brokers mediate transaction between sellers and buyers. They act as an intermediary to negotiate the sale of animals directly with the clients, i.e. without active involvement of the trader. This relationship offers the following advantages i) the wide client base of the Nairobi broker to realise fast sales and thereby avoid additional costs to the trader ii) follow up on debts in a situation where some customers only pay the deposit for the sale and the balance is to be remitted later.

"Even when he gives some goats to a buyer before they are paid, that is none of our business, and it is him to deal with it because there are some buyers who fear carrying money to the market. They will agree with the broker and the money will eventually reach me" (L47, Korr).

The importance of the broker in establishing creditworthiness or reliability of the customer is also documented in other studies (Mahmoud 2008; Cohen 1965; Hill 1966). Cohen (1965) describes brokers as both insurer and risk taker in complex cattle markets characterised by variability in buyers. They guarantee eventual payment because even in situa-

tion of default by the buyer, they will take responsibility for paying the traders. Furthermore, interacting with multi-ethnic clients can pose language barriers and expose local traders to greater risks because they are outside of the regional network of long-distance traders.

Therefore, for long-distance traders, it is currently inconceivable to sell sheep and goats without engaging a broker in Nairobi because the buyers in Nairobi are 'simply faceless' to the traders from the study area. All long-distance traders from Marsabit south recruit the same broker because the contact is passed through positive referral from one trader to another. This broker from Marsabit County is given preference because he 'shares a common region of origin'. When a long-distance trader visits the market for the first time, they prefer to be accompanied by an experienced trader who will make an introduction to the broker.

## Local traders – Secondary actors

The regulatory requirements associated with the long-distance movement of livestock expose long-distance traders to secondary actors such as law enforcement officers and tax collectors. Transportation of the sheep and goats with the lorry is always done during the night. However, in Kenya, transportation of animals between 6pm and 6am is forbidden by law, under legal notice 119 of 1984. If animals would be transported as per the law, the arrival time would be outside the market hours and, combined with more than 10 hours of travel and high day-time temperatures, sheep and goats could become weak or some might even die. As it is better to offer the animals for sale in Nairobi during the more vibrant early morning market, and it is better to sell the animals while they are still 'fresh', before their appearance is diminished due to different climatic conditions and lack of proper forage, the traders are then obliged to pay bribes of non-negotiable sums to police at multiple road check points in an 'institutionalized' manner. The prohibition of night transport is an important factor contributing to losses and systematically disadvantages traders from Marsabit. This practice is aptly described by a trader as, "libations for the grave", ascribing a kind of inevitability to the cost by associating it with the Rendille belief that an offering is necessary whenever you walk by your ancestral graves. Although almost every trader transporting livestock to Nairobi expressed being burdened by the bribery costs, it is generally acknowledged that this is the most feasible option until the law is changed to allow night travel. Also, Mahmoud, (2008) identified police tipping at all checkpoints as a salient cost facing long-distance cattle traders.

*"We start our journey, when we reach first police checkpoint, we have to pay something small at the barrier, from that place onwards we have to pay that amount at each barrier we encounter..."* (L45).

The number of pastoral producers selling regularly at the local markets has increased. This change has led to the emergence of another secondary actor, the Livestock Marketing Associations (LMAs) who manage the local markets. The LMAs collect tax per head of sheep and goats sold and remit 70% of money to the County Treasury while the County government provides necessary travel permits to transport goats to Nairobi or to other regional markets. According to local traders and pastoral producers, the activities performed by these two actors are disconnected from the shifting cycles of profit and loss that characterise their trade. The nearly unilateral imposition of tax for each goat or sheep ex-

changed by sellers and buyers at local markets, in addition to the high fee for issuing travel documents, is not connected to price fluctuations that make the sheep and goat trade precarious. The centralised organisation for issuing these documents further deepens the weak relationships between local traders and county government departments.

## Collaboration between local traders

Trader to trader collaboration plays an important role in the organisation of the sheep and goat trade. Whereas the purchase activities at the local markets are mostly performed by traders individually, the movement of animals to a long-distance market is mostly done jointly. The collaboration is established out of practical convenience and necessity such as in case of limited working capital. Organising to sell sheep and goats at the Nairobi market requires that a long-distance trader has between 300,000 – 400,000 Ksh. (approximately 3000-4000 Euros) of working capital per trip. As sheep and goats are usually bought on a cash basis, and the working capital is typically raised jointly by 2 - 4 traders per lorry.

*"We still need other traders to help us fill the lorry… [because] the transportation is costly and hard on us… so we increase the capacity to 160, 170, 180 goats… if there are fewer goats, it becomes costly"* (L48, Korr).

Through collaboration between traders, the costs which must be paid in advance such as a deposit for the lorry and the salary for the herder who will supervise the goats en route can be shared. Traders share costs according to the number of sheep and goats they contribute to a lorry. Joining efforts to purchase animals reduces the time needed to fill a lorry.

Long-distance traders will also collaborate by sharing market information. Traders might call each other from the Nairobi market to share information about number of lorries in the market, prices and the demand situation. This is then used to cross-check the information obtained from the Nairobi broker. Traders also help each other at the local market by offering `peer review´ to estimate sheep or goat purchase prices, in order to avoid over pricing that would increase their likelihood of selling at a loss in the terminal market.

In the study area, the upcoming traders who are constrained by limited working capital but who aim to trade in the Nairobi market seek mentorship from experienced long-distance traders. The `new trader´ can add his goats to the herd of an experienced trader. In such collaboration, the new trader benefits from the contacts, experiences and knowledge of the established trader, while the new trader provides assistance during transport so that they can reduce costs together. This is similar to cattle traders from northern Kenya, where larger traders partner with new entrants who begin as apprentices and help procuring cattle. The new trader benefits from guidance and trading tips from the experienced trader (Mahmoud, 2008, p. 571).

Among itinerant traders, collaboration is mainly sought when goats are trekked to a secondary market, usually involving 3 - 4 days of travel. Combining their animals eases trekking and also reduces risks related to predators and robbery along the way. Secondly, they also collaborate to boost their bargaining power by strategically selling their goats together in the market to attract buyers interested in large sales.

### 4.4.5 Gaps in relationships and implications for producers and local traders

Because of the intermediary role of Nairobi-based brokers discussed above, long-distance traders have no direct link to end buyers. This gives the broker a powerful position. A similar finding was highlighted by Watson and Binsbergen (2008) who argued that because of the dominance of the brokers, the Nairobi market is difficult to penetrate by traders from pastoral regions. The missing relationship between the long-distance traders and the clients in Nairobi also results in a lack of knowledge regarding supply specifications, such as 1) the range of prices disaggregated for different types and sizes of goats or sheep 2) available buyers and their specific demands, from which to select, 3) specifications regarding the type of goats, sizes and other attributes preferred by end consumers, and 4) alternative market outlets in Nairobi or other urban centres.

Currently this knowledge is partly with Nairobi brokers who never divulge it to local traders because of the obvious implications to their businesses. Due to this gap, a mismatch between the types of sheep and goats delivered by traders and the demands of the market are likely to happen. To hedge themselves, long-distance traders often revert to transporting a mix of different types and sizes of sheep and goats. While this is an important buffering strategy to save them from severe losses, it simultaneously limits potential profits.

The second gap is between the local traders and Non-Governmental Organizations (NGOs) that conduct projects on "linking pastoralists to markets". Most investment was directed towards building market structures, offering financial grants and capacity building to the LMAs for managing local markets. Local traders articulated that they are not informed about upcoming projects with potential benefits to their trading business.

The third gap is between local traders and the Marsabit county government. The county government executes projects to improve livestock marketing. A recent example is the establishment of a slaughterhouse near Marsabit town as part of a strategy to supply meat to both national and international markets. Despite their central role in the supply chain, local traders and producers were not adequately involved or consulted in the crucial planning stages meaning that the perspectives of those currently active in the system get overlooked.

## 4.5  Conclusion

As rural livelihoods in northern Kenya depend on the trade of sheep and goats, local traders perform a vital function to link pastoral producers to markets. This analysis shows that trade is sustained by a diverse set of local traders who play different roles in the finely-branched supply chain that streamlines the supply towards diverse local, regional and terminal markets. In this marginalised vast rural area characterised by varying sheep and goat supply, local traders harness their relationships to primary and secondary actors to up-hold their trading activities in uncertain ecological and economic contexts.

Activity analysis revealed activities which can be considered for improving the supply chain coordination. Currently there are no established contracts with agreed upon prices between the traders and end buyers and there is also a lack of prior information about the

types and numbers of animals demanded at the terminal market. This means that the traders have to manoeuvre in a terrain characterised by uncertainty in profit margins and potential high operating costs. Given that animals have a 'limited shelf life' in the urban environment, major losses occur when they cannot be sold immediately. After being taken out of their rearing environment, their appearance diminishes due to different climatic conditions and lack of proper forage reducing their potential sale price. Simultaneously, their up-keep in Nairobi leads to high costs.

In order to make quick sale, local traders rely on their relationship with a Nairobi broker who has a broad client base. However, in the absence of alternative contacts, they are at the mercy of this broker. A high extent of collaboration between local traders with regard to organisational, informational and financial issues as well as their attitude of ethnic solidarity leverage some advantage but may not be enough to continue fulfilling their role of linking pastoralists to the market in the long term. Therefore, what is required is an arrangement that negotiate for more beneficial agreements for traders through linking them to clients at the terminal market so that traders could move from current spot market transactions to contractual arrangements where prices and the demand specifications are known prior to buying and moving animals to the market.

## Acknowledgements

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# 5 Making decisions without reliable information: the struggle of local traders in the pastoral meat supply chain[7]

## Abstract

In Sub-Saharan Africa, arid and semi-arid rangelands are mainly used by pastoral communities for livestock production. In northern Kenya, these communities predominantly sell sheep and goats to local traders who connect them to different markets. This pastoral livestock supply chain is characterized by inadequate market information, without which it is difficult to improve the coordination of seller - buyer activities. This paper examines the information needs and constraints of producers and different categories of traders. Semi-structured and narrative interviews were conducted with 15 producers and 26 traders. Results revealed the particular information needs of traders; such as the range of prices in different markets, the extent of competition, grades of animals in high demand and further specifications. However, market information tended to change within a short timespan. Analysis of weekly prices for different grades revealed high price variability such that they were only known on the market day. This unpredictability made it difficult for traders to improve prices offered to pastoral producers. We recommend strengthening relations of local traders to processors and wholesalers that structure information exchange so that they can make better decisions to improve their margins.

## Keywords

pastoralists; traders; market information; supply chain; goats; northern Kenya

## 5.1  Introduction

In Africa, 43 % of the land is arid and semi-arid, used for livestock production (Koohafkan and Stewart, 2008). In Sub-Saharan Africa, an estimated 50 million pastoralists rely on this land for their livelihoods (IIRR, 2014; Rass, 2006). Assessment of pastoralism's contribution to national economies revealed that it contributes over 35% of the agricultural GDP in Kenya, Sudan and Ethiopia (COMESA, 2009). Despite this significant contribution, pastoral livestock marketing has not been accorded priority in policy (Hatfield and Davies, 2007), budgetary allocations (Alushula, 2016) and institutional support (Otieno, 2008).

In Kenya, the long-term absence of a comprehensive livestock marketing policy has set the stage for minimal investments in marketing infrastructure and limited coordination among investments. The first statutes relevant to livestock marketing in the post-independence era were the Meat Control Act of 1977 (cap 356), the Animal Diseases Act of 1984 (cap 364) and the Crop and Livestock Production Act of 1977 (cap 321), revised

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in 2012. Although aspects of marketing were incorporated into the National Livestock Policy; sessional paper no. 2 of 2008, it does not specifically detail i) ways to streamline livestock marketing investments, and ii) integration of livestock producers in value chains. Only in 2016, did parliament pass the Livestock and Livestock Product Marketing Bill which established the Kenya Livestock and Livestock Products Development and Marketing Board tasked with spearheading market research and development for the sector. The approach outlined in the "Agricultural Sector Development Strategy (ASDS), 2010-2020" places emphasis on improving market access by supporting livestock marketing groups, building markets and strengthening associated infrastructure such as market information systems (Republic of Kenya, 2010, p. 42). Moreover, many counties within arid and semi-arid areas of Kenya have been investing in infrastructure to target high-value livestock export markets, mostly to the Middle East. A recent example of such an investment is the construction of an abattoir in Marsabit County (worth 3.8 million USD) commissioned jointly by national and county governments in 2014 (Otieno, 2014). Promoting livestock trade is a core aim of the Kenya Meat Commission (KMC), although the scale of its activities has gradually declined over the last decade, attributed, in large part, to mismanagement (Ringa, 2013).

Despite these interventions, pastoralists still face the problem of low prices; suppressed by unfavourable terms of trade, droughts (Little et al., 2014), distance from main markets (Nunow, 2000), and relatively few traders. The problem is not that pastoralists are unwilling to sell their livestock, but rather that market conditions are often not to their advantage. Pastoral producers' weak position in the supply chain is attributed to lack of access to market information (Bailey et al., 1999). This information is required to make timely decisions for organizing livestock sales (Pavanello, 2010, p. 27). Therefore, unequal information exchange leaves producers relatively disadvantaged compared to traders (Stuth et al., 2006, p. 204). However, traders face high risks related to inadequate terminal market information (Bailey et al., 1999; Stuth et al., 2006). A further problem is livestock price volatility caused by informational disparities (Barrett and Luseno, 2004), climatic conditions, and changes in demand and supply (Barrett et al., 2003).

To improve producer prices, livestock market information systems were promoted by government and international donors. An early example of a project in northern Kenya is the 'Livestock Information Network and Knowledge System (LINKS)' funded under USAID's Global Livestock Collaborative Research Support Program (GL-CRSP) (Stuth et al., 2006, p. 203). In this project, prices and information on livestock volume, forage condition, security and water supply were transmitted on a regular basis for selected markets in East Africa. Another example is a project conducted by the German development cooperation agency, GTZ (now GIZ), that supported the collection of price information from four markets in Marsabit County to be broadcast across the region in Rendille and Borana languages (Bailey et al., 1999). However, these projects failed to influence producers' and traders' marketing decisions because of i) limited access to communication infrastructure in remote areas (Stuth et al., 2006), ii) coordination challenges for collecting and organizing information and punctually transmitting it to users (Komen, 2010). Decisions regarding which animals to sell, where and when to sell and at what price remain a challenge, resulting in higher transaction costs for producers and traders.

Strengthening information exchange is associated with: higher producer prices (Coronado et al., 2010), increased negotiating power (Shepherd and Schalke, 1995) and improved marketing decisions of both producers and traders (Magesa et al., 2014). Understanding of information exchange requires analysis of: i) "micro-level factors that influence individual actors to transmit information" and ii) "macro-level factors that determine the structure of channels directing the flow of information" (Frenzen and Nakamoto, 1993, p. 360). Analysing these relations can be grounded by social exchange theory (Emerson, 1976), complimented by investigation of activities and interdependencies between actors (Dubois et al., 2004) and further, by evaluating why supply chain actors engage in information sharing, what information they share, with whom and how (Kembro et al., 2014).

Only a few studies briefly touched on market information exchange in pastoral livestock markets (Bailey et al., 1999; Pavanello, 2010). This includes Stuth et al.´s (2006) research on the challenges and priorities for developing livestock information network and knowledge systems in northern Kenya and southern Ethiopia; and Jama et al.'s (2006) analysis of the strengths and limitations of livestock market information services to inform the design of better systems in Ethiopia's highland regions. However, these studies do not adequately consider the information requirements and constraints of different actors along the livestock supply chain.

To fill this gap, this paper aims to: i) identify specific information needs of pastoral producers and traders in sheep and goat supply chains in northern Kenya, ii) assess information gaps and constraints that hamper information flow and access within the chain, and iii) identify options traders use to bridge information gaps. These aims are accomplished primarily through qualitative techniques described in the methods section. In the sheep and goat supply chains, producers and traders transact in spot markets through direct negotiations, hence price information varies due to many factors and it is assumed that traders cannot anticipate prices based on past prices. We therefore test the hypothesis that current prices for four grades of goats in Nairobi are influenced by previous prices through time-series correlation of current and previous prices. This price analysis gives further perspective to contextualize the information needs and constraints shared by traders and pastoralists.

## 5.2 Theoretical framework

To understand information flow within exchange relationships that are not based on explicit agreements and contracts, we used a theoretical framework that emphasizes actors' relational interdependence and social networks. Social exchange theory reveals dynamics of exchange among mutually dependent actors interacting in a context where power is unequally distributed (Emerson, 1976, p. 351) and embedded within networks (Molm, 2003).

Although social exchange can be applied to many different kinds of relations, business exchange is a specific form of exchange that entails assessment of three complementary flows - product (material), finance (money) and knowledge (information) (Kaipia, 2009; Le Heron et al., 2001). The relational perspective in business, which includes socially embedded exchange processes, can include studies such as how supply chain actors engage in information seeking and what information is shared with whom (Kembro et al.,

2014). Transmission of market information between actors requires analyses of both the "micro-level" factors that shape how individual actors convey information and the "macro-level" factors that explain the structures connecting the actors that define information flow (Frenzen and Nakamoto, 1993, p. 360).

In supply chains, actors share information to perform purposeful activities in the chain (Zott and Amit, 2010). Fulfilling the activities of an actor in the chain is partly contingent upon the degree of connection to other actors with varying levels of interdependence. This perspective draws attention to the importance of activity links in supply networks that relate the activities of disparate upstream and downstream actors (Håkansson and Snehota, 1995). Additionally, it is essential to understand the constraints in information sharing in supply chain (Kumar and Pugazhendhi 2012, 2148) to show how they influence the overall functioning of the system. For example, "the dynamics of how the delays, amplifications, and oscillations" affect supply chain processes, particularly in relation to transmission of demand related information (Sahin and Robinson 2002, p. 506).

In our study, we use social exchange theory to show how different sheep and goat supply chain actors seek to fulfil different information needs for making business decisions. Likewise, the limits of information exchange in this context reveal aspects of power inequalities within the chain.

