

International Livestock Research Institute

Livestock traceability system for domestic and export markets in pastoral areas
of East Africa: An outline of the traceability database

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Acknowledgements

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Background

This livestock identification and traceability project is being implemented under a partnership research agreement between the International Livestock Research Institute (ILRI) and the African Union – Interafrican Bureau for Animal Resources. It is one of the activities supported by the Standard Methods and Procedures in Animal Health project funded by the United States Agency for International Development. One of the planned outputs of the project is a traceability database that can be used to demonstrate the feasibility of traceability systems in the local and international markets in the region. This report outlines the structure and content of the database that was developed and used in a pilot study implemented in parts of northern Tanzania and southwestern Kenya in the last quarter of 2014. The methodology section also gives general information on the study area and the identification methods used.

Methodology

Study area

Figure 1 shows a map of the study area and the trade routes involved in the study. Some of the supply chains terminate in the Dagoretti slaughterhouses in Nairobi although most serve local slaughterhouses in Ewaso Ng'iro, which also supplies large quantities of beef to Nairobi. These chains were purposively selected in a stakeholder workshop that preceded the pilot study since they represented the busiest supply chains in the region.

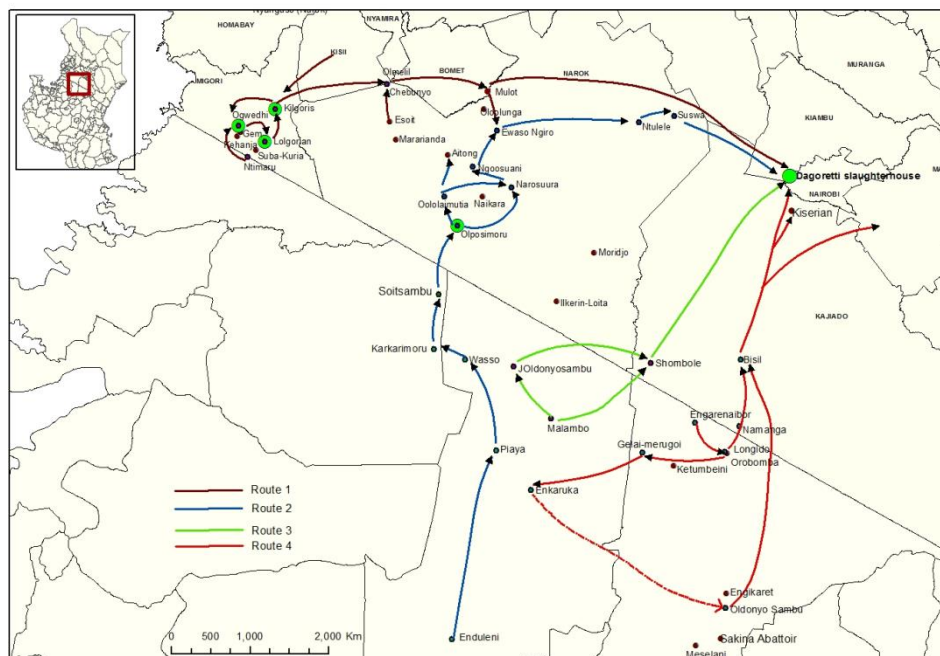


Figure 1: Map of the livestock identification and traceability pilot study area in northern Tanzania-southwestern Kenya showing the market chains selected for the study.

Animal identification methods

The pilot study was implemented along the market chains up to the slaughterhouses in Narok and Nairobi but the traceability system could get back to the production units, depending on the accuracy of the information collected at the primary markets. Animals were identified at the primary markets using three identification methods: plain ear tags, back tags and paint. However, paint was not preferred by the traders because they felt that it interfered with their system of identifying animals that had been purchased or sold. Back tags had pre-coded numbers whereas the plain ear tags used a numbering system which consisted of a letter indicating the country of origin (*K* for Kenya and *T* for Tanzania), three letters that represented the administrative region where the animal came from (NRK for Narok and NGR for Ngorongoro District) and a four-digit serial number.

Data capture system

Data on animal locations and movements along the selected market chains were collected by enumerators using the Open Data Kit Collect Android application (<https://opendatakit.org/use/collect>) which ran on smart phones. The data collected were submitted to an online database (<http://azizi.ilri.cgiar.org/aggregate>) where they were collated and interlinked based on the animal identification. The online database is hosted on ILRI's research computing cluster. The different types of data collected are listed in Table 1 and a screenshot shown in Photo 1.