## 5.3 Material and methods

### 5.3.1 Study area

This study was conducted in the southern part of Marsabit County in northern Kenya (fig. 5.1). The area is rural, with sparsely populated arid lands and represents an important livestock production area. It is home to pastoralists who mainly rely on livestock production for their livelihoods, mostly from the Rendille ethnic group but also, along the border to Samburu County, from the Ariaal ethnic group.
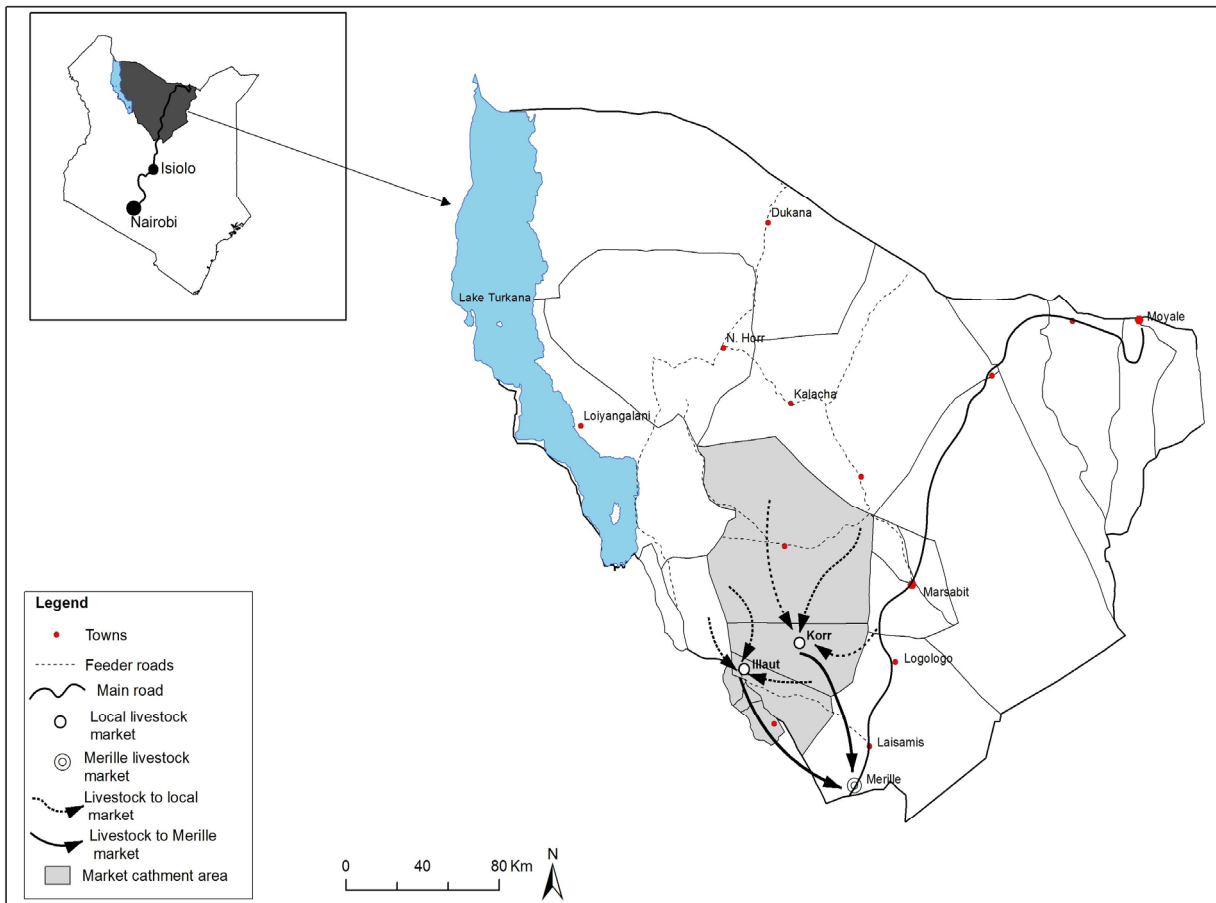
**Figure 5.1: The study area**

In the study area, sheep and goats are sold to acquire income for regular household needs at primary markets, in Illaut and Korr, and at a secondary market, in Merille. The Illaut market is held every two weeks. Occasionally cattle and camels are offered. Meanwhile, only sheep and goats are traded at the Korr market which takes place every Saturday. Primary markets are collection points for traders trekking livestock to the secondary market which is 2 - 3 days walk, and for those transporting animals to the terminal market at Kariobangi in Nairobi, lorries are used for a distance of over 600 km. Traders transporting animals to Nairobi typically need a minimum of 150 sheep and goats to fill a truck, that usually take 5-14 days to amass. The tarmacked road connecting Marsabit, Isiolo and Nairobi eases mobility in the region. However, other rural roads are not paved and many become impassable during wet seasons (County Government of Marsabit, 2013). Steadily growing mobile phone coverage, offers better connectivity, especially in towns along the highway.

## 5.3.2 Data collection

Fieldwork included multiple phases from March 2014 until November 2016. Data presented in this paper is from two phases in 2015: 1) July-August, and 2) September-November. Feedback seminars where research results were shared back to the traders for further confirmation were conducted in November 2015 and September 2016.

From July to August 2015, fieldwork included six focus groups with traders and twelve focus groups with livestock producers. Analysis of the focus group findings led to attention on market information for further exploration. The first author did field observations on 32 market days at the primary, secondary and terminal markets to identify interviewees and build rapport. Overall, about 30 traders were identified who were active during the study period. Of these, interviews were done with all 14 long-distance traders, 7 itinerant traders (out of 9 total) and 5 inter-local market traders (out of 7 totals). At the markets, producers were also identified and purposively selected for interviews from different settlements (locations) within the study area. Subsequent interviewees were identified through the snowball technique and the interviews were conducted in Kiswahili and English, but frequently translated into the Rendille language, which is the native language spoken by the traders and pastoralists in the area. For traders who were confident speaking Kiswahili, translation was not always necessary.

Between September and November 2015, the first author conducted semi-structured interviews with producers and traders. Questions were structured on the basis of producers' and traders' supply chain activities to identify: i) information required to do a specific activity, ii) sources of information, iii) constraints to sharing market information, and iv) ideas for improving information flow in the supply chain. These interviews were conducted with 15 producers and 25 traders (approximately 45 minutes each), including all 14 long-distance traders in Korr and Illaut and 11 other traders. These interviews were complemented by narrative interviews with 4 traders (3 of whom had already done semi-structured interviews and 1 new). In total, 26 traders were involved in this study. The narrative interview method was used to explore the trader´s perspectives through narration of their trading history including events they considered most relevant.

To further understand traders' information needs at the terminal market, a meeting was organized with 11 long-distance traders and an expert from the Neema slaughterhouse in Nairobi who had knowledge of the livestock and meat trade. The meeting was prepared using an expert interview structure through which the traders organized key topics they wanted to discuss based on questions they prepared including: specific requirements of different slaughterhouses, the typology of clients at the terminal market (including meat importing countries), types of animals required by different clients (and importing countries), and alternative markets for sheep and goats in Nairobi.

A major challenge that came across repeatedly was terminal market price fluctuation. To investigate this, Kariobangi market's weekly price data were acquired from the Kenya Livestock Marketing Council (KLMC). The weekly prices for different grades[8] of goats sold from March 2014 to January 2015 were collected by the KLMC data collectors. In all, 15,400 livestock sales were recorded over 135 market days. To further contextualize the information needs and constraints given by the traders and pastoralists, longer term price analysis was produced from these data.

Individual interviews and selected traders' meetings were audio recorded. Notes were taken during all interviews and eight were fully transcribed. A thematic coding scheme

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[8] The goats are categorized into grades ranging from 1 to 4, with grade 1 goat having thick muscle, superior meat and often best priced, grade 2 having average meat and moderately muscled, grade 3 having inferior meat type (mostly old goats) and finally grade 4 as thinly fleshed and relatively fetch low prices. The price differences between the grades are reflected in the appendix 1 (table 1a and 1c and figures 1b and 1d).

was developed with four categories relating to our research: activities, information needs, information sources and gaps. Each category further contains sub-codes. This coding framework was applied to transcripts revealing patterns in the data using RQDA® qualitative data analysis software that allows sorting by code and by attributes such as type of trader.

## 5.4 Results

### 5.4.1 Information needs in sheep and goat supply chains

We identified market information needs based on the activities of multiple actors including pastoral producers and different categories of traders. Local traders were divided into three categories with diverse supply chain activities: i) itinerant traders (IT), purchase from villages or water points to sell at primary markets, ii) inter-market traders (IMT), purchase from primary markets and sell at a secondary market, and iii) long-distance traders (LDT), buy from primary and secondary markets to sell at the terminal market in Nairobi. Table 6 shows the percentage of responses to different information needs as symbolized by different sizes of squares under each actor category. Generally, the information needs of the actors vary by activity, with more diverse information needs expressed for selling than for buying. The types and frequency of information collected varied by the individual actor's location and their access to different market options.

**Table 6: Information needed by producers and traders**

| Activity | Information category | Specific information needed | P | IT | IMT | LDT | Information needed to… |
|---|---|---|---|---|---|---|---|
| Buying | Price | Prices for different grades of animals | - | □ | □ | □ | Assess the potential margins and identify animals to buy |
| | Supply | Areas with cheaper goats and more herds | - | □ | - | - | Assess the availability of animals |
| | | Number & grades of animals on offer at the primary markets | - | - | □ | □ | See the possibility of getting the required grades and quantity of animals |
| | Condition | Health & body condition of animals on offer | - | □ | □ | □ | Ascertain the quality of animals on offer |
| | Marketing cost | Amount of tax charged at the markets & other costs associated with the trip | - | - | □ | □ | Establish direct costs at the market |
| Selling | Price | Price range and most common prices for different grades of sheep and goats | | □ | □ | □ | Assess the potential margins in trade and offer goats with better prices |
| | | Prices offered by different traders | □ | □ | □ | - | Evaluate price competitiveness |
| | | Prices at different markets | □ | □ | □ | - | Choose the market with better offer |
| | Characteristics of the market | Security at the market & on travel routes | □ | □ | □ | □ | Avoid insecure markets to minimize losses (cash and physical loss of animals) |
| | | Marketing costs – taxes at the market | □ | □ | □ | - | Estimate direct costs at the market |
| | | Accessibility – number of days to the market, routes with water and pasture | □ | □ | □ | - | Decide where to sell (based on overall costs incurred when selling) |
| | | Offer/supply of different household commodities at the market | □ | □ | ▫ | - | Assess availability of essential household commodities at the market for additional benefits |
| | | Breed of animals on offer | - | - | - | ▫ | Establish extent of competition |
| | Past market situation | Previous selling experience | □ | □ | □ | - | Decide where to sell based on past markets |
| | Current market situation | Supply and demand for different animals | □ | □ | □ | □ | Make demand comparisons in order to choose the combination of grades |
| | Characteristics of alternative markets | Types and diversity of clients at the market | □ | □ | □ | □ | Make comparisons in order to choose the best market |
| | | Prices offered for different grades of animals | ▫ | □ | □ | - | Assess attractiveness of prices compared to other markets |
| | | Grades of animals sought by buyers | ▫ | □ | □ | - | Supply the grades on demand |

- No individual expressed need
▫ Less than 20% of the individuals expressed need □ 20 to 49% of the individuals expressed need
□ 50 to 80% of the individuals expressed need □ More than 80% of the individuals expressed need
P-Producers, IT-Itinerant traders, IMT-Inter-market traders and LDT-Long-distance traders
Source: 40 semi-structured interviews, 2015

Producers tended to have little flexibility regarding the market place because they mostly sold at nearby markets. As they usually sold in small "trade volumes", transaction costs to travel to far away markets were relatively high. However, producers still benefitted from information about different markets, because they used it to improve their bargaining position when negotiating with traders. For example, producers who were not in need of immediate cash, used information about low prices to postpone sales. For producers who were in a position to sell many animals, better livestock marketing information helped them optimize sales when prices were highest.

For traders, familiarity with the market influenced the depth and frequency of information they collected. For example, at markets close-to-home, traders operate within a circle of regular sellers and clients; hence, they purposefully collected information less regularly and not as intensively. As stated by an inter-market trader:

*"I collect detailed information only when I start going to a new market but as soon as I become a regular trader there, I mostly go without asking much. I mean this information is only very necessary when you are new to a market and I do this to study the operation of the market and then I never ask unless I am worried"* (SSI_IMT20).

However, when the market occurred at farther distances, like in Nairobi, more details were sought because of the high investment required; an average of 4,000 - 5,000 Euros to buy and transport a truck-load of animals. Once in Nairobi, the animals needed to be sold quickly, even if at a loss, because there was no possibility of returning them and the longer they remained unsold the more their condition declined. Thus, long-distance traders had less influence over their sales and more risk than other types of local traders. Due to these differences, our results will cite more examples from long-distance traders. The different types of information required are elaborated in Table 6.

### Information required for making a profit

### Range of prices at the markets

In addition to the marketing costs, the trader's profit is influenced by the buying and selling prices of the animal. Therefore, all traders regularly enquired about the lowest and highest prices for every livestock grade at the primary, secondary and terminal markets, regardless of whether they planned to sell specific grade. Although most long-distance traders bought at the primary markets and seldom bought at the secondary market where prices were higher and competition stiffer, this information helped other traders to compare prices in different areas and to decide where to buy. All long-distance traders called the brokers at the terminal market in Nairobi before they started buying animals. The quote below reflects how they probed for price information:

*"When I sell, I ask the broker about the prices of animals. I ask the prices from grade 1 to the last grade sold at Kariobangi… both the average price and the unit price"* (SSI_LD31).

By inquiring about prices for all grades, traders were able to: i) establish the threshold for buying prices, ii) identify the grade of animals to buy, and iii) evaluate the possible profit they might make from a trip.

### The grades of animals in high demand

Long-distance traders regularly collected information on market demand, because the demand for sheep and goat at the Nairobi market strongly vacillated between grades. Although there are no formal grades for live sheep and goats, chain actors use the terminology of grades to refer to commonly understood goat descriptions as shorthand for communication within the chain (table 7).

**Table 7: Description of goat grades used in the supply chain in Kenya**

| Goat grades | Descriptions based on fieldwork observations |
|---|---|
| Grade 1 | Grade 1 goat is the highest quality goats characterized by bigger body size, excellent body conformation with a thick uniform muscles layer. They have visible bulging biceps and a full back strip. |
| Grade 2 | Grade 2 goats have good body condition and they are moderately muscled throughout the body. |
| Grade 3 | Grade 3 goats have fair body condition characterized by a narrower body and dull appearance. |
| Grade 4 | Grade 4 goats have poor body condition and dull appearance. Mostly, thinly fleshed old goats are classified as grade 4. |

Traders enquired about the grades using market parlance about which goats were `released´, a term used to designate animals that sold quickly and at good prices.

*"We ask which goats have been released today… sometimes you are told big goats or small and medium goats have been released…"* (SSI_LD30).

The Nairobi market ordinarily had two trading sessions each day; the early morning session was from 5-10 am, after which animals were grazed until trading resumed in the afternoon from 4-6pm. Traders enquired about the first trading session which was usually more vibrant and offered better prices.

**Further livestock specifications**

Breed[9] was an aspect of quality that affected the price and ultimately the profit margins of traders. Information about the breeds on offer was used by traders to assess potential sales and discern the type of animals to trade. As explained by an inter-local market trader, goats from neighbouring Samburu County made competition stiffer when they were sold at the secondary market:

*"I ask whether the goats from the Rift Valley are in the market, because they have bigger body sizes than our goats… They reduce the likelihood of our goats selling at better prices"* (IMT_19).

Within the producer region, this trader's quote shows that their goats were not the most preferred within southern Marsabit. However, at the terminal market, goats from all of Marsabit were highly preferred. This is emphasised by a long-distance trader, who explained the importance of knowing where other goats in the terminal market originate:

*"We ask about different things, including which goats are in the market… The Galla goats are different from ours. So, if I am told a goat is selling at a specific price, I must ascertain its breed and origin"* (NI_LD32).

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[9] In this paper, we define breed as a specific group of livestock with definable external characteristics that enable its separation by visual appraisal from other similarly defined groups within the same species (FAO, 2000).

Galla goats, commonly reared by the Gabra and Borana pastoral communities, tended to fetch higher prices than the shorter Rendille goats because of their heavier weight and the market preference for their long and tall body.

Traders also enquired about livestock health[10] at primary markets or from the area of origin. A sick or weak animal was hard to sell and sometimes died in transit. As this contributed to losses incurred by traders, animal health became another factor in decision-making, as explained by a trader:

*"I started buying from far away markets and many animals became Sirgo [heartwater disease] and died. So, for fear of buying from distant areas, I decided to buy from my home area since I know the owner and if I discover the animal is sick, I can return them to the owner"* (NI_IMT19).

**Supply of animals at primary and secondary markets**

To estimate the time, it would take to buy a truck-load of animals, traders sought information on sheep and goat supply. Long-distance traders needed a minimum of 150 animals to fill a truck, which typically took from five days to two weeks. Additionally, low supply translated into higher buying prices. As explained by a trader:

*"I enquire about the number of animals coming to the market, just to know how long it might take us to do the buying. If animals are few in the market, we can't meet our numbers to go to Nairobi and this is expensive"* (SSI_LD33).

Long-distance traders enquired about the supply information from the local broker or from the itinerant traders. For example:

*"There is no other information we get apart from the itinerant traders who come from outside Korr. We ask if they have goats. But when we are not in a hurry to fill a truck, we just go directly to the market"* (SSI_LD30).

However, the actual number and grades of animals on sale at the primary markets could only be ascertained on the particular market day.

**Competition**

Generally, the number of traders at primary markets determined the extent of competition. Buying prices rose when traders were many, reducing their profit margins and the overall number of livestock a trader could buy. As stated by a long-distance trader:

*"When we (traders) are many, the buying prices are bad and some days we buy at higher prices than what we are offered in Nairobi"* (SSI_LD33).

There was competition between traders who bought similar grades of animal. Producers sought information about traders who offered higher prices or bought a specific grade. The absence or presence of these traders was used as an indication of the level of competition and ultimately the buying prices of animals. As explained by a producer:

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[10] In this paper, by health we refer to the state of the animals expressed by body condition and in terms of being free from diseases

*"We know all traders; we know those… who offer better prices. We ask which traders were present in the last market… also; some traders mainly buy big male goats while others buy mixed sizes…"* (FN_P12).

Prices at primary markets were also influenced by differences in traders' working capital and experience. For instance, when traders from outside the region competed with local traders, the livestock buying prices increased. These external traders were known to have relatively higher purchasing power than the local traders and often had more trading experience.

At the terminal market, the number of trucks delivering animals on the same day was used to assess a market as good or bad. Signalling a good market for traders, 3 - 5 truck-loads of goats delivered on a day to the terminal market was interpreted to mean that goat demand and prices were likely to be favourable because there was no oversupply. In contrast, 7 or more truck-loads were taken as an indication that the prices offered would not be as attractive.

If competition was high on arrival, it was uneconomical to wait for a better day, as additional days led to costs related to herding, watching over the animals, the trader's upkeep, and, as explained earlier, reduced prices.

## 5.4.2  Constraints to information flow in sheep and goat supply chains

Information flow in the supply chain was not considered by traders to be timely and accurate. In Table 8 we identify information gaps that hindered the flow of information along the chain.

**Table 8: Information gaps in sheep and goat supply chains**

| Activity | Supply chain actors | Information gaps | Reasons for information gaps |
|---|---|---|---|
| Buying | Itinerant traders | The supply of different grades is only known on the actual transaction day | The number of animals offered by the sellers varied across the area |
| | | The prices of animals at different purchasing areas | Long-distances and lack of mobile connectivity made it difficult to compare prices |
| | | The specific demand of the long-distance traders are not known in advance | The actual demand at the terminal market was only known on the transaction day |
| | Inter-market traders | Apart from provisional prices, the actual prices are only agreed on the market day | Contingent on the supply and number of traders in the market |
| | | The overall supply of animals are only known on the market day | Varied with number of sellers and trading season |
| | | The demand of the clients at the secondary market can change in short span of time | The demand varied with clients present in the market |
| | Long-distance traders | Only prices from the previous day at the terminal market are known | Prices varied with supply & clients in the market |
| | | The number of traders buying at the same market – only know on market day | Traders at the market had no regular trading time |
| | | The actual supply is only known on the market day | Varied with the population of animals in the areas supplying the market |
| | | The specific demand at the terminal market is only known on the transaction day | The demand was inconsistent, changing between grades and market days |
| Selling | Producers | They inquire about prices and animals required but the actual prices are not known until market day | Depends on the number of traders and number of animals on offer |
| | | Prices of animals in Nairobi | They relied mostly on the long-distance traders who had no clear information on the going prices in Nairobi |
| | Itinerant traders | Prices offered by the long-distance traders are only known on market day | Long-distance traders did not know prospective Nairobi prices |
| | | Prices at other regional (alternative) markets | Not connected directly to the brokers in other markets |
| | Inter-market traders | The destination of the animals they sell and the prices received by their clients | Clients did not divulge the full details and traders had no alternative information |
| | | Business opportunities in bigger towns to supply animals | Not directly linked to clients |
| | | The number of traders at the market are only known on the market day | Trader numbers and diversity varied with market days |
| | Long-distance traders | More profitable markets and their demand specifications | All traders from Marsabit South predominantly sold at one market and via the same broker |
| | | The clients who buy only a specific grade of animals and their criteria | Not linked to buyers who could give them first-hand information |
| | | The actual supply and demand at the terminal market is only known on the market day | Supply depended on the number of trucks delivering animals while demand varied with the number of clients present on that day |

Source: 40, semi-structured interviews, 2015

From the table we can distil that i) although traders repeatedly inquired about demand, supply and price information, the actual information could only be known on the market day, ii) there was a lack of information about the entire supply chain such that individual actors did not know the profit margins of other actors, and iii) traders missed opportunities without information on alternative markets. Constraints to information flow are described in the next section.

**Information changes in a short time-span**

The information about prices in sheep and goat markets oscillated quickly. To demonstrate this, we used an example of weekly price fluctuations for two grades of goats at the terminal market in Nairobi (figure 5.2). The price data shows that i) there was a large change in average prices with a 41% and 73% and a for grade 1 and 4 respectively (coefficient of variation of 0.11 and 0.18); ii) there was no discernible pattern of high and low price periods corresponding to rainy and dry seasons in the production area, and iii) the direction of change was not parallel for the two grades e.g. in April when prices for grade 1 was fairly stable, the prices for grade 4 continued to fluctuate. So, when long-distance traders bought goats based on information about good prices the second week of August (7,000 Ksh) for grade 1 and were then ready to sell them in the terminal market in Nairobi the following week, prices had reduced to 5,300 Ksh. Further, autocorrelation coefficients were calculated to determine if there was a direct correlation between current prices and previous prices. The insignificant coefficients of the lags and the low slope parameter show that the lagged prices poorly predict current prices (see appendix 1, table A.1). This example shows that traders were continuously subjected to fluctuating profits and even losses. This risk is captured by a quote from a trader.

*"The first trip, when I sold 18 he-goats, I made a profit of 10,000 shillings but in the second trip I lost 20,000 shillings… So, three out of six last trips, I made losses and in the most recent trip, I got profit of 15,000 shillings. Some trips we just sell animals at our buying prices"* (NI_LD34).

This shows the risks faced by traders. On average, long-distance traders made a profit of 250-300 Ksh per animal and the price variation of up to 2,000 Ksh obviously translated into substantial losses.
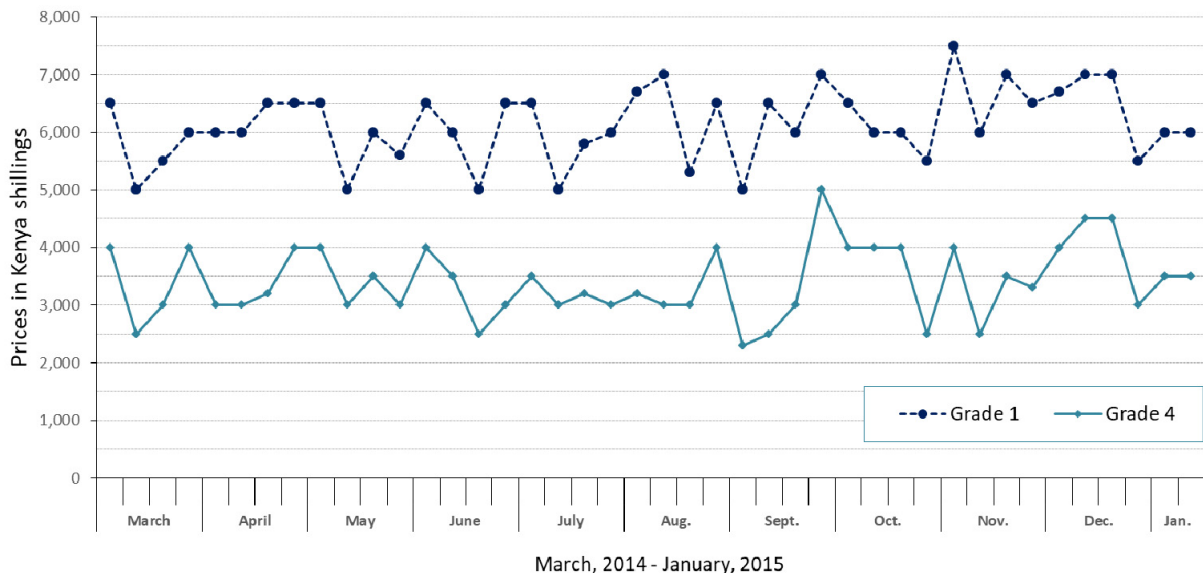


**Figure 5.2: Weekly price variation at Kariobangi terminal market, Nairobi**

(Source: based on data from the Kenya Livestock Marketing Council (KLMC)

There is high variability in goat prices between each week, 2013 - 2015 (see appendix 1a, and appendix 1d). The prices usually changed with the level of competition among buyers, the number of animals supplied, the breeds and body condition of the animals on offer.

The demand for different grades of goats at the terminal market was highly dynamic. Traders usually called brokers and responded to demand they specified. However, by the time they had accomplished the tasks required to gather the number of animals of each grade, the prior information was outdated and instead other grades of goats were on demand. This challenge was underscored by a long-distance trader who stated that:

*"We always talk to the broker in Nairobi, but it does not work… in our last trip to Nairobi, we found that old female goats were on demand, the ones we usually buy at less than 1,000 shilling were selling at 2,500. Unfortunately, we had just four of them"* (SSI_LD34).

The above quote offers an illustration of the practical difficulty experienced by long-distance traders to capitalize on demand information.

## The actual supply and demand is only known on transaction day

Long-distance traders had no contract with clients such as processors and meat wholesalers in Nairobi to guarantee the grades and prices of goats to be delivered. The supply and demand of animals in the terminal market, and hence the price, were only known when traders arrived at the market. In this chain, the main challenge is the distance from the terminal market together with the period of time needed to gather the required animals from remote areas. In such a situation, traders would continuously call brokers for updates and occasionally based their judgment on their most recent trip or on experiences shared by other traders. Sometimes long-distance traders would catch a vibrant market in which a specific grade of animal was 'sold faster' and at a higher price. They would then base their next purchase on this past favourable market to procure the grades that corresponded with that day. Such a strategy based on experience of a previous market was found to be costly, as described by a long-distance trader:

*"Our business is stressful… I might buy big goats based on the last demand and when I go to the market, I realize that these goats are not needed. Instead, small ones are in high demand. Again, we all focus on the small goats with every trader delivering them to the market, making the prices low"* (NI_LD36).

Although traders committed considerable capital to get the 'required' goats, these were not in demand when they arrived at the terminal market. As the actual demand was unknown until the market day, traders experienced reduced margins and even losses.

## Factors affecting the time needed to respond to positive market information

There are different reasons why long-distance traders could not react quickly to favourable market information. First, they needed time to buy enough sheep and goats to fill a truck to transport to the terminal market, especially when competition between traders was high at primary markets. Once traders set off on this journey, the initial information they had about the terminal market was usually no longer valid. This is explained by a long-distance trader:

*"We speak to the broker in Nairobi but always it does not work because we can get information on the prices, the sizes on demand that day but by the time we are ready to travel, the initial information we got is not wholly the same as the current one… we ask about prices and demand but it's not fully useful, we just do it to avoid travelling blindly"* (SSI_LD34).

Secondly, to transport animals to the terminal market, traders needed to hire a truck. However, its availability depended on the truck owner's other business. Additionally, when transport fees were high, traders might also wait for a less expensive truck to become available. As explained by a long-distance trader:

*"Some vehicle owners have a lot of commitment and they have choice to put their vehicle on another route. Sometimes when the owner doesn't want his car to come to Korr, he raises the fee to unreasonable amount…"* (SSI_LD33).

Thirdly, when the specific grades needed were not offered at primary markets, traders took more time to fill a truck. As a long-distance trader explained:

*"Sometimes we get information about specific sizes of goats that can fetch better prices but -these sizes are mostly not sold by producers, hence buying them takes a longer time"* (SSI_LD35).

In such a situation, traders could only buy in small numbers, thus extending their response time. Meanwhile, during this time, they ran increased risk that the demand period would lapse, annulling the information that they were acting on.

### 5.4.3  Bridging information gaps

Traders bridge information gaps through different strategies specified below.

**Regular information exchange with brokers**

All long-distance traders confirmed that brokers played a central role in sharing terminal market information. As explained earlier, although it was highly probable that this information would not hold until they arrived, they maintained communication with brokers - before buying, when booking the truck, the day prior to traveling and during transit.

This continuous communication with the broker helped them get the best possible information under the circumstances. Nonetheless, this frequent exchange between traders and brokers did not guarantee that the same information would prevail when traders delivered animals to the market.

*"It's hard. Recently, I was told by a colleague in the market that the smallest size is fast moving. I bought them in high number and travelled in a record three days, but on arrival I found that the demand condition had completely changed"* (SSI_LD35).

**Delayed sales**

Both producers and traders could, to some extent, postpone their sales when prices were low. Producers (mostly wealthy ones with less immediate demand for cash) temporarily

delayed sales; for example, they might present an animal in the market and return it to the herd when prices were not favourable.

When information on demand, price or any other condition was reported as unfavourable by the broker, long-distance traders postponed embarking on the journey to the terminal market.

*"Two things are extremely crucial, the prices and security at the market. When responses on the two are bad, we don't travel"* (SSI_LD31).

From the interviews, we established that this was a common strategy among long-distance traders because once they left the production area, the costs for postponing sales became unreasonable. Until a broker advised them of a good time to depart, they were inclined to stay in the production area.

**Selling on the way**

To improve their position in the face of information gaps, long-distance traders would sell sheep and goats along the highway at Karatina town and at the Embu-Nairobi highway junction (Makutano). However, few traders could fulfil this strategy because roadside sales were irregular and the first trucks to start the journey from Marsabit usually seized the opportunities. For this type of roadside transaction, traders with grade 1 goats or big rams had better chances. A long-distance trader shared insight on this market:

*"There are many traders with butcheries in surrounding smaller towns. The majority… are buying mostly for slaughter. So, they choose the animals they want in the truck"* (SSI_LD33).

Although the number of animals sold this way was usually low, traders preferred this market because prices were higher compared to the terminal market. They perceived it as reducing the risk of the overall trip, because some of their animals were already sold at a good price before reaching the terminal market.

**Mixed delivery**

All long-distance traders transported a combination of animal grades in an attempt to mitigate the risk of uncertain or contradictory information about terminal market demand. Delivering mixed grades was perceived as a way of balancing fortunes because of the demand unpredictability. As expressed by a long-distance trader, they chose this strategy to reduce their risk:

*"Sometimes you are told big goats or small and medium goats have been released… you cannot be certain. I won't leave the Ilmole[11], even though they might have lower prices"* (SSI_LD30).

Because of the smaller body size, many *Ilmole* could be carried in a truck. While this was an important strategy to minimize risk and possible economic losses, it also limited the potential for profit because traders could not fully match their supply with what was demanded. The parallel price movement between grades (see appendix, 1d) shows insignifi-

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[11] A common name given to 9-15 months old male or female goats

cant interaction term between grade and time, hence confirms narrow price spread among the grades.

## Multiple sources of information

To get diverse opinions, traders sought information from different sources other than just the brokers. This included personal visits to the market (primary and secondary markets), engaging relatives living closer to the market and contacting other traders. A trader gave the following example:

*"I deal with two people based in Nairobi, my broker and my son in-law… I send my son in-law to get an alternative view on the market. I send him to the market to go see all grades sold on that day and brief me on their prices"* (SSI_LD34).

Additionally, some long-distance traders drew on reciprocity with other Marsabit County traders from Gabra, Borana, Turkana and Samburu ethnic groups. As stated by a trader:

*"Mobile phone has helped us so much… I even have the telephone numbers of traders in Nairobi… so if I find that Korr traders have not been to the market, I next call the trader in Merille and finally those in Kariobangi market. If I don't get information from one, I try the next"* (SSI_IMT20).

According to long-distance traders from southern Marsabit, such relations with other traders increased their chances of getting information from each other rather than relying only on brokers.

## Establish relations with clients at the secondary market

Inter-market traders with more business experience established preferential contacts with regular clients who came from Nairobi, Isiolo and Meru to buy at the secondary market. They called these clients ahead of market days to know their demand preferences, provisional prices and also to compare offers from different clients. As expressed by an inter-market trader:

*"For different sizes of animals I buy, I have someone to buy from me… that small one there, I have a ready customer waiting for it, including for the big ones. Now, I have even advanced, I have two customers for these small sizes and they know I will bring a specific number of goats to next market"* (SSI_IMT20).

The inter-market traders had an advantage over the long-distance traders because their clients came to them at the secondary market with the goal of leaving on the same day. Therefore, by virtue of being able to sell a higher number of animals, they had first priority from these clients. However, the actual prices could only be agreed on the market day.

## 5.5  Discussion and policy implications

### 5.5.1  Information needs and constraints

Our study explores information needs and constraints of producers and local traders and additionally provides insights on the price discovery process in pastoral sheep and goat supply chains. Currently, the terminal market is organized as a spot market with no pre-agreed arrangements. The absence of formal contracts (Mahmoud, 2008, p. 573; Williams and Okike, 2007) specifying prices and spelling out the terms of agreement, meant that traders relied on existing social networks for price discovery.

The traders' information needs to fulfil their role in the chain are extensive. They need information on prices, specifications of animals in high demand, information on supply (i.e. number and location of producers with different types of animals on offer) and competition (number and capacity of competing traders) as this influences buying and selling prices. The results show that the process through which traders learn about prices follows the typical price discovery process. Price discovery "is the process of buyers and sellers arriving at a transaction price for a given quality and quantity of a product at a given time and place" (Ward and Schroeder 2002, p. 1). However, in this particular context, we demonstrate that getting relevant information to make this process less precarious is very challenging for local traders and pastoralists. For example, Ward, (1984) specifies that price discovery in the livestock market must first be informed by the supply and demand conditions to determine (implicitly or explicitly) the general level of expected prices, while considering the costs and expected profits to establish the range within which the transaction prices will likely fluctuate. However, local traders and pastoralists only have limited information at the time that they are negotiating. Further, Ward (1984) states that in livestock markets, buyers and sellers must further consider the value of the animal with regard to its size, grade and weight among other factors. Our analysis has also shown that the prices have high fluctuations by grade further confirming local traders' complaint that it is unpredictable. Long-distance traders connecting Marsabit County to Nairobi especially need relevant information on prices at the terminal market because each trip involves significant investment. Once delivered, the animals must be sold, even at a loss because there is no possibility of returning them to the production area; hence long-distance traders have less negotiating power when selling. The influence of distance is significant for traders from Marsabit when compared, for example, with traders from Kajiado which is closer to Nairobi. Even in the late nineties, traders from this pastoral region were able to create preferential trading agreements and use refrigerated trucks (Zaal and Ton, 1999). Local traders from southern Marsabit are replaceable in their relationship to the Nairobi-based broker who can easily get goats from other parts of Kenya and even Tanzania.

Long-distance traders were particularly challenged by the fluctuating prices at the terminal market and the constant change in supply and demand that created high risks for them when they chose to act on information received from the terminal market. At first glance, this matches with findings from previous studies (Jama et al., 2006; Komen, 2010) which underlined the limited utility of market information caused by delays between when information was gathered, organized and transmitted and the time of sale. However, our findings establish that even when information was transmitted without delay; it rapidly became irrelevant because of the dynamic market.

Contrary to other research (Barrett et al., 2003; Barrett and Luseno, 2004), we did not find that price fluctuations were driven by seasonal variation. At the terminal market, sheep and goat prices vacillated between market days and were influenced by factors like the level of competition among buyers, supply of animals, breeds, and animals' body condition. As a result, we found that the 'real' prices were only known on the transaction day. This impaired the ability of traders to make well-informed buying and selling decisions (Jama et al., 2006) because, for example, the information that triggered animal purchases (e.g. high demand for a specific type of goats or high prices) was no longer relevant upon arrival. With the high price fluctuations at the terminal market, long-distance traders faced diminished profits and even risked losses. In order to deal with the demand uncertainty, traders used various strategies to cope with the information gaps such as purchasing different categories of animals in order to balance changes in the demand situation. Although these strategies helped to reduce losses, they also limited potential profits. For local traders with relatively low capital, the high uncertainty of the spot market made it difficult for many of them to sustain their small-scale businesses without additional buffer.

In our results, the quality and flow of information experienced by local traders was hampered by their lack of connection to clients with clearly defined demand specifications. For example, there was no link between the long-distance traders and buyers at the terminal market; instead, they relied on brokers who sold animals on their behalf (Roba et al., 2017). As expressed by (Pavanello, 2010, p. 18; Teklewold et al., 2008, p. 42), brokers are essential for facilitating information flow from the terminal market to traders at the primary markets. However, we observed that the dominant position of these brokers simultaneously excludes traders from accessing first-hand market information from buyers. This means that even when they continually seek information about the market, that they are not structurally in a position to have more control. This links to what Frenzen and Nakamoto (1993) said about how "macro-level" structures connecting actors influence information flow.

Lack of knowledge about buyers' preferences for animal qualities and the level of livestock supply and demand, as also indicated by (Williams and Okike, 2007) caused livestock producers and traders from our study region to miss opportunities for higher prices. Consequently, traders were unsure what prices they could attain, and whether they would make a profit or a loss. Hence, they were not in a position to offer higher prices to pastoral producers. This points to how the unequal distribution of power (Emerson, 1976) within the supply chain affects the livelihoods of those in pastoral regions.

### 5.5.2 Practical implications for policy and projects

Addressing the challenges identified in our study requires building new relations that fulfil the information needs of producers and local traders. We will review some options including information and communication technology (ICT), group marketing, product branding, and livestock auctions that potentially shift relations shaping information flow. Although this example is focused on Kenya, this process is relevant for policy that aims to support livelihoods in pastoral regions more generally.

ICT-based market information services have frequently been promoted as a solution for connecting smallholders with sellers and buyers. In Kenya, mobile phones have become

widespread among even remote rural communities, hence ICT technologies have become a realistic option (Wyche and Steinfield, 2016) For example, ICT connections have been used to connect input suppliers and smallholder farmers to ensure seed distribution (Ogutu et al., 2014). However, technology alone cannot solve the problem without social context. With lessons from rural Zambia, Milligan et al. (2011) demonstrate how new relations between farmers and urban buyers were built by establishing an interactive SMS platform to offer information on commodity characteristics, prices and buyer contacts. This has only recently become an option in Northern Kenya as mobile service, including internet, has only been available, for example in Korr in the study region, since mid-2015.

Group marketing that combines the efforts of multiple long-distance traders to aggregate a higher number of animals position them to attract buyers with whom they could pre-establish prices for a specific quantity and quality of goats. The incentive for meat processors, importers and wholesalers would be a guaranteed supply at a specified time; that could potentially reduce their overall procurement costs. These long-distance traders could ensure consistent supplies through arrangements with pastoral producer groups and possibly inter-local market traders. This would be a necessary step to diversify from the current spot market.

Product branding has the potential to enable a shift from an undifferentiated commodity market to a niche market. Establishing a process to ensure the traceability of sheep and goats from pastoral areas could benefit actors from Marsabit, because their goats are already preferred. Previous assessments of labeling and branding goat and sheep meat established the following producer advantages: i) comparatively more income than from the mass market (Mathias et al., 2010), ii) better decision-making conditions to optimize profits from preferred animals (Imami et al., 2011). However, this requires policy attention to establish reputable enforcement systems for traceability.

Lastly, livestock auctions could be a mechanism for drawing in new actors to pastoral regions. Evaluations of livestock auctions reveal a number of benefits for both buyers and sellers (Green et al., 2006; Robinson and Christley, 2007; Williams, 1993). Three benefits have been consistently highlighted: i) higher prices resulting from competitive bidding, ii) improved information flow and price accuracy, and iii) increased number of potential buyers, including processors. In Kenya, auctions were previously organized by the government between 1946 and the early 1980s (Kerven, 1992). Although the numbers transacted were generally low because of the quota set by the Kenya Meat Commission (KMC), auction sales gave pastoralist producers an alternative option for price discovery in the absence of established primary markets. However, this was abolished when the livestock market was liberalized. This weakened coordination between buyers and sellers and also shifted structural relations between diverse actors belonging to different ethnicities and classes. This liberalization was associated with few actors having the power to connect to terminal market clients, the reverberations of which are still ongoing.

## 5.6 Conclusion

This study reveals the information needs of different actors in pastoral sheep and goat supply chains, in which livestock are mainly traded in spot markets. It shows that long-distance traders had the highest information needs because of decisions related to activi-

ties to reach the terminal market were beset with unpredictability. However, the organization of structural relations that influenced information flow within the chain made obtaining accurate information practically impossible. As terminal market prices fluctuated with no recognizable pattern, classical market information systems were of limited use since they cannot reliably forecast market trends in such a situation. Thus, the profit margin of long-distance traders depended almost entirely on chance.

Based on these findings, it is necessary to recognize the central role of long-distance traders and support their business through respective policies. We recommend that future research and development efforts to focus on options for improving the structural relations between chain actors. Policy and programs that only connect pastoralists to the market without addressing how they are connected to the market will miss the mark. The aim is to strengthen relations that structure information exchange to minimize information asymmetry. In doing so, the producers and traders can make marketing decisions to earn better prices and improve their margins. That requires trust building and improving relations that facilitate fulfilling information needs of producers and traders.

## Acknowledgements

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# 6 Elusive profits: understanding economic performance of local traders in the pastoral small ruminant supply chain in northern Kenya

## Abstract

Traders are preconceived as exploitative towards producers often with minimal knowledge of the role and economic performance of their businesses. This study examines marketing costs, net-profits and return to invested capital of small ruminant traders from Marsabit County, northern Kenya. Based on 84 transactions made between 2014 and 2016, we found that 60 per cent of long-distance traders' costs are incurred in transportation and 17 per cent on permits and illicit payments. High variation in net-profit was observed among long-distance traders, ranging from less than 100 Euros to more than 500 Euros. Traders working in partnerships of two and more had low monthly incomes that hardly exceeded the minimum wage in Kenya. This monthly income arises from the return to invested capital usually between 3 and 6 per cent, showing the precarity faced by long-distance traders. The net-profit per animal and return to invested capital is higher for experienced inter-local market traders as they usually trade based on oral contractual arrangements. This study highlights marketing costs that can be moderated through policy change. Such supporting measures are necessary to stabilize the fluctuation in profit that is a threat to the sustainability of the pastoral small ruminant value chain in Kenya.

## Keywords

traders; profits; marketing costs; small ruminants; pastoral production; supply chain; northern Kenya

## 6.1  Introduction

Pastoral livestock production is an important economic activity in Kenya, particularly in arid and semi-arid areas. Livestock sales are important for pastoral household income and serve as a buffer against risks like droughts and epidemics (Otte and Chilonda, 2002). Additionally, livestock markets, when functional, play an important role in securing pastoral welfare by offering opportunities to destock and restock herds after droughts. Multiple actors, such as traders, brokers, transporters, exporters, processors, butchers and meat distributors play different roles in securing the supply of livestock to domestic and international markets, thereby enabling an estimated annual marketed livestock value of €50–80 million to be realized from pastoralism in Kenya (CELEP, 2017).

Local traders are those who purchase livestock from pastoral producers at local markets and sell to buyers in distant secondary and terminal markets. These local traders play an important role in connecting pastoralists to consumers in urban areas as they streamline the flow of livestock from a vast and very remote area (Roba et al. 2017). Particularly, for trade networks embedded in social relations interwoven by ethnicity and kinship ties, local traders lower transaction costs and reduce risks associated with challenging market conditions (Allegretti, 2017; Van Ufford and Zaal, 2004), and facilitate sharing of market

information on prices, supply and demand from terminal markets to local markets in pastoral areas (Bailey et al., 1999).

However, these studies are at odds with others that portray African pastoral livestock traders as opportunistic, (Holtzman and Kulibaba, 1994: 81) and exploitative by reaping excessive margins in the chain (Bailey et al., 1999: 14; Makokha and Witwer, 2013: 13). As large-scale traders are better resourced to gather better price information, (Nunow, 2000: 73) considers them to sometimes monopolize market information to the disadvantage of pastoralists in remote areas of northern Kenya. Also, in other agricultural value chains, traders and brokers (called market intermediaries) are often blamed for exploitation. For example, a comparison of gross profit among farmers in Ethiopia revealed that those transacting without intermediaries received 225 per cent higher gross profit (Abebe et al., 2016), while assessment of farmer-trader margins in mandarin markets in Nepal showed that the traders received 33 per cent of the margin (Pokhrel and Thapa, 2007), which is substantially above what farmers receive as net-income for their production.

Traders mainly pursue price advantages through transacting in spatially and temporally separated markets. While doing this, traders face constraints related to weak market information (Bailey et al., 1999; Pavanello, 2010), high transport costs, insecurity (Watson and Binsbergen, 2008) and price volatility at the terminal market (Barrett et al., 2003) which undermine their profits. To support the argument that the profits of livestock traders are wrought by numerous challenges, previous studies conducted in rural markets in Cameroon (Holtzman et al., 1980) and Ethiopia (Jabbar et al., 2008) have pointed out the costs and risks that considerably reduce traders' profits. The risks and constraints that they face have been documented in literature on livestock trade in pastoral regions (Van Ufford, 1999; Mahmoud, 2008; Roba et al., 2017).

Several studies, (Eze, 2007; Jabbar et al., 2008; Konaka, 2001; Van Ufford, 1999b; Williams and Okike, 2007) have empirically investigated the costs and returns of livestock traders in East and West Africa. Cost accounting among livestock traders in West Africa (Eze, 2007; Williams and Okike, 2007) linked the low net-return of traders to diverse variable and fixed costs. Traders' margins are significantly affected by transport costs which vary with change in distance between purchase and sales markets, whereby a longer distance decreased margins (Jabbar et al., 2008). Costs have been shown not to be the only determinant of variation in profits of the traders, other factors such as the trader's level of education, personal experience (Eze, 2007) and their total available working capital also influence their gross margins (Jabbar et al., 2008).

Relatively few studies have examined marketing costs and profits of small ruminant traders in northern Kenya. In Konaka's analysis of Samburu traders (2001), he showed that the margin per animal and the gross margin are higher among cattle traders than small ruminant traders. Other studies conducted in northern Kenya have mentioned livestock trade bottlenecks that potentially increase costs and reduce profits, like high transport costs (Bailey et al., 1999; Watson and Binsbergen van, 2008), high transaction costs (Barrett and Luseno, 2004) and lack of knowledge by traders on attribute preference by importers (Negassa, et al., 2008). Although marketing costs are often mentioned as constraints, no scientific study could be traced that provides quantitative figures on the extent and composition of these costs incurred by livestock traders in Kenya. Thus, the aim of this study is to assess the economic performance of pastoral small ruminant trade by ex-

amining the i) marketing costs and net-profits of local traders, and ii) strategies traders utilize to manage fluctuating profits.

## 6.2 Material and methods

### 6.2.1 Study area

Within northern Kenya, the study area of Lower Laisamis sub-county, in the southern part of Marsabit County, was selected because small ruminant production and marketing is central to its pastoral economy. It is an important source of income for livestock producers, traders, brokers, transporters and other actors along the supply chain. The sub-county covers 20,290.5km$^2$ of land classified as arid with temporally and spatially variable rainfall that, on average, is less than 200mm. The vegetation cover is predominantly bushland with mainly dwarf shrubs and acacia (Roba, 2008), that form the fodder resources for livestock production. Households usually keep sheep and goats, camels and to some extent cattle. The population is mainly comprised by the Rendille ethnic group and, in areas bordering Samburu County to the South and Isiolo County to the East, they are named Arial because of intermarriage with members of the Samburu ethnic group.
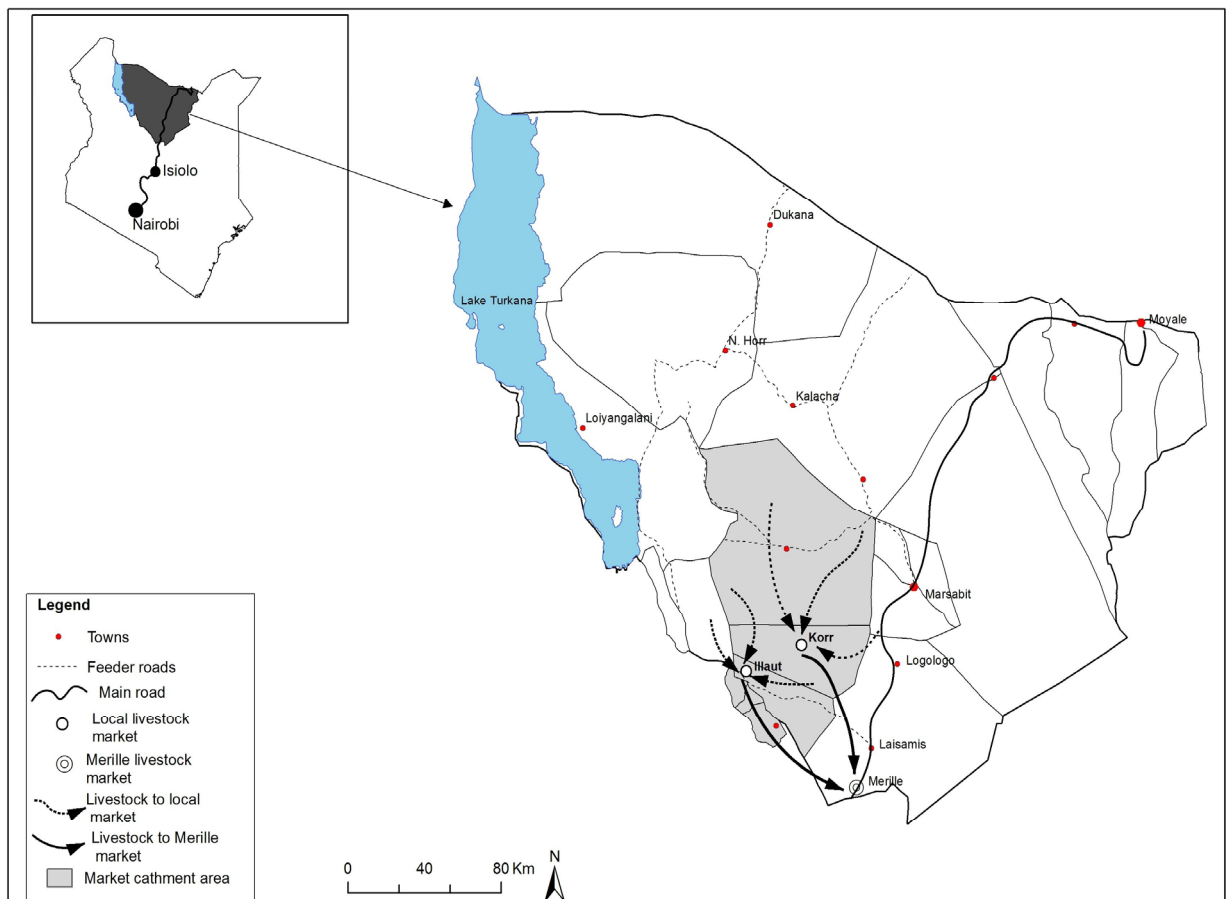


**Figure 6.1: Livestock Markets and Routes in the Laisamis Sub-County of Marsabit County**

Two primary markets located in Korr and Illaut and a secondary market in Merille are the active livestock markets within the study area (Figure 6.1). The Korr market is a weekly market, while the Illaut market is held every fortnight. The distance between the Illaut and the Korr market is about 30km. They are about 60 and 70km away from the secondary market in Merille, which is located along the tarmac road linking Marsabit to Isiolo town. The bulk of sheep and goats traded in the two primary markets are transported to the terminal market in Kariobangi, a neighborhood of Nairobi. This market is located about 600km from the study area and operates daily, trading sheep and goats from all regions in Kenya and from northern Tanzania. Some of the sheep and goats sold in the Korr and Illaut markets are trekked by traders for sale to the secondary market in Merille. The Merille market operates on a weekly basis and serves as a collection point for traders transporting livestock to the regional and terminal markets. However, some long-distance traders based in Marsabit buy from the Marsabit central market and truck animals to terminal market in Nairobi.

## 6.2.2  Data collection and analysis

The sample of traders was drawn from two categories based on their location and type of trading activities. For this study, we focused on inter-local market traders and long-distance traders. Inter-local market traders buy from the primary markets and trek livestock on the hoof to sell at the secondary market in Merille. There are two groups of long-distance traders; those who truck livestock from Korr and Illaut to sell at the terminal market and those who truck livestock from Marsabit market to sell at the terminal market.

The first author engaged with traders for 12 months overall between July 2014 and October 2016. In the first fieldwork period (July and August 2014), he established the activities and the characteristics of the actors who are active in the markets. In the same period, the first round of data collection on marketing costs took place. In total, the marketing costs for nine trips were collected from nine Korr-based long-distance traders asked to recount their most recent trip in detail. Following this, a list of market actors, including all active traders (overall about 30 traders) with their contact information was prepared.

Prior to commencing data collection on traders' business transactions over a period of 12 months, the first author established rapport and built trust with them. This was done through regular informal interactions during market visits and after the market days where he became well acquainted with all the traders and identified those who later volunteered to record trip information in a booklet. In total, six long-distance traders and two inter-local market traders were selected based on the frequency of their trading and ability to keep regular records of the trips.

Starting in July 2015, these traders were trained to systematically record data about their transactions. In the booklet, they documented: i) the number of sheep and goats bought and sold, ii) the market of origin and destination, iii) amount of working capital invested per trip, iv) the value of total sales, and iv) disaggregated marketing costs per trip. The traders with the booklet recorded this information from July 2015 to August 2016. However, two long-distance traders dropped out of trade, thus stopping the recording after 4 months. To fill this gap, in field work conducted between August and October 2016, the information on the most recent two trips was collected from four additional long-distance

traders in Korr who make frequent trips to the terminal market. The information on their transactions was obtained partly from their own records and partly recalled from memory.

In this fieldwork period, the first author additionally obtained data from three traders located in Marsabit town, to compare variations in marketing costs and profits of long-distance traders along different chains within Marsabit County. In total, 59 long-distance traders' trips and 25 of inter-local market traders' trips were captured including different chains with the following breakdowns: Illaut-Merille (25), Korr-Nairobi (51), and Marsabit-Nairobi (8). These data are used for the analysis of marketing costs and traders' net-profits.

Secondary information on the number of animals sold at the markets was obtained from the non-profit organization, Food for the Hungry, Kenya (FH Kenya) for the Merille and Illaut market. This information covers all market days from March 2014 to June 2015.

The study made use of budgetary analysis of the disaggregated marketing costs, working capital and total sales to analyze the costs and the profits. We used different measures to investigate profitability, starting with the traders' net-profit, computed as:

$NP = GP-(\sum X1.....n)$

Where (NP) is the net-profit, (GP) is the gross profit and $(\sum X1.....n)$ is the sum of marketing costs incurred by the traders in performing marketing activities. It should be noted that as small-scale entrepreneurs, the trader's own labor is not included as a marketing cost. Thus, the net-profit becomes their income.

We further calculated the return to invested capital which provides information on the overall returns to the trader from small ruminant trade. This is expressed as:

$RoiC \text{ (per cent)} = (\sum NP1.....n)/ (\sum x1.....n) *100.$

Where RoiC is the return to invested capital, $\sum NP1.....n$, is the sum of the net-profits from overall trips of one trader, $(\sum x1.....n)$ is the sum of marketing costs incurred by the trader. To supplement these analyses, we also assessed other indicators of profitability such as profit per animal and the trader's average monthly income. Descriptive statistics are provided for the marketing costs and net-profits associated with different trader categories.

## 6.3  Results and discussion

### 6.3.1  Analysis of marketing costs

Marketing costs are composed of different items that can be grouped according to activities performed at different stages by traders: costs incurred at purchase, costs of transporting and handling livestock, and the costs at sales markets. Within these groups, we identified seventeen types of costs to truck livestock and four types of costs to trek livestock (Table 9). This finding is congruent with that of a study (William et al., 2006) on cattle traders involved in domestic markets in Mali and Burkina Faso which identified, similar

categories with the exception of the extra costs of illicit payments[12] for night travel and the official health and movement permits.

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[12] This refers to extortion by police at many checkpoints along the way on the main tarmacked road between Merille and Nairobi. To circumvent the travel regulation that prohibits transportation of livestock outside the 6am to 6pm hours, traders bribe police at checkpoints. Generally, trucks starting a journey after 5pm pay higher fees due to a proliferation of police checkpoints. However, as the morning market in Nairobi is the most lucrative, many long-distance traders find it necessary to travel at night. Furthermore, lower temperature during night travel is advantageous with regard to animal welfare.

**Table 9: Components of marketing costs by supply chain, currency in Kenya shillings (Ksh)**

| Number of traders / Cost items | Long-distance traders (trucking) | | | | | | Inter-local market traders (trekking) | | |
|---|---|---|---|---|---|---|---|---|---|
| | Korr (n=13) | | | Marsabit (n=3) | | | Illaut-Merille (n=2) | | |
| | Average | SD[3] | %[4] | Average | SD | % | Average | SD | % |
| **I. Costs at primary market** | | | | | | | | | |
| i. Commission for broker | - | - | - | 5,975 | 2,964 | 8 | - | - | - |
| ii. Fee for assistant & herder | 3,164 | 1,332 | 5 | 3,140 | 2,600 | 4 | - | - | - |
| iii. Travel to Illaut, food | 1,490 | 494 | 2 | - | - | - | - | - | - |
| iv. tax per animal sold | 3,950 | 4,007 | 6 | 7,708 | 475 | 10 | 1,306 | 707 | 15 |
| *Sub-total* | *8,604* | *5,833* | *13* | *16,823* | *6,039* | *22* | *1,306* | *707* | *15* |
| **II. Transportation & handling** | | | | | | | | | 28 |
| i. Commission for lorry broker | 1,139 | 248 | 2 | 1,000 | 518 | 1 | - | - | - |
| ii. Truck rental | 27,402 | 3,105 | 40 | 22,125 | 2,475 | 30 | - | - | - |
| iii. Handling costs (loading sand and goats) | 345 | 83 | 1 | 857 | 1,069 | 1 | - | - | - |
| iv. Security fee for home guards | - | - | - | 2,333 | 816 | 3 | - | - | - |
| v. Herder accompanying the animal | 4,129 | 562 | 6 | 5,875 | 991 | 8 | 3,375 | 1,102 | 37 |
| vi. Health permit | 841 | 104 | 1 | 920 | 483 | 1 | - | - | - |
| vii. Livestock movement permit | 7,000 | - | 10 | 7,000 | - | 9 | - | - | - |
| viii. Illicit payments at check-points | 4,200 | 1,697 | 6 | 4,075 | 900 | 7 | - | - | - |
| *Sub-total* | *45,055* | *5,799* | *66* | *44,185* | *7,252* | *60* | *3,375* | *1,102* | *37* |
| **III. Costs at terminal market** | | | | | | | | | |
| i. Entry fee (Nairobi) | 337 | 150 | 1 | 575 | 104 | 1 | - | - | - |
| ii. Commission for broker (Nairobi) | 3,000 | - | 4 | 3,828 | 975 | 5 | - | - | - |
| iii. Trader's personal travel cost (fare & taxi) | 2,868 | 1,521 | 4 | 4,730 | 1,896 | 6 | 2,981 | 774 | 33 |
| iv. Tax per animal sold (Merille) | - | - | - | - | - | - | 1,384 | 656 | 15 |
| v. Loss of animals[1] | 7,787 | 6,852 | 12 | 3,000 | 4,648 | 6 | - | - | - |
| *Sub-total* | *13,992* | *8,523* | *21* | *13,133* | *2,975* | *18* | *4,365* | *1,430* | *48* |
| **Total costs** | **67,651** | **20,155** | **100** | **74,141** | **16,266** | **100** | **9,046** | **3,239** | **100** |
| Average number of animals | 180 | - | - | 180 | - | - | 40 | - | - |
| Average marketing costs per animal | 356 | - | - | 390 | - | - | 226 | - | - |
| Average working capital | 500,000 | | | 620,000 | - | - | 110,000 | - | - |
| Marketing cost as % of working capital | 13.5 | - | - | 12 | - | - | 8.2 | - | - |
| **Time spent** | | | | | | | | | |
| Buying animals and transportation | 7-14 days | - | - | 7-10 days | - | - | 7 days | - | - |
| Days in transit | 1 day | - | - | 1 day | - | - | 3 days | - | - |
| Total sale and return trip | 3 days | - | - | 3 days | - | - | 1 day | - | - |
| Maximum number of trips per year | 24 times | - | - | 24 times | - | - | 36 times | - | - |

On average, 1 per cent of animals die per trip, en route to the terminal market, 1 USD=103 Kenya Shillings, SD = Standard Deviation, % = the percentage of the total marketing cost incurred by a trader

(Source: 61 trips made by long-distance traders, 16 trips made by inter-local market traders, 2014-2016)

The marketing cost is explained by the distance to the sales market, geographical location of traders and the number of activities performed by traders. Therefore, the marketing costs vary between the three chains and among different types of traders. Marketing costs

of long-distance traders are more than 6 times higher than those of inter-local market traders. Due to the relatively short distances between the primary and secondary markets (approximately 70km), the predominant mode of livestock transfer between markets in the production area is trekking on the hoof which is relatively inexpensive (average between Illaut and Merille is 3,375Ksh for herder′s fees and food). In this chain, 70 per cent of the costs are for the travel and subsistence costs of the herders and traders.

Between the two types of traders, there is a marked difference in the required working capital. While inter-local market traders needed an average of 110,000Ksh per trip, long-distance traders required an average of 560,000Ksh per trip, for purchasing a truckload, usually 150-180 animals, and to cover the high transportation costs as detailed in section II (table 9). For long-distance traders from Korr and Marsabit, transportation and handling accounted for 66 per cent and 60 per cent of marketing costs respectively. This includes standardized payments for the official movement and health permits per truck and the varying costs for truck rental, herder's fee and illicit payments at travel checkpoints to circumvent night travel restrictions. Although transport costs were also found to be the largest cost component in previous studies on cattle trade in India and West Africa (Das et al., 2014; Eze, 2007; Williams and Okike, 2007), the detailed breakdown of these costs are missing in these studies.

Long-distance traders from Marsabit incurred purchase costs twice as high as those in Korr or Illaut. The latter costs are lower because of the organized market days in Korr and Illaut[13] that aggregate more animals, reducing efforts for traders to source the required number of animals. The benefits of organized markets in livestock production areas were also highlighted for northern Benin where the increased number of markets was linked to a reduction in cattle procurement costs as well as a decline in the number of days required to collect the herd (Van Ufford, 1999). The Marsabit market is held every day with an intermittent flow of animals from grazing areas within a radius of approximately 50km such as, Hawaye, Shurr and Jaldesa. Due to the high frequency, the Marsabit market has a lower number of animals available on a daily basis, hence increasing the time needed to gather the required number of sheep and goats through multiple visits. Marsabit traders choose to save time by partly delegating purchasing tasks to local brokers who charge commissions which increases their purchase costs.

Furthermore, traders in Marsabit pay higher taxes when buying because of closer supervision by tax collectors in Marsabit town. While the problems associated with the multiple taxes and non-transparent tax enforcement was also reported by 52 per cent of small ruminant traders in the markets in Ethiopian highland (Jabbar et al, 2008), this study establishes the actual figures for taxes and fees which account for slightly above 20 per cent of the total marketing costs, with an average of 15,628Ksh incurred per trip between northern Kenya and Nairobi. At first glance, the purchase tax in the small ruminant trade does not appear very high, but when other government-issued travel and health permits are added, these payments constitute substantial upfront investment required prior to moving the animals from the point of origin.

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[13] In Korr, market day is held every Saturday while in Illaut, the market day is held fortnightly, on the first and the third Tuesday of the month. During our fieldwork, the majority of long-distance traders in this chain conclude their purchases within a maximum of two market days which are roughly one week apart.

Traders in Marsabit had higher costs for herders accompanying animals and labour for loading sand and goats. Only traders in Marsabit incurred security costs because they are still bounded by a regulation which requires their truck to be escorted by security guards as a measure to reduce incidences of banditry attacks along the Marsabit – Isiolo highway that still happen from time to time.

## 6.3.2 Causes for varying marketing costs

In addition to variation between chains, marketing costs also differ for traders in the same chain. However, plotting the overall marketing costs against the years shows that the median value always lies between 54,950Ksh and 57,000Ksh but higher variations are observed in the single cost categories such as tax at buying markets, and loss of animals en route to the terminal market (table 9). Reasons for the variations are detailed below.
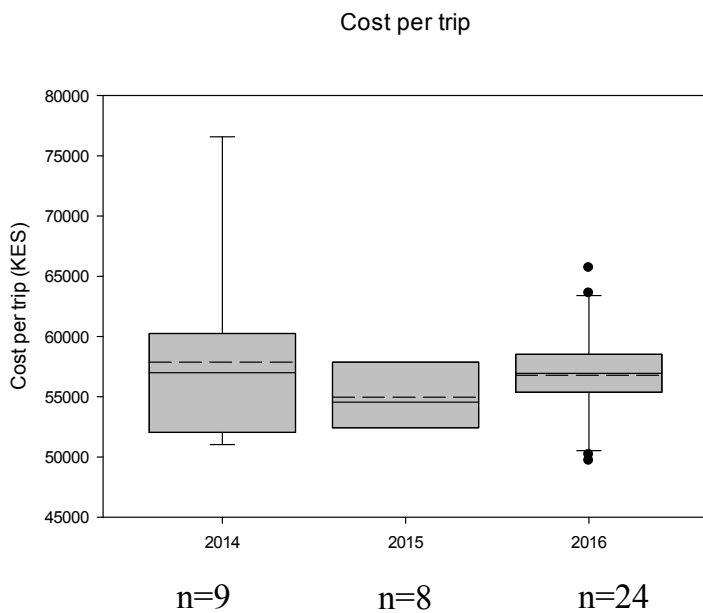


**Figure 6.2: Marketing costs for truckloads in the long-distance chains, 2014-2016 (n= number of trips).**

The box represents the middle 50 per cent of cost distribution, lower and upper 'whiskers' represent the spread of the data, the mean (horizontal broken line), median (horizontal continuous line) and the outliers (black dots).

**Supply seasonality at the primary markets**

The time taken by long-distance traders to assemble the required number of sheep and goats to fill a truck depends on primary market supply. However, sales at primary and secondary markets fluctuate between months (figure 6.3). For example, the Illaut market's supply during June-July was lowered by the onset of the dry season when most herds generally shift to dry season grazing areas which are located nearer to the secondary market (Merille). In the same period, the number of animals supplied to the Merille market increased. Because small ruminants are the first to be considered for sale to cover most household expenses, Ayele et al., (2006), observed that the sale of sheep and goats in Afar and Somali pastoral areas increased during the dry season because of higher food expens-

es and lower values of animals. As confirmed by traders, such seasonal fluctuations in supply influence the number of monthly sale trips they can make to the terminal market.
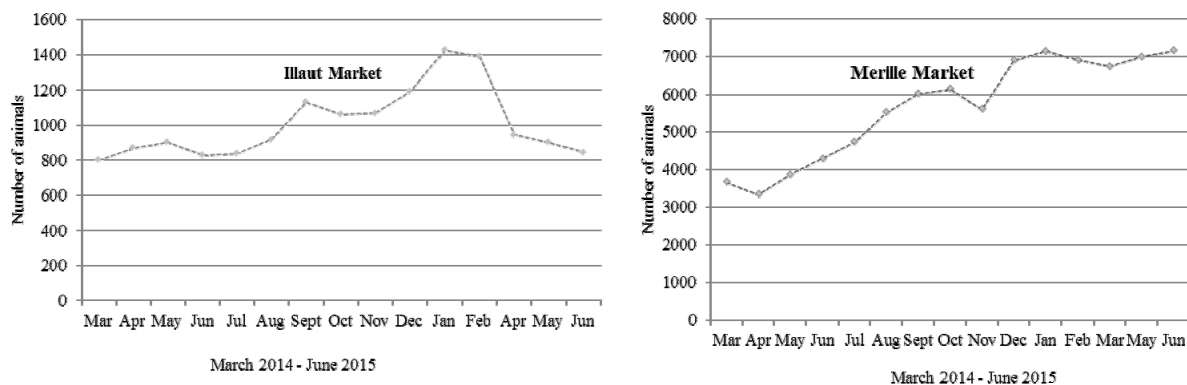


**Figure 6.3: Monthly sales of sheep and goats at primary and secondary markets**

(Source: FH Kenya (Marsabit field office), total number of the 2 market days per month in Illaut and the 4 market days per month in Merille)

Usually there are between 6 and 10 long-distance traders and 4 to 6 other traders coming to the Illaut market. When the supply is low (between 800 and 1,000 sheep and goats), traders cannot purchase the needed animals in the usual one or two market days. As one inter-local market trader puts it, 'when we [traders] come and find that there are few stocks [livestock] in the market, we buy in a rush in the morning and by 11.00 a.m there is no animal in the market[14]. Such a period of low supply typically involves additional trips to other markets which lead to costs related to repeated fare, besides the increased costs of herding and watering, as shown in the example of the extreme costs in 2014 (figure 6.2), that are about 20,000Ksh higher than the average. Traders in Korr might also visit areas such as Oltorot and Kargi and water points (within a radius of 60km) while those in Marsabit town sometimes also travel to Shurr and Hawaye grazing areas (about 50km away). As the time period increases between purchase and sale, the costs also increase and eventually squeeze the traders' profit margin.

**Varying transport costs**

None of the local traders in this study owns a truck. They depend on renting trucks from truck owners with businesses in Marsabit town. Usually, lorries that bring goods from Nairobi or other towns outside the pastoral area are rented on their way back to Nairobi. This means, in periods when the trucks are committed to other more lucrative businesses (e.g. distributing relief food within the county) or when many traders are competing for transport services, the transport costs are higher. As expressed by a long-distance trader in Korr, 'the vehicle hire normally costs 25,000Ksh per trip, but sometimes it costs 27,000 or 28,000 and during the Eid festivals it can be as high as 35,000Ksh[15]. Usually during

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[14] Interview, inter-local market trader in Illaut, (September 2015)

[15] Interview, a long-distance trader in Korr (August 2014)

festive seasons like Eid and Christmas when demand is higher, there is stiffer competition for transport service. The speed of securing a truck influences other costs of the trip. An extended search for cheaper trucks increases the period of grazing of the purchased animals which in turn increases the costs associated with watering and herding.

Although Mahmoud (2008) mentioned police 'tips' among Burji cattle traders trucking cattle from Moyale in northern Kenya to Nairobi, he did not establish the actual costs. We established that the illicit payments vary with the number of police checkpoints encountered in a trip and the time of travel. Although the average figure is currently about 4,000Ksh per trip, in extreme cases, traders pay up to 10,000Ksh. As stated in a remark made by a long-distance trader, 'so many problems are associated with trucking animals to Nairobi. In the past, when we trek animals to the market, no permit and county council receipt was required, but now, there are so many police barriers[16]. Payments of illicit costs appear to be a widespread practice among long-distance livestock traders. This is similar to an observation made more than three decades ago in cattle and meat markets in Ivory Coast, where long-distance cross border livestock trucking compels transporters and traders to offer bribes and 'gift' to police and customs officials along the route (Staatz, 1980). Strict adherence to the official travel regulation disadvantages traders from northern Kenya who would miss business opportunities[17]. Moreover, when the truck is stopped, the overall time of the journey is extended further deteriorating the animals' body condition and well-being, affecting the selling price and ultimately the traders' profit. Delays add significantly to trader's marketing costs such as through increased mortality and weight loss during transportation. In an example from West Africa, this weight loss during transit was estimated for cattle at 9 per cent body weight between Ouagadodgou and Abidjan, a distance of 1,150Km (Staatz, 1980).

**Delayed sales at the terminal market**

The number of days a sale and return trip takes is contingent on the prices and inter-linked supply and demand condition at the terminal market which influence the pace of sale and the overall cost of the trip. If the animals are not sold on the first day, traders graze them along the road reserves in the city and hold them overnight in pens in the market to sell on the next day. As confirmed by a trader from Korr, 'sometimes I go and find there are no buyers in the market and I am forced to sleep several days around the market which is expensive because I have to pay for my accommodation, where the animals stay and graze and many other petty costs incurred while waiting for the market to improve[18]. Moreover, as reported from Benin, long-distance traders face multiple risks at terminal markets, including, likelihood of losing animals at the collection stage, weight loss due to limited pasture and water in urban areas, road accidents and animal thefts at night (Van Ufford, 1999).

**Traders' strategies to reduce marketing costs**

Long-distance traders have few strategies to decrease marketing costs. One strategy is that instead of employing labor for moving the herd from primary markets to their collection

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[16] Interview, a long-distance trader in Korr (July 2014)

[17] All traders target to sell at the more vibrant early morning market between 5 and 10am, when most trading activity takes place

[18] Interview, a long-distance trader in Korr (August 2014)

point and accompanying the truck to the terminal market, they perform these activities themselves. This lowers their trip costs by up to 7,000Ksh. Furthermore, due to the high working capital requirements, traders often operate in partnerships of two or more in order to pull together the required capital. Traders in partnership also have other organizational advantages, for example, while two traders sell in Nairobi, the remaining traders may already purchase animals for a subsequent trip. Such collaboration reduces the number of days required to organize multiple trips in quick succession, which increases their monthly income.

## 6.4 Determining the net-profit of traders

Net-profits were determined by subtracting marketing costs from the gross-profits obtained by the different traders. The results show that net-profits fluctuate highly. In the following section, fluctuations in net-profit in different months of the year are presented for long-distance and inter-local market traders. Thereafter, variations in net-profits under different trading arrangements and traders' strategies to deal with the fluctuating profits are explained.

### 6.4.1 Fluctuations in net-profits of small ruminant traders

The determination of net-profits for different trips and types of traders shows a marked fluctuation in the small ruminant trade. However, the level of profits and even losses has no discernible pattern over the year and there seems to be no correlation between the number of animals sold and the net-profits (figure 6.4). Contrary to the observation by Zaal et al., (2006) who reported a pattern of price increases during Easter, Christmas, Ramadan and after monthly pay days for cross-border livestock trade over the Kenya-Uganda and Kenya-Tanzania borders, seasonal fluctuations in periods of high consumer demand for sheep and goats do not appear to affect the net-profits in our case. For example, as can be seen in figure 6.4, the high demand does not necessarily translate into good profits as the traders involved in this record-keeping experienced low profits (e.g.14,000Ksh) as well as losses (e.g. -11,500Ksh), between October and December 2015. However, Zaal et al.'s observation was based on demand and pattern of sales for cattle and small stock at different periods and not on records of costs and profits kept by traders. In this study, we observed that traders built up animal numbers in anticipation of peak demand during such festive seasons, increasing the supply and possibly contributing to a decline in prices. These results are not aligned with findings about the West African livestock market (William et al., 2006), which showed traders' profits following discernible seasonal patterns, classified into i) a peak period with generally higher price offers and better profits for traders corresponding with the rainy season, and ii) off-peak period with low prices and low traders' profits coinciding with the dry season.
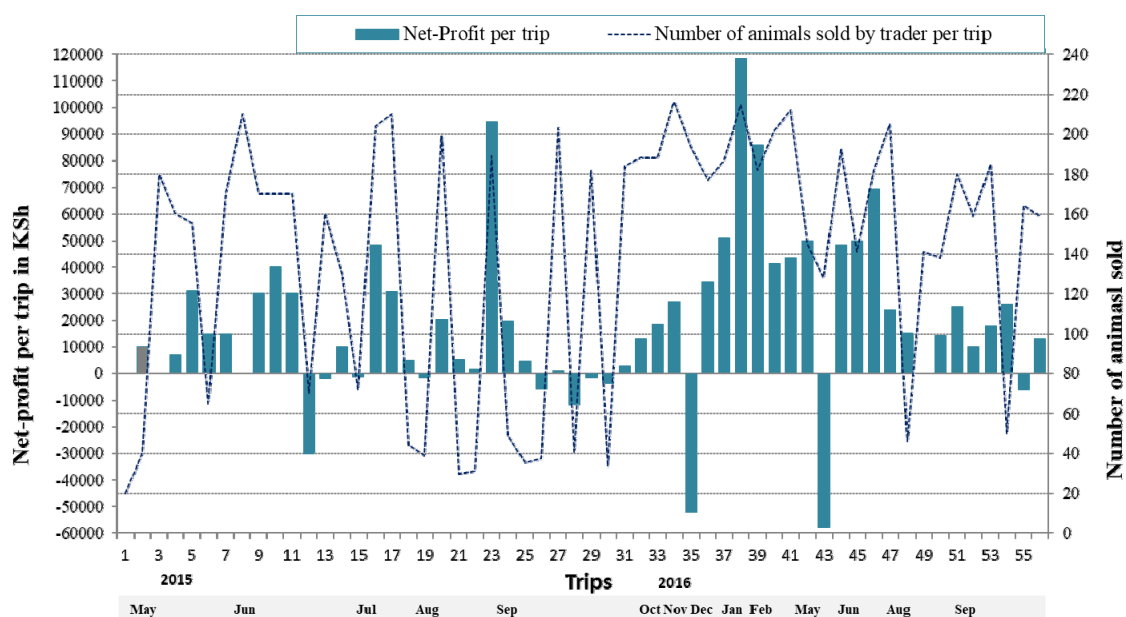
**Figure 6.4: Fluctuating net-profits of long-distance traders**

(Source: records for 56 trips of long-distance traders, data gaps in April, May and July 2016 (trips are sorted according to selling date in Nairobi)

Apart from modest overall net-profits observed in most trips, long-distance traders recorded losses in 18 per cent of their trips (figure 6.4). Despite the efforts, large investment, uncertainty and risks, 40 per cent of the trips in our sample yielded only a low profit. This low profit echoes the complaint of a trader who commented that 'in this business, I sometimes get profit and other times I operate at a loss. I was saying to myself, if I had other options, like a job, I could have left this business, but this is the only option I have for now[19]. A closer look at the pattern of net-profits among long-distance traders confirms another statement from a trader who indicated that the 'goat business is more like gambling, there are days we get good profit but there are also days we make huge losses. Even in a situation where we don't get a profit, we still have to sell them[20].

To demonstrate variability in profits among different traders, we further categorized the net-profit per trip (Figure 6.5). The result reveals that in 49 per cent of the trips, long-distance traders made a net-profit of less than 10,000Ksh (≅100 Euros) while only in 2 per cent of the trips, the traders made more than 50,000Ksh (≅500 Euros). This shows wide-ranging profits that underline the risks for reduced profits and even loss involved in the small ruminant trade arising from livestock mortality, variable and high marketing cost, and occasionally delayed or forced sales.

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[19] Interview with a long-distance trader in Korr, July 2014

[20] Interview with a long-distance trader in Merille, August 2014
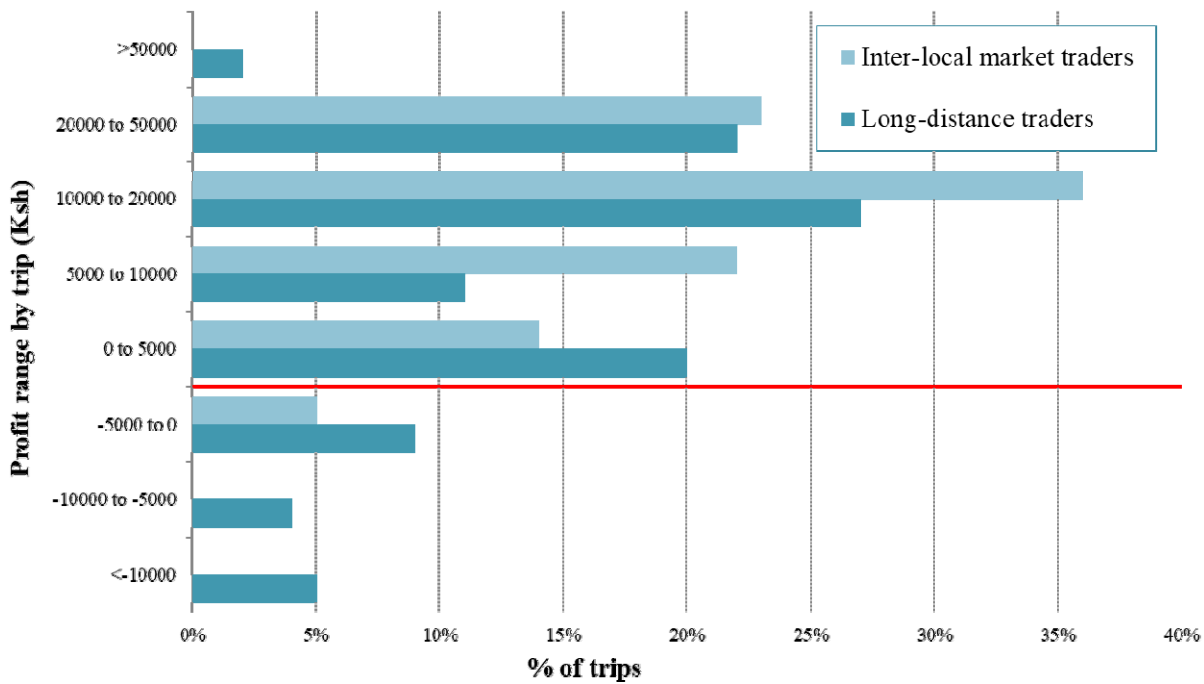
**Figure 6.5: Range of net-profit by trips**

Source: 56 trips of long-distance traders, 22 trips of inter-local market traders (Average animals sold per trip (long-distance traders, 180 and inter-local market traders, 40) and current number of trips per year (long-distance traders =19, inter-local market traders = 30)

In contrast to long-distance traders, the net-profits of inter-local market traders are more stable with losses recorded only in one trip over the sampled period (figure 6.5).
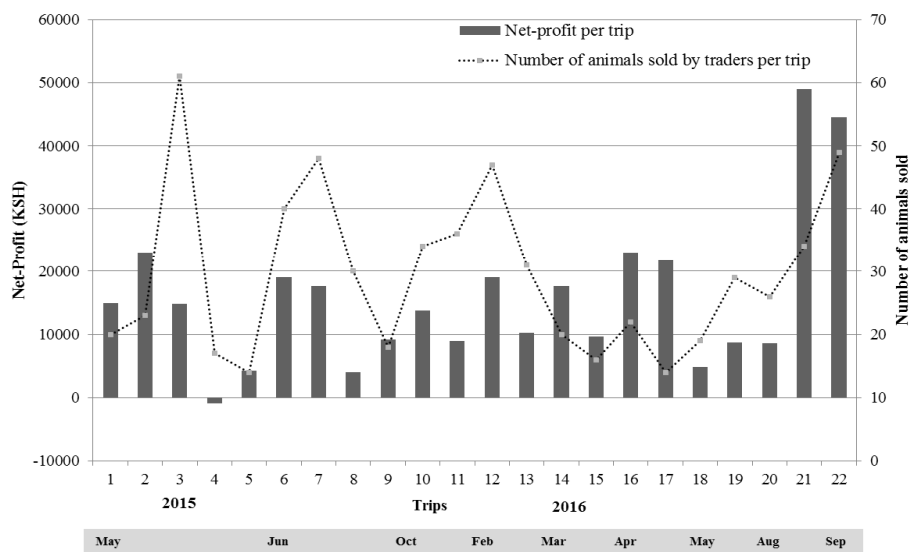


**Figure 6.6: The net-profits of inter-local market traders**

(Source: records from 22 trips, data gaps in July- September & November - December 2015, June - July 2016)

Inter-local market traders had more reliable net-profits compared to long-distance traders because they incurred lower expenses; hence their profit was largely the difference between the buying and selling prices of the sheep and goats. Secondly, at the time of this research Lower Laisamis had few inter-local market traders resulting in less competition and more advantage when bargaining with buyers. As the inter-local market traders concentrate a higher number of goats than other sellers in the area, they are positioned to gain higher prices and preference from buyers interested in bigger purchases. Finally, those who are in business for an extended period of time have regular contacts with buyers and have the possibility to make oral agreements on prices prior to purchase which assures them positive net-profit. The benefit of direct buyer relations is also confirmed by a study (Jabbar et al., 2008) in which livestock traders had higher margins per animal when there were 'long-term business relations based on trust, reliable information on price and supply, and assured delivery of products in a timely manner usually reduce transaction costs and increase unit margin' (ibid.: 14). This is further reinforced by Das et al., (2014) who observed that the marketing chain in which a producer and a buyer has a direct relationship is preferred by producers.

In contrast, long-distance traders are susceptible to unpredictable and fluctuating supply and demand and associated prices at the terminal market in Nairobi where they have little control in negotiations. Researchers have attributed low margins to distance from the sales market. Jabbar et al. (2008), established the inverse relation between the traders' margin and increase in the distance between purchase and sale markets in Ethiopian highland.

Traders work under different trading arrangements (table 10) which further influenced their profit. While the majority of traders in the study area are in a partnership of two or more, sole traders are individuals who operate their livestock business alone. The high working capital required for this means that there are relatively few traders who are able to operate as sole traders. As shown in Table 10, the net-profit and monthly income differ between traders. A sole trader has a chance to make two times as much income than those working together in group of two and, likewise, three times more than those working in group of three.

**Table 10: Net-profits of traders under different trading arrangements, 2015-2016**

(Currency, Kenya shillings (Ksh)

| Variables | Long-distance traders | | | Inter-local market traders |
|---|---|---|---|---|
| | Partners of 3 | Partners of 2 | Sole trader* | |
| 1. Number of trips | 18 | 6 | 2 | 13 |
| 2. Duration in months | 12 | 2 | 1 | 9 |
| 3. Investment per trip | 481,456 | 612,500 | 525, 000 | 110, 240 |
| 4. Total investment for all trips | 8,666,210 | 3,675,000 | 1,050,000 | 1,433,150 |
| 5. Total gross profit for all trips | 1,615,190 | 534,730 | 240,000 | 362,900 |
| 6. Total costs for all trips | 1,014,800 | 417,730 | 122,350 | 123,000 |
| 7. Total net-profit (total gross profit – total costs) | 600,390 | 117,000 | 117,650 | 239,900* |
| 8. Average return to invested capital (total net profit/total investment | 6% | 3% | 19% | 19% |

| 9. Average monthly income | 16,678 | 29,250 | 58,825 | 39,900 |
|---|---|---|---|---|
| Other measure of profitability | | | | |
| i. Average marketing cost per animal (total cost/total number of animals) | 285 | 390 | 327 | 226 |
| ii. Average net-profit per animal | 168 | 127 | 314 | 735 |

\* The excessive profit is linked to the last two trips with exceptionally high profit as shown in figure 6.5

Inter-local market traders had higher overall profitability, measured by return to invested capital and net-profit per animal. For example, a comparison of net-profit per animal showed that an inter-local market trader receives more than twice that of an individual trader with highest net-profit among the long-distance traders. The average return to invested capital varied depending on if a trader was working alone, as a pair, or as a group of three or more. In partnerships of two and three, the average return to invested capital was 3 per cent and 6 per cent respectively, whereas a trader working alone has an average return estimated at 19 per cent (table 10). However, sole trading is not a reason for high profit but rather the excessive profits is linked to the two trips whose profit fall in the highest bracket of the 2 per cent profit range in Figure 6.5. With much less risk and lower investment, inter-local market traders achieved the same average return to invested capital, also at 19 per cent. The average return to invested capital is even lower than what was established 25 years ago among small ruminant traders by Oruko, (1993), in the coastal area of Kenya, where 15 per cent return to investment were reported for the traders buying from villages and selling at primary markets and 10 per cent, per head for the itinerant traders, transacting between markets as well as the figures established by Chabari, (1986), where 17 per cent and 25 per cent return to capital were received by small ruminant traders in Nakuru and Kajiado respectively.

Overall, despite the large capital investment, effort, uncertainty and risk, local traders in Northern Kenya make a low profit from most trips and hence receive only a low monthly income, especially if they work in groups of two or more. When the average monthly income for such traders is compared with possible wages from alternative employment, we found that their income barely exceeds the monthly salary of watchmen, messengers, gardeners and cleaners which range from 11,000Ksh to 12,200Ksh[21].

Furthermore, it is important to note that traders are restricted from increasing their income by increasing the number of monthly trips. The overall number of trips a trader can make is reliant on the number of days required to gather the goats, which is affected by seasonality in supply and availability of transport. Currently traders take between 5 and 14 days to organize purchases and transportation. From the trip record, we established that a long-distance trader, as an upper limit, makes 24 trips per year while an inter-local market trader makes 36 trips.

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[21] http://www.africapay.org/kenya/home/salary/minimum-wages

## 6.5 Strategies to deal with fluctuating profit

Although the type of strategies used by traders varies with the marketing chain and over-all working capital, we identified two broad strategies used by traders: strategies to improve profits from the small ruminant trade and strategies to diversify income through alternative businesses.

To improve their profits from the small ruminant trade, traders take different approaches. An example of a strategy used by both long-distance traders and inter-local market traders is adding value by rearing and improving the body condition of animals. In this strategy, some traders use their own herd as a reserve to recover from losses or when they require additional working capital. For instance, along with their routine trading, they buy extra, mostly expectant goats to add to their herd for an estimated period of one year and later sell them strategically. Such value addition based on fattening prior to sale was reported to give higher margins to traders employing such a strategy among beef cattle traders in southern Ethiopia (Ayele et al., 2017) and a higher net income per ram among sheep traders in Nigeria (Zalkuwi et al., 2014). The second strategy common among inter-local market traders, which is also sometimes used by the long-distance traders, is inter-species bartering; e.g. camels or donkeys are bartered for goats and sheep, making use of different values attributed to different species in various pastoral communities. Another strategy occasionally used by wealthier traders with higher working capital is to shift between species of livestock. When camel prices in Nairobi are better than for goats, then these wealthier traders may switch to camels.

A common strategy among long-distance traders is to transport more sheep and goats than the 150 that are allowed on the travel permit. We found that on average, long-distance traders transport 180 sheep and goats per trip to the terminal market. When the extra animals survive the journey, the average transport cost per animal is reduced, giving long-distance traders more of a cushion to face the market price volatility at the terminal market.

Finally, some traders employ strategies to complement the livestock trade with additional income from alternative businesses like retail food shop, butchery and car hire. They capitalize on any opportunity from petty trade with items that have potential demand in the area. This includes purchasing of return merchandise in Nairobi such as ropes, veterinary medicines, shoes and motorbike spare parts to be sold in local shops, from their own homes, or in some cases through a second official business like a retail shop. However, such second business can overextend traders' time and lead to unpaid arrears that may also trap part of their working capital.

## 6.6 Conclusion and policy recommendations

Against the preconception that local livestock traders are exploitative and enrich themselves at pastoralists' expense, this study investigated economic performance, particularly marketing costs and net-profits, of inter-local market traders who sell between markets in Marsabit South, and long-distance traders who sell between Marsabit County and the Nairobi terminal market.

The cost analysis reveals that long-distance traders expends even times more for marketing costs than inter-local market traders. Per trip, over 60 per cent of the costs are spent on transportation and livestock handling and an estimated 17 per cent are for statutory permits and illicit payments. The results show that marketing costs vary across the three chains and among different types of traders. Different reasons are identified for the variation in marketing costs: the supply seasonality at the local markets, fluctuating transport costs and delayed sales at the terminal market.

We examined the profitability of traders' activities, and contrary to popular belief, we found that the long-distance traders operating in groups of two and more earn a monthly income that barely exceeds the minimum wage in Kenya from alternative employment. Compared to the high investment needed, net-profits of long-distance traders, that become income for their labour, are low which result in low returns on capital investment of 3 to 6 per cent. However, we also established that inter-local market traders can achieve a relatively high return to invested capital (estimated at 19 per cent) and higher net-profits per animal. However, the profits for all traders fluctuated widely over the course of the year.

The results on marketing costs and net-profits and the insight gained on policies and regulations can be used to devise policy changes that can help to increase profitability in the pastoral meat value chains. One measure to directly lower marketing costs is revision of the regulation established under legal notice 119 of 1984 that bans night travel for long-distance traders and creates opportunity for extortion by the police. Similarly, decentralizing the issuance of the official permits, which can currently only be done in Marsabit town, is important to reduce costs and time delays, especially in situations where traders need to act quickly to try to take advantage of a good market. In addition, a review and harmonization of local taxes (tax per head of goat sold at northern Kenyan local markets and the costs for health and movement permits) are necessary to lower the overall marketing costs.

Blaming local traders for exploitation misses the mark in terms of analysis of how they are acting within the constraints of a broader socio-economic system that is not adequately supporting pastoral regions. Therefore, development policy that merely looks to eliminate these "intermediaries" without actually assessing who is doing what and how the supply chain functions may do more harm than good. On the contrary, supportive measures are necessary as the current precarity of the local long-distance traders threatens the sustainability of the pastoral small ruminant value chains in northern Kenya.

## Acknowledgements

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# 7  General Discussion and Conclusion

## 7.1  Actors, activities and different social relations linking pastoralists to markets

This study examines the activity systems of actors in small ruminant supply chains in northern Kenya and the roles of different categories of local traders to link pastoralists to markets. The actor identification and characterization began at the producer 'catchment areas' and explored the connections along the chain towards the terminal market in Nairobi. Since the supply chain actors operate and sustain the chain in a specific context, the argument running through this thesis is that analyses of small ruminant supply chains should commence with an assessment of the actors, their activities, relationships and problem perspectives. The merits of actor and activity orientation in the study of agri-food chains was previously stressed by Handayati et al. (2015), who mentioned the importance of understanding activity interdependence as a precondition for improved supply chain coordination. The focus on actors and their activities follows the theory of second order

observation, which emphasizes that there is not a single reality but rather that different observers have different system views (von Foerster, 1984). For one to facilitate change in the system e.g. improvement in supply chain functioning, it is important to know how the actors see the system, by which activities they maintain it, their experiences and what information needs underlie their actions (Kaufmann and Hülsebusch, 2015). Through activity and knowledge analyses, one can learn about how context-related factors influence the actors' activities (Kaufmann, 2011; Restrepo et al 2016) and about prioritized problems from actor's own perspectives.

The perspectives of outsiders and local actors are not always similar. Analyses by the outsiders tend to favour macro-level interventions, such as, in the case of livestock development, increasing the number of markets and related market infrastructure (IIRR, 2014; Pavanello, 2010). NGO investments[22] in the study area[23], as well as projects executed by the county government of Marsabit[24], both with funding from international donors and bilateral agencies, focus on constructing market and slaughterhouse facilities. In the present study, local supply chain actors apparently had a stronger focus on issues such as relational and informational gaps and placed higher value on those activities that foster direct commercial benefits for them. Traders in this study expressed their main interests as being: i) a need for direct connections of long-distance traders to specific clients at terminal markets; ii) a need to harmonize multiple taxes; and iii) a need for better access to market information.

This study further assessed the functioning of pastoral livestock supply chains by differentiating between different types of traders with their respective roles and activities with regard to streamlining livestock flow from primary markets to secondary and terminal markets (figure 4.3, chapter 4). The results show the different connections between trader categories at different segments of the chain and help illustrate activity links between different actors as well as illuminate, from the perspectives of the involved actors, the existing activity gaps (table 5, chapter 4), that contribute to supply chain problems such as mismatch between the animals supplied and animals demanded, high transaction costs and losses to traders, particularly at the terminal market. The results of the actor and activity analyses show i) the typologies of local traders, differentiated into short and long-distance traders and the relationships between trader categories at different segments of the chain as well as with other supply chain actors. This complex situation is typically presented as linear in previous studies on pastoral livestock value chains (IIRR, 2014; Turner and Williams, 2002); ii) activity links between different actors which can be considered for improving the supply chain coordination; and iii) the central role of long-distance traders in connecting pastoralists to markets (figure 4.4, chapter 4). Furthermore, the interdependencies of actors performing diverse activities, revealed the gaps in activity links that affect the coordination of the upstream and downstream supply chain activities (table 5).

Previous livestock value chain studies have already mapped the linkages between livestock value chain actors (IIRR, 2014; Kocho et al., 2011; Rich et al., 2011). However, the relations between traders (sellers) and buyers (clients) have been given peripheral consid-

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[22] http://www.acdivoca.org/2016/08/kenya-regal-ag-project-builds-livestock-markets-that-transform-communities/
[23] http://allafrica.com/stories/201510141038.html
[24] http://kenyanewsagency.go.ke/en/sh-1-6-billion-slaughterhouse-underway-in-marsabit-county/

eration compared to the relations among the sellers, except in few studies such as Allegretti, (2017); Mahmoud, (2008); Van Ufford and Zaal, (2004). Findings of the present study revealed the relational gaps between long-distance traders and clients at terminal markets that contribute to the lack of information relating to prices, animal specifications and alternative market options, altogether exposing traders to demand uncertainty and economic losses. Challenges identified in this study that result from a lack of direct links to clients in urban areas are consistent with some of the findings by Mahmoud (2008), who found that cattle traders from Moyale in northern Kenya sometimes hurriedly sell their animals at low prices as soon as they arrive, to reduce living expenses and risks such as robbery and nocturnal theft of animals. In addition to increased marketing costs associated with up-keep costs of traders in Nairobi, the present study found that animals from arid and semi-arid environment have a 'limited shelf life' in the urban environment; hence major losses occur when sheep and goats cannot be sold immediately. After being taken out of their production area and exposed to different climatic conditions which often lack proper forage, their appearance diminishes, reducing their potential sale price.

The activity linking revealed relationships between local traders and other actors along the chain that facilitate transactions from primary to regional and terminal markets. For example, closer to the producer catchment areas, where the trade network is both locally and socially embedded, the mutual relationships between local traders and producers are used to source sheep and goats, which is vital to reduce supply uncertainty in a context where livestock supply is spatially dispersed. While social relations are a common feature of pastoral livestock markets (see Van Ufford, 1999; Williams and Okike, 2007), establishing trustful relationships require interactions over longer periods, thus prior relations based on common kinship, clanship or family ties in pastoral communities helps to build relations more quickly (Allegretti, 2017). This study found that in Southern Marsabit, long-distance traders usually come from the same ethnic group as the pastoralists and are in a reciprocal relationship with them; hence, it is an important aim of their activities to "help their own people". However, as the network extends towards the downstream (terminal) market, the long-distance traders lack social relations with clients who could share more precise market information, thus increasing the risk of mismatch between supply and demand and resultant economic losses to traders. When producers and traders lack knowledge of market preferences, they miss out on opportunities for better sales as well as information to inform their production and marketing decisions (Williams and Okike, 2007).

The relevance of understanding the activity links of involved actors was emphasized by Håkansson and Snehota, (1995) when establishing the type of business relationships and to know the activities that need to be synchronized for better performance of the overall supply chain. The activity interlinkages between actors in the supply chain (see table xxx, chapter 4) identified the activities along the small ruminant chain that need to be coordinated for the benefit of local traders and highlighted points where new activities are needed in order to facilitate better market connections for pastoralists. The coordination of activities between sellers and buyers require mechanisms such as contracts (oral or written) which spell out the requirements and demands of buyers that need to be fulfilled by the sellers (Arshinder et al., 2011; Handayati et al., 2015)

Overall, the activity and actor orientation in this study elucidated insider knowledge on the functioning of the chain contextualized the activity system of the traders and the differentiated roles of different types of local traders in connecting pastoralists to markets. It also revealed the current relationships that foster transactions as well as the existing relational gaps that expose local traders and pastoralists to precarity.

## 7.2 Information flow and gaps in pastoral livestock supply chains

Attention to market information flow along livestock supply chains results from the need to identify insufficiencies in information flow in the chain in order to suggest possible improvements (Schroeder and Hope, 2004) and to point out restrictions to information flow (Hueth et al., 2006). This study (in chapter 5) assessed information needs of producers and local traders, how information is exchanged and gaps in information flow between the downstream and upstream parts of the sheep and goat supply chain.

Information needs of producers and different categories of local traders vary with the activities performed by these actors. Although the geographical location of an actor and accessibility to alternative markets determine both the types and frequency of information collection, the majority of pastoralists and local traders prioritized their need for price information and supply and demand information. The importance of specific market information to coordinate and manage supply chain activities was underlined in previous agricultural product market studies (Aker, 2010; Ali and Kumar, 2011; Zhong et al., 2015). The current study revealed different types of information required to make a profit: range of prices at the market, livestock supply at the primary and terminal markets, livestock specifications such as grades in demand, the breeds of goats on offer and information on competition. Such findings raise new and interesting points to be considered for improving livestock marketing policy and related investments, particularly in the context where such information on animal characteristics (breed, age, slaughter weight) and market seasonality are known to influence livestock prices (Radeny et al., 2006), but are not transmitted to producers and traders in order to make informed buying and selling decisions.

While local traders are often seen as transmitters of price and supply or demand related information from one market to another across pastoral regions (Stuth et al., 2006), the results of this study show that this role is not generally fulfilled, given the above-described structural constraints in pastoral sheep and goat chains. The findings of the present study show that due to the long-distance between primary and terminal markets and the long period needed to gather the required sheep and goats, there is a considerable time lag between the moment that decisions about purchasing animals for transportation based on available information are made and the actual delivery for sale. This issue, along with some other factors such as unpredictable supply and demand, high variability in goat prices between different weeks, presented in chapter 5, contributes to information gaps that make local traders and thus, pastoralists miss more lucrative market opportunities such as from meat export, high-end butchers and meat wholesalers. The organization of structural relations in these chains makes it practically difficult to get market information in a timely manner and with the required specifications, particularly for actors in the upstream of the chain (e.g. pastoralists and the local traders). Although the terminal market in Nairobi is an important point of price discovery, this study shows that the long-distance traders are

challenged by fluctuating prices and shifting supply and demand at the Nairobi market creating high risks for traders who have no possibility of returning animals to the production area once they are delivered. On quick comparison, this matches with the findings by Jama et al., (2006) and Komen, (2010) who found that delays between when information is collected, organized and transmitted and the time of sale leads to limited utility of market information. However, this study establishes that even when information is transmitted efficiently; it rapidly becomes irrelevant because of the erratic prices changes in this spot market.

The finding that market information gaps among chain actors increase with distance from the markets and access to communication infrastructure supports the results of Stuth et al. (2006) obtained by studying livestock markets in Kenya, Ethiopia and Tanzania. However, distance is not the only important factor. As the present study reveals, market information changes within short time-spans, whereas the actual supply can only be ascertained on delivery day. Hence, even if there were ways to receive accurate and relevant market information in distant areas, it takes time for a trader to buy the required animals and take them to the market, so that the information received may have become obsolete. The results of this study show that in the absence of contracts, local traders bridge current information gaps by using relations with other actors, such as livestock brokers who mediate between them and clients, to facilitate fast sales and thereby avoid additional costs. They also rely on relations with lorry brokers, lorry drivers and pastoral producers in order to meet organizational and informational needs. Hence, the results demonstrate the importance of social relations to cope with organizational and informational needs along the supply chain. The significant role of social capital in minimizing transaction costs was also emphasized in other livestock marketing studies (Jabbar et al., 2006; Mahmoud, 2008; Van Ufford and Zaal, 2004). Furthermore, they are in line with the study by Bailey et al. (1999), who highlighted the importance of informal networks among livestock traders to reduce cost of information and help in enforcing contracts.

These findings can be used to inform interventions that aim to improve connections among supply chain actors and to increase their profits; overall the type of interventions that address ways of reducing economic post-harvest losses. Among the possible ways to improve information flow, the results of this study show that the types of information needs in the pastoral meat value chain could possibly be met by a combination of organized auctions reported by Bailey et al., (1999) and targeted ICT platforms using cellphone technology (Debsu et al., 2016; Jama et al., 2004). Whereas the former offers a partial solution by connecting the clients and sellers together, thereby offering opportunities for price discovery, the latter addresses the gap in market knowledge and offers possibilities to directly link long-distance traders to clients. For example, in Botswana, livestock auctions are used as important mechanisms for price discovery by farmers, in addition to weekly prices published by the Botswana Meat Commission (van Engelen et al., 2013). Up until the late 1980s, the Kenya Meat Commission (KMC) conducted similar auctions in the pastoral areas, including northern Kenya and published a weekly bulletin with specification of the animals and the prices. However, these services were terminated following budgetary constraints and operational challenges faced by KMC. This reduced options for pastoralists and local traders to receive livestock price information for the Nairobi market.

In a context where livestock producers are spatially dispersed and not in close proximity to urban markets and meat processors, Ward et al., (1996) noted that a group marketing approach could be an alternative to improve price discovery in spot markets. This approach is worth exploring in long-distance trade, as an option to move from the current spot market to direct contracts with meat processors and wholesalers in Nairobi. The links between long-distance traders and livestock marketing groups in pastoral production areas could be strengthened to meet demand for specific type of animals. A potential advantage of such working arrangements for long-distance traders would be to more quickly source the quantity and quality of sheep and goats desired by buyers and to better keep the required delivery schedule, while producers would receive more reliable information on the required animal specification, which altogether could result in more favourable conditions for price discovery.

To summarize, the analysis of informational needs and gaps in information flow revealed not only that specific information needs vary with actors' activities and position along the chain, but also complemented the information on the relational gaps identified in chapter 4. These gaps contribute to post-harvest losses related to information flow problems. Overall, this is relevant for policy and livestock marketing related investments aimed at improving pastoralists' connections to markets.

## 7.3 Economic performance of small ruminant traders in pastoral livestock meat supply chains

This study assessed the economic performance of traders in pastoral sheep and goat supply chains with special attention to local traders' marketing costs and profits. The results reveal variation in marketing costs between the long-distance and inter-local chains and between individual traders (table 9, chapter 6). On average, the marketing cost of long-distance traders is 57,000Ksh per trip while that of inter-local market traders is 9,000Ksh. The marketing costs paid by long-distance traders are thus seven times higher than those paid by inter-local market traders. While over 60% of the costs are incurred in transportation and livestock handling, an estimated 17% of the costs are for statutory permits and illicit payments per trip. The cost components identified are similar to those of cattle traders involved in domestic markets in Mali and Burkina Faso (Williams and Okike, 2007), which identified, similar categories with the exception of the extra costs of illicit payments. The finding that the transportation costs accounted for the largest cost component is also corroborated by other researchers (Delgado and Staatz, 1980; Jabbar et al., 2008; William et al., 2006). However, the cost analysis in the present study went further by disaggregating all costs that were associated with the transfer of animals to the terminal market and by combining the analysis of the activities of the traders from primary markets to terminal markets with detailed information on the costs associated with performing them.

The high marketing costs affect the profits of the long-distance traders. The monthly income of long-distance traders depended on if a trader worked alone, in a pair, or in a group of three or more. The results of this study show that long-distance traders working in partnerships of two and three received a monthly income of about 17,000Ksh which barely exceeded minimum wages from alternative employment in Kenya. Whereas, those trading in pairs earned a monthly income of about 30,000ksh and a sole trader has an average income of about 59,000Ksh. The average return on invested capital of the long-

distance traders' working in partnerships of two and three[25] was estimated at 3 per cent and 6 per cent respectively, further demonstrating their precarity. The income and returns are low, particularly for long-distance traders when assessed against their investment which is five times more than what the inter-local market traders need to invest. In comparison, an inter-local market trader received an average return on invested capital of 19%, which is one and half times more than that of the long-distance traders.

When current returns are compared with a 15% return on investment found 25 years ago in the coast area of Kenya, (Oruko, 1993), the value is still low. Low returns were also found for small and medium livestock traders as observed by William et al. (2006) in West African domestic markets when compared with higher margins of the cross-border traders. Such low return on capital is attributed to disproportionate risks faced by long-distance traders, including volatile prices, animal mortality en route and related economic losses. The risks to the long-distance traders are similar to those observed among the cross-border livestock traders in West Africa (Staatz, 1980), where physical losses of animals en route (animals going astray when in transit to the market or while in the market), deaths, forced sales and weight losses were mentioned in addition to a host of other direct costs. Apart from low returns on invested capital, high variation in net-profits were observed among long-distance traders, without observable patterns of highs and lows corresponding to specific periods. The profits of long-distance traders range from less than 100 Euros in 49% of the trips, to more than 500 Euros in only 2% of the trips. The present study further described the inherent restrictions hindering traders from increasing their income. For example, they cannot increase the frequency of monthly trips because they need between 5 and 14 days to gather goats for a return trip. These fluctuations in profits are different from findings relating to the West African livestock market. William et al., (2006), showed discernible peak profits in rainy seasons when generally price offers are higher resulting in better profits for traders, and off-peak periods during dry season with low prices and low traders' profits.

Interestingly, the finding revealed that inter-local market traders had higher overall profitability, measured by return on invested capital and net-profit per animal because of the advantage of trading in markets which are cheaper to access and located within the production area, so that most traders transact directly with their clients. This is surprising, because usually price differences between different markets in the production area are much lower than between the local and terminal markets. However, it turned out that better returns are attributed to specific strategies of some traders. The experienced inter-local market traders make use of long-term relations with clients resulting in oral trade contracts. Additionally, they mentioned two extra options to make better sales: i) to proceed farther to regional markets in Archers Post and Isiolo in case the Merille market prices are low; and ii) to choose to graze the animals for a week or two in case the price is low and sell them on one of the subsequent market day, without that the body weight of the animals is negatively affected because of extended waiting period. These strategic options followed by some inter-local market traders to make higher and relatively stable net-profits support previous research by Jabbar et al. (2008) who noted the instrumental value of long-term business relationships between traders and clients (and reliable information on price and supply) for reducing traders' transaction costs and increasing margins.

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[25]  Partnership of two and three is the commonest way the long-distance traders from Marsabit south work

The assessment of the marketing costs and net-profits unravelled the deeply entrenched myth of 'exploitative' traders, at least for the specific case of long-distance traders in the study area. From the results, the combination of the high amount of capital invested (an average of 5,500 Euro), average marketing costs of 57,000Ksh (approx. 550 euros) per trip, low return on capital invested, high variations in net-profits and low monthly income illustrate the precarious nature of business. Furthermore, the fact that all indicators for profitability are higher for inter-local market traders compared with long-distance traders, points to the relevance of adopting some of their strategies. Therefore, efforts to connect long-distance traders more directly to clients at the terminal market in Nairobi or to explore alternative markets such as meat exporters, high-end butchers and meat wholesalers might be promising options to raise their profit.

## 7.4 Reflection of methodology and limitations

For the research to be well-grounded in the perspectives of supply chain actors, it is important that methodologies are chosen that can reveal information that is relevant from the perspective of the respondents. A better understanding of the actors' perspectives brings to the fore their positions and resources as well as the social context of the exchange (Hinrichs, 2000). The choice of the methodology was based on the view of the food systems as a social construct where the actions and practices of the actors are viewed as shaping the social life of commodities (Arce and Marsden, 1993). Therefore, this thesis places an emphasis on the careful identification of relevant actors. It followed a stepwise approach (see Figure 3.2, Chapter 3) developed at the preliminary stage of the study that involved: selecting a specific sheep and goat supply chain, actor identification and initial characterization, problem analysis, stakeholder analysis, selection and integration of participants into research.

To understand actors along the chain, the study began with actor identification and characterization to explain their roles, interest and challenges. Actor characterization commenced from pastoral producer areas and subsequent connections from the initial producer 'catchment' upstream to different actors with whom they currently interact and eventually learn about with whom they could potentially interact downstream, as detailed in chapter 4. A limitation of this approach was that information on downstream actors remained incomplete. The long-distance between the local and terminal markets, of about 600 km, coupled with the longer timeframe required to identify downstream actors made their identification a challenge.

To achieve a thorough understanding of the actors' activities and their problem views, the present study used an innovative methodology. Narrative interviews were used to allow the traders, or "informants", to structure the interview based on their own relevance system (Bauer, 1996). In the interview, the respondent first gives a narration to respond to the initial question of the interviewer. Then in the course of the interview, the interviewer only expands on the points mentioned in the narration by asking "can you tell me more" until they get to specific narrations of single events (Hollway and Jefferson, 2008). This method helped to generate a detailed description of the important events in sheep and goat trade from the initial entry to the current situation of different types of traders. It included traders' routine activities and the description of relationships between them and other actors in the chain. This method also gave broader insights on the actors' perspectives on

how supply chain problems are contextualized. Getting information on the personal experiences of the supply chain actors allows for the understanding of the details of the operation of the chain. The strength of this approach lies in its ability to build better historical perspectives of the supply chain, yield information about the changes over a certain period and to capture issues in the sheep and goat supply chains from the perspectives of different actors at different segments of the chain. However, one limitation of the method was that respondents at times exaggerated issues, particularly to stress specific problems important to them, and in other cases, did not mention aspects that were of less interest to them. However, triangulation with other methods was used to reduce such bias.

Other approaches were used to complement the narrative interviews conducted with traders. Stakeholder meetings including various actors active in and influencing the pastoral meat value chain and focus group discussions were used to build a rich picture of the chain. The perspectives of diverse actors that emerged from the dialogue allowed for a more comprehensive understanding of the chain. For example, the intra-stakeholder meetings with actors of a specific actor category (e.g. with producers only or specific trader category) helped to elucidate problem perspectives at specific segments of the chain and the room for manoeuvre of different actors of the same actor group. The interactions in the multi-stakeholder meetings further improved the primary actors' understanding of secondary stakeholders and the power dynamics that specifically disadvantage upstream actors (pastoralists and local traders). However, the main shortcoming in the stakeholder processes was the difficulty of sustaining them. As an attempt to facilitate the stakeholders to go beyond problem identification to actions to resolve specific problematic situations, a series of stakeholder meetings were facilitated during this study. However, sustaining these stakeholder meetings were challenged by a lack of adequate participation by the traders. Traders had many responsibilities competing for their time, especially during the dry seasons when their time was split between two parallel commitments i.e. management of their own herd and routine business activities. The attendance of the meetings was further hampered by the limitations of transport services in the area; especially in a situation where traders needed to cover considerable distances. Therefore, the stakeholder process did not cover all activities initially planned, including, the step where the actors would try new practices and options with the goal of improving their situation.

The simultaneous collection of traders' costs and other trip transaction details for both short period (1-2 months) and long period (12 months) provided data to compute the marketing costs and profits based on both short and long-term periods. The analysis and interpretation of the data from the traders, explicate the cost-related challenges previously mentioned in other studies in northern Kenya (Barrett et al., 2006; Barrett and Luseno, 2004). However, this could only yield information on traders' costs and profits and does not show the differences in the costs and profits of other actors along the chain. It was, however, a challenge to get some illiterate traders to keep transaction records and only the traders with willingness to participate in regular record keeping could be engaged. In doing so, some individual active traders without the ability to keep records were omitted which reduced the amount of the data available to compute the marketing costs, profits and other related analyses. However, many traders in partnerships of two or more usually had at least one literate trader in the group who could keep records.

Overall, the use of mixed methods proved useful to deepen the knowledge of the organization of the pastoral sheep and goat supply chains and highlighted important results that can inform discussions on options to improve benefits to the pastoralists and local traders in northern Kenya. This analysis offers insight for taking steps to improve the quantity and quality of goats and sheep delivered to markets in Nairobi as well as improving the financial situation of traders; hence contributing to a reduction in post-harvest losses in this pastoral meat value chain.

## 7.5 Research needs

Although there are many research needs that could be pursued, four areas have been identified needing particular attention: stakeholder processes, downstream investigations, opportunities from ICT related investments, and policy implications. These research needs were identified based on the results of the present study and are elaborated in the following paragraphs.

### 7.5.1 More research on stakeholder processes

This study identified different stakeholders and initiated stakeholder meetings at different levels of the local livestock traders and other upstream actors such as brokers, local butchers, livestock marketing committees and representatives of livestock marketing groups. These stakeholder meetings identified the problems faced by pastoral producers and local traders as well as the power dynamics between stakeholders. However, stakeholder collaborations to explore the actions to improve the problematic situation were not institutionalized due to time constraints and the challenges of managing simultaneous activities in the field. Therefore, one future research area remaining is the expansion of stakeholder processes by taking it beyond problem identification to specific aims and actions to seek solutions to the problematic situations, also by including the downstream actors.

### 7.5.2 Downstream investigations

Another important extension to the present research is to expand further research to include downstream actors. Such an extension towards the terminal market would allow additional information on the operation of meat businesses and the downstream organization of the supply chain. One possible topic, of immediate relevance to traders, is the identification of Nairobi clients, including their demand specifications and livestock or meat procurement procedures. Secondly, based on the information from the long-distance traders regarding preferences for goats originating from Marsabit County for tender meat, it would be important to investigate this "preference". Such a study could inform the ongoing and future efforts to brand meat products by the county government of Marsabit and other county level stakeholders.

### 7.5.3 Opportunities from ICT related investments

This thesis identifies a broad range of market information needs of traders and producers as well as highlights information gaps affecting their marketing decisions. With this estab-

lished, it would be useful to explore how these information gaps can be bridged, including through mobile phone-based ICT platforms. Therefore, another possible area for further study is the assessment of opportunities for exploiting mobile networks and internet data connectivity in information exchange in livestock markets. Past efforts regarding ICT based research and intervention in Kenya have mainly focused on the farm product markets while livestock markets have remained rather marginal.

## 7.6 Policy implications

The results of this study have some policy and development implications. The findings revealed that the sheep and goat supply chains are characterized by multiple structural challenges, including price volatility, information asymmetry and uncertainty in demand and supply leading to diverse risks that contribute to narrow profits and the post-harvest losses experienced by traders. Therefore, in order to improve the benefits for pastoralists and local traders, governmental agencies and international donors need to broaden their attention beyond development of physical infrastructure. Improving connections between long-distance traders and clients in terminal markets, as well as efforts to differentiate products through branded meat products, has the potential to foster change in livestock production and marketing strategies. This study suggests that for upstream actors to bene-fit from their engagement with the livestock market, they need to be better positioned e.g. through established contracts between the traders and clients that specify livestock prices, animal characteristics and other relevant market information. Overall, such efforts would better synchronize the activities of downstream and upstream actors.

The results on marketing costs and net-profits pointed to policies and regulations that should be changed to increase profitability of the small ruminant trade. The results sug-gest that one important measure to lower marketing costs would be to revise the regula-tion that bans night travel for long-distance traders and thereby creates opportunity for ex-tortion by the police. This regulation that stems from colonial time which was designed to protect the white settler's interest systematically disadvantaged the traders from northern Kenya by restricting them from responding to instantaneous demand conveyed by Nairobi brokers while an extended travel time leads to livestock weight losses or mortality. Gen-erally, night travel is more animal friendly, because often the temperature is low, the jour-ney is faster due to less traffic and there is greater likelihood that the traders will catch the more vibrant early morning market that offer better prices.

## 7.7 Conclusions

In this study, the analysis of the actors, activities and relationships in pastoral sheep and goat supply chains were combined with the assessment of market performance to address the question of reducing post-harvest losses, particularly its economic aspects, in sheep and goat supply chains originating in pastoral areas of northern Kenya. The results re-vealed that diverse types of local traders sustain the sheep and goat trade by linking pas-toralists to local, regional and terminal markets in a finely-branched supply chain. They also showed how traders and other actors manage the supply and demand uncertainty through relationships between them. Furthermore, the results indicate relational gaps that disadvantage traders through a lack of information leading to low net-profits, high operat-

ing costs and economic losses hence rendering the local traders unable to offer better prices to pastoralists. Particularly, lack of direct links to clients in Nairobi increases the marketing costs and narrows the net-profits and subjects them to price fluctuations, thus contributing to the precarious situation of long-distance traders. The results from the activity analysis reveal upstream and downstream linkages required to improve supply chain coordination that are needed to shift from the vagaries of the spot market to an alternative arrangement where traders can strike more beneficial agreements with clients.

Producers and local traders in sheep and goat supply chains face constraints resulting from market information gaps. The severity of constraints differs from one category of trader to another with long-distance traders most impacted. Generally, the organization of structural relations within the pastoral livestock chain influences information flow and determines the timeliness and relevance of information obtained. In particular, the fluctuations of terminal market prices do not follow discernible patterns, making typical market information systems of limited relevance because they cannot reliably forecast market trends. Thus, the current trading decisions of long-distance traders and the eventual profit margin are largely dependent on chance. Although traders use their social networks to respond to information deficits, these networks have limited potential to provide the required market information to facilitate timely decisions. Therefore, the question of how pastoralists and traders are connected to the markets rather than whether pastoralists are connected to markets comes to the forefront.

While the attractiveness of the sheep and goat trade depends on the profit and ultimate income received by pastoralists and traders, high marketing costs along with low and unpredictable net-profits affect the traders' income. Particularly for these long-distance traders, high and variable marketing costs, resulting in narrow profits and losses in some trips severely affect the sustainability of long-distance traders' activities. The upfront investments required for the purchase and transportation of the livestock to the terminal market are currently high compared to the income attained, making it practically impossible for most traders to raise this capital alone. Furthermore, the fluctuating and modest net-profits of traders working in partnerships, as well as low return on invested capital affects the sustainability of the long-distance traders' business. In contrast to most inter-local market traders, the majority of long-distance traders have no stable and assured positive income. This study reveals the precarity of traders in the sheep and goat chain and highlights areas in which economic aspects of post-harvest losses can be reduced through options for cost reductions, better coordination of activities and improved information flow.

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# 8 Appendices

**Appendix 1a: Time series plot for prices of different goat grades at the terminal market in Nairobi, 2013-2015**
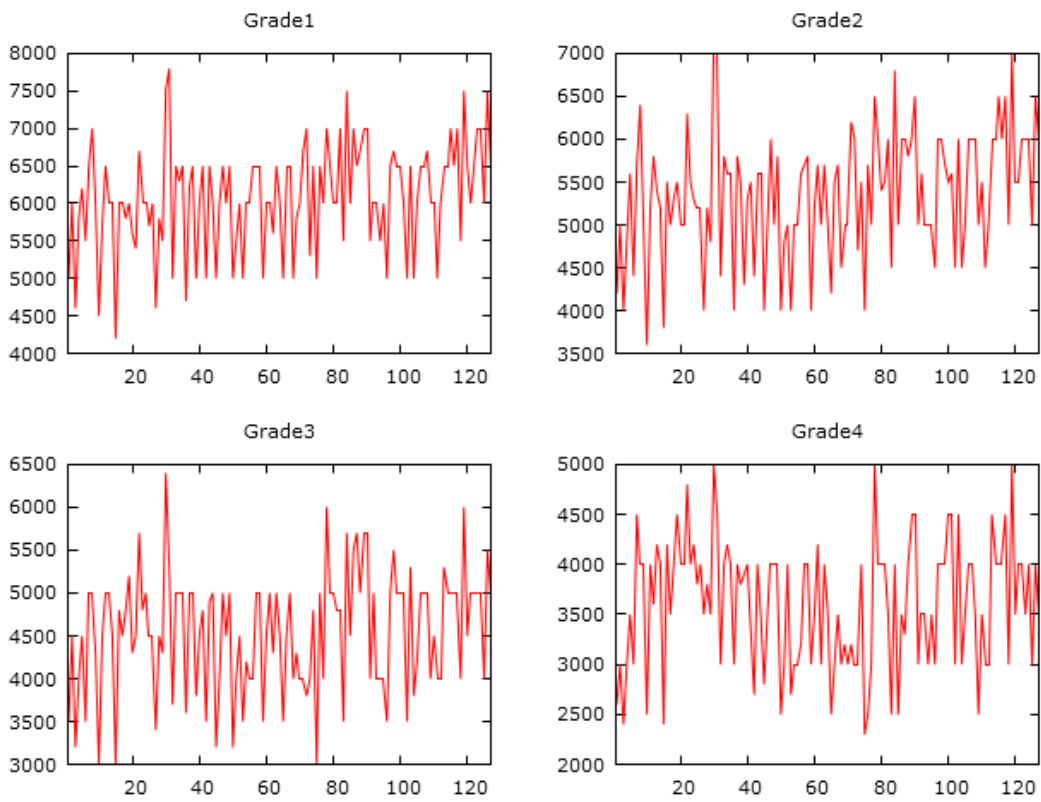


Y-axis=prices in Kenya shilling, X-axis= time periods in weeks

**Appendix 1b: OLS using observations 2013-01-03:2015-06-04 (T = 127)**

| Variables | Grade1 | | | | Grade 2 | | | |
|---|---|---|---|---|---|---|---|---|
| | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* | *Coefficient* | *Std. Error* | *t-ratio* | *p-value* |
| Constant | 5696.55 | 120.031 | 47.46 | <0.0001*** | 4296.25 | 122.164 | 35.17 | <0.0001*** |
| Index | 5.86345 | 1.62740 | 3.603 | 0.0005*** | 3.87256 | 1.65632 | 2.338 | 0.0210 ** |
| $R^2$ | 0.094080 | | P-value(F) | 0.000453 | $R^2$ | 0.041899 | P-value(F) | 0.020973 |
| Adjusted $R^2$ | 0.086832 | | F(1, 125) | 12.98120 | Adjusted $R^2$ | 0.034235 | F(1, 125) | 5.466469 |
| | Grade 3 | | | | Grade 4 | | | |
| Constant | 4296.25 | 122.164 | 35.17 | <0.0001*** | 3564.38 | 113.044 | 31.53 | <0.0001*** |
| Index | 3.87256 | 1.65632 | 2.338 | 0.0210** | 0.544268 | 1.53266 | 0.3551 | 0.7231 |
| $R^2$ | 0.041899 | | P-value(F) | 0.020973 | $R^2$ | 0.001008 | P-value(F) | 0.723103 |
| Adjusted $R^2$ | 0.034235 | | F(1, 125) | 5.466469 | Adjusted $R^2$ | -0.006984 | F(1, 125) | 0.126105 |

$*p < .05, **p<.01, ***p<.001$

Notes: We fitted time series plot with 10 and 20 lags and the analysis showed a slope parameter that closely matched the inflation rate at that time, which is 5.7% to 6.9%. The autocorrelation and partial autocorrelation functions gave similar results with insignificant P-values for coefficient of the lags which confirms weak link between previous and current prices.
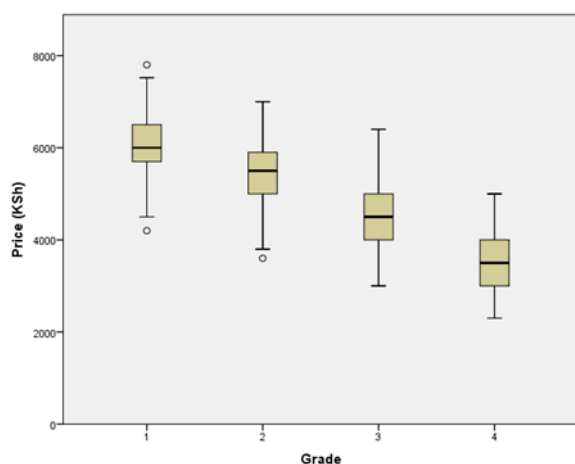


**Appendix 1c: the results of multiple comparisons**

**Dependent Variable:  Price**

Notes: The box plot indicates price differences between the grades; outliers for grade 1 and 2 are not significant. Levene's test demonstrated homogeneity of variance at $p = .561$. One-way analysis of variance (ANOVA) showed significant difference in mean prices between the different grades, $F (3, 502) = 298.307$, $p < .001$ independent of the time.

Two-way analysis of variance ANOVA (cf appendix 1d) showed that the interaction between grade and time was not significant. Hence, we assume that the prices develop in parallel.

**Appendix 1d: the results of multiple comparisons**

Dependent Variable: Price

| | (I) Grade | (J) Grade | Mean Difference (I-J) | Std. Error | Sig. | 95 % Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| Tukey-HSD | 1 | 2 | 725.354* | 86.660 | .000 | 501.97 | 948.73 |
| | | 3 | 1527.717* | 86.660 | .000 | 1304.34 | 1751.10 |
| | | 4 | 2471.011* | 87.006 | 000 | 2246.74 | 2695.28 |
| | 2 | 1 | -725.354* | 86.660 | .000 | -948.73 | -501.97 |
| | | 3 | 802.362* | 86.660 | .000 | 578.98 | 1025.74 |
| | | 4 | 1745.657* | 87.006 | .000 | 1521.39 | 1969.93 |
| | 3 | 1 | -1527.717* | 86.660 | .000 | -1751.10 | -1304.34 |
| | | 2 | -802.362* | 86.660 | .000 | -1025.74 | -578.98 |
| | | 4 | 943.294* | 87.006 | .000 | 719.02 | 1167.57 |
| | 4 | 1 | -2471.011* | 87.006 | .000 | -2695.28 | -2246.74 |
| | | 2 | -1745.657* | 87.006 | .000 | -1969.93 | -1521.39 |
| | | 3 | -943.294* | 87.006 | .000 | -1167.57 | -719.02 |

*. The mean difference is significant at the 0.05 level.

# Questionnaire for assessing market information flow

1. What are the activities you perform from purchase at the local market to the terminal market in Nairobi?

2. What information do you need to effectively do each of your activity?

3. Where do you get this information from?

4. Do you get all required information to make marketing decision? If no, which information is missing? and why?

| Activity | What information do you need to undertake this activity | Where do you get this information from? | What information is missing? |
|---|---|---|---|
| A1 | | | |
| A2 | | | |
| A3 | | | |
| A4 | | | |

5. What improvements are needed to foster better information flow?

# Guide for stakeholder analysis

**Appendix 1e: Overview of the methods and purpose of different tools**

| Objective | Method | Purpose | Participants |
|---|---|---|---|
| 1. Problem formulation | Problem tree analysis | Understanding the causes of the problem and what stakeholders' see as possible option to deal with the problematic situation. | Groups of stakeholders in a workshop |
| | Issues & consequences | A table showing the problem, causes and the possible solutions. | Groups of stakeholders in a workshop |
| 2. Relationship analysis | Venn diagram | To identify and analyse institutions in sheep and goat supply chains, relationships to represent different individuals, groups and organisations within pastoral meat supply chains. | |
| 3. Stakeholders Interest | Interest – priority matrix | To identify key institutions and individuals with power to influence change and decisions | Groups of stakeholders in a workshop |
| 4. Analyse power and influence | Net map | To understand what aspects of the research will likely interest different stakeholders and what their role will be in collaborative research process | mix- individual interviews and group exercise |

**Problem formulation – (problem collected individually will be discussed anonymously in group meetings)**

**Output**

- Specification of the problems from the actors' perspectives

- Tease out the important matters that are unresolved and discuss possibilities of dealing with them

**Relevant questions**

- What are the major problems in sheep and goat marketing?

- What are possible causes of the problem?

- What problems are seen as urgent by different stakeholders? By whom?

- What problems are associated with different segment of the supply chain?

- Who is affected by the problem? And who else is working on the problem?

- Why was finding the solution difficult?

**Methods**

a) Problem tree

b) Causes and consequences matrix

1.  **Tool 1: Problem tree analysis**

**Activities:**

*Step 1 – Develop the Problem Statement*

- Getting a complete picture – share problems identified by individuals anonymously in a plenary discussion (from first interviews)

- Complete the problem list by brainstorming more after the presentation

- Narrow the list by discussing the importance of the problems and the extent to which they can be grouped

- Each of the sets of problems selected then needs to be explored by the team in more detail using relevant questions above

- Begins by placing an index card—with the problem written on the card—in the centre of an open space. The index card should include words to describe an existing problem;

*Step 2 - Identify major causes*

- Ask participants, to identify the major causes leading to the problem.

- Note the name of each cause on an index on another card and place the index card underneath the card representing the problem

- The facilitator asks about each cause, "How does this (cause) lead to the problem?"

- Record explanations given by participants.

*Step 3 - Identify root causes*

**The "but why" technique**

- The "But why?" technique examines the major cause by asking questions to find out what caused it. Each time an answer is given, a follow-up "But why?" is asked to indicate the chain of events leading to each of the major causes leading to the problem.

- For example, the issue is that actors like the traders and producers don't have access to market information; one can ask "but why?" Once you come up with an answer to that question, probe that answer with another "but why?" question, until you reach the root of the problem.

- The rule of thumb is to ask, "What leads to _____?" five times for each major cause that leads to the problem or until the participants cannot think of anything further.

- Continue this line of questioning for each major cause leading to the problem.

- Have participants, using consensus, graphically show the chain of events leading to the problem, by placing a symbol on the ground and drawing lines between symbols in a way that links the causes in the order mentioned.

- We ask these questions to look in-depth at a problem to try and understand its underlying root causes. This is so that we can address problems by developing solutions that address root causes rather than superficial symptoms.

*Step 4 - Identify "most important" root causes:*

- Once the problem tree is completed, the group then selects, from among all the root causes identified, the ones they consider to be the major sources of the problem – sticking dot can be used here where each participant place their vote

- Encourage participants to rank among those causes farthest down the 'branches' of the problem tree.

- Ask about and record explanations of why some root causes are ranked highly important.

*Step 5 - Identify root causes that are both important and changeable:*

- Ensure that there is a card or symbol for the root causes identified as "most important" in the exercise above.

- Ask participants to re-arrange the symbols for the "most important" root causes in order of "changeability" from most changeable to least changeable.

- Divide the ordered root causes in half and into two groups: most changeable and least changeable.

- Suggest that the "most changeable group of root causes be the focus of intervention.

2. **Tool 2: Issues, consequences & solutions**

**Relevant questions**

- What do the stakeholders see as possible reasons (or causes) for the problem situation?

- How do the stakeholders perceive the consequences of the problem situation?

| Causes | Consequences |
|--------|--------------|
|        |              |

3. **Stakeholders' interest and role in collaborative research**

**Output:**

- Understand the stakeholders' needs and wishes for the future related to problems identified

- Understand their perception and point of view on issues urgent and important

**Relevant question**

- What are your specific interests and why are these issues important to you?

- What are your expectations of the research project (dialogue process)?

- What knowledge do you have that will help in finding possible solution?

**Stakeholder´s interest**

- List different stakeholders interviewed in a table and build on the relevant information.

| Actor | Interests | Priority |
|-------|-----------|----------|
|       |           |          |

4.  **Relationship Analysis (stakeholders & their relationships)**

**Venn diagram**

**Output**

- Visual picture to identify and analyse institutions, relationships to represent different individuals, groups and organisations within pastoral meat supply chains

- Highlight the perceived importance of different relationships,

- Their degree of interactions - through positioning of actors

- The constraints in the relationship and discussion on ways of improving such relationship

**Activities:**

**Step 1:** Revisiting feedback from previous field work

Share initial information from first field work

- Put all names of identified stakeholders on cards and present to the stakeholders

**Step 2:** Divide the stakeholders into groups according to the section of the supply chain and ask them to arrange the cards according to the relationship between different stakeholders

**Step 3 (visualise the relationships):** Ask the stakeholders to arrange the circles on paper to represent which type of relationships among the various organisations identified. E.g.

draw a large circle on the paper, representing the producers for example, and then put a circle representing the producers at the centre. Ask the group then to place each organisation close or near the group circle, to represent how closely they work together. For example:

- Separate circles: no contact among institutions or individuals.

- Touching circles: information is shared between them.

- Small overlap: some collaboration and cooperation in decision making.

- Large overlap: considerable collaboration and cooperation.

**Step 4:** Ask the stakeholders to revisit the Venn diagram to identify any missing stakeholder

**Step 5 (discuss& characterise the relationships):** When the diagram is complete, discuss the relationships further

**Further Discussion on the Venn diagram**

- Which organisations/institutions/groups/individuals are working with you on these issues?

- Which institutions/groups do you regard as most important, and why?

- Which organisations are addressing the issue we are investigating?

- What are the most important relationships? And why?

- What sorts of coordination occur now? What gaps and overlapping can be seen with respect to coordination?

- What factors could stakeholders improve to improve the performance?

- What role will different stakeholders play in regard to the issue

**Characterising the relationships between the individuals and the organisations in Venn diagram**

- What is the object of the relationship? (Information exchange, credit service, extension services etc.)

- What is the importance of the relationship? (Essential, important, not so important, etc…)?

- Ask the participants to place a sticker next to the relationships they would most want to improve.

- What sorts of coordination occur now? What gaps and overlapping can be seen with respect to coordination?

### 5. Net-Map (Tracing Power and Influence in Networks) (follow up after Venn diagram)

**Aim:**

- To understand and visualise who has power and influence to make change happen or influence decisions
- To discover local power dynamics and facilitate more effective collaboration

**Relevant Questions**

- Who in your chain has power and/or influence over this issue?
- Who would be absolutely essential in a planning process to gain improvement in marketing challenges currently faced?

**Activities:**

- Use stakeholders already assembled on Venn Diagram with different links and network
- Define 'Influence/Power' and put actors on Influence Towers
- Qualitative discussion (focus on the sources and effects of influence)
- Add links to be established or strengthened in the future (answers to questions like 'To achieve these goals which links, would you want to establish in the future?", 'Any actors to add in the future?", 'What alliances are needed to achieve these goals?"

**Stakeholder collaboration: actions to implement research and collaboration**

**Output:**

- Discussing promising ideas for improving the problematic situation in the chain
- Preliminary identification of possible actions for improving problematic situation.

**Follow up questions**

| What actions are needed? | What are specific activities to achieve the action? | Who does what and when? | | | What resources are required to do the activity? |
|---|---|---|---|---|---|
| | | On our own | With others | By others | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**Activities:**

- Start with brief overview of what was already discussed and agreed upon e.g. problems formulated

- Draw an action matrix.

- Ask participants to identify possible action or strategy to address specified problem.

- Ask participants to think about potential activities which will make those actions come about and put these in the left-hand column.

- For each activity, ask participants who should carry it out. Should it be done by them alone? With others? Or by other people or organisations? Write the names of each person or organisation in the appropriate column.

- Now ask participants to consider what resources will be required to implement each activity successfully. Write these resources in the last column.

- Agree with participants which individual people will take the lead responsibility for each activity to make sure it is done. Write the names of these people next to each activity.

- Ask participants to look at the action plan as a whole. Does it make sense? Is anything missing? Is it realistic?