Table 1: Data collected at the markets used in the pilot study in northern Tanzania and southwestern Kenya

Subject	Characteristics
Market	Name GPS location
Animal	Identification number and method (ear tag, back tag, paint) used Source (farm or another market) Next destination (market, back to farm, slaughter) Sex Colour Age category Entering or exiting the market
Owner (producer or trader)	Name Telephone contact Specify if entry or exit or stock check
Slaughterhouse	Traders details (name and phone contacts) Animal ID Immediate source of the animal being presented Inspection result in summary
Laboratory	Specify if sample is taken (barcode id of the sample linked to the animal ID) Sample identification number Tests done (antibiotic residue; brucellosis)

id	date	enumerator	gps_coord Latitude	gps_coord Longitude	gps_coord Altitude	gps_coord Accuracy	which_status	which_current_market	which_setter	which_setter_name	which_number	animal_details	end	meta timestamp
2014-11-03 10:46:24.0	2014-11-03 10:46:24.0	joy_karia	-1.81366545	35 4880825	1981.0	5.0	arriving_market	otpusimonu	farmer	KASOSI	+254716436983	View	2014-11-03 10:49:29.0	uid:57472 ec40-40a 427 588615d95c
2014-11-03 10:34:49.0	2014-11-03 10:34:49.0	alex_oturi	-1.81363533	35 48805277	1998 90002441	5.0	arriving_market	otpusimonu	trader	Olempusia	+254704671296	View	2014-11-03 10:56:42.0	uid:a89499 03 R03-478 86a 61a038a0c
2014-11-03 10:04:04.0	2014-11-03 10:04:04.0	naguran_abbin	-1.81362372	35 48812006	1983.0	5.0	arriving_market	otpusimonu	farmer	MORJOI	+254713304706	View	2014-11-03 10:53:48.0	uid:380a32 03 83c7-407e 807a 688ccbc4795
2014-11-03 11:10:28.0	2014-11-03 11:10:28.0	alex_oturi	-1.8136954	35 48810952	1992 80004883	5.0	arriving_market	otpusimonu	farmer	Oletman	+25470689505	View	2014-11-03 11:14:25.0	uid:960089 03 9840-4403 896 1093c264fc
2014-11-03 10:53:01.0	2014-11-03 10:53:01.0	john_naadokila	-1.81360708	35 48812049	1995.0	5.0	arriving_market	otpusimonu	farmer	Hampaso	+254715272846	View	2014-11-03 11:20:04.0	uid:00818a3 03 6106-4503 9886 44603c699
2014-11-03 10:55:14.0	2014-11-03 10:55:14.0	joy_karia	-1.81364707	35 48798493	1970.0	5.0	arriving_market	otpusimonu	farmer	LOKOWAN	+254716436983	View	2014-11-03 10:56:28.0	uid:98284a3 03 0357-48c7 8028 30b59f1a88
2014-11-03 11:52:52.0	2014-11-03 11:52:52.0	john_naadokila	-1.81369458	35 4880821	1993.0	3.0	arriving_market	otpusimonu	trader	Ole Mako	+254729765600	View	2014-11-03 12:00:52.0	uid:8a8899 03 1885-476a 4097a05b13
2014-11-03 11:18:51.0	2014-11-03 11:18:51.0	alex_oturi	-1.81362529	35 48795168	1975 69995117	5.0	arriving_market	otpusimonu	trader	Oletman	+25470689505	View	2014-11-03 11:23:53.0	uid:85937a7 03 3977-440b 9399 8896b33596
2014-11-03 10:58:09.0	2014-11-03 10:58:09.0	joy_karia	-1.81359788	35 48783935	1980.0	5.0	arriving_market	otpusimonu	farmer	OLEPAPAJAT	+254716436983	View	2014-11-03 11:01:42.0	uid:aa6110 03 2311-4243-81 816 0378-434898
2014-11-03 12:41:32.0	2014-11-03 12:41:32.0	john_naadokila	-1.81362482	35 48797295	1976.0	5.0	arriving_market	otpusimonu	trader	Olemoyare	+254708557026	View	2014-11-03 12:47:33.0	uid:7e295a7 03 8876-401e 8897 687284246
2014-11-03 11:26:14.0	2014-11-03 11:26:14.0	alex_oturi	-1.81362145	35 48806114	1982 30004893	5.0	arriving_market	otpusimonu	farmer	John	+254781918250	View	2014-11-03 11:32:54.0	uid:602271 03 42bc-4e81 8429 64267c9a99
2014-11-03 11:01:58.0	2014-11-03 11:01:58.0	joy_karia	-1.81361003	35 48801956	1988.0	5.0	arriving_market	otpusimonu	farmer	OLEPAPATANY	+254716436983	View	2014-11-03 11:06:40.0	uid:812c41 03 895-4c38-816 1196-40.0 6271a86977
2014-11-03 10:59:25.0	2014-11-03 10:59:25.0	alex_oturi	-1.81357333	35 48808781	1984 69995117	5.0	arriving_market	otpusimonu	farmer	Olpadidy	+254723574480	View	2014-11-03 11:04:34.0	uid:602058 03 28c7-4cbb 87a2 50928a747
2014-11-03 11:04:18.0	2014-11-03 11:04:18.0	alex_oturi	-1.81361459	35 4880704	1981 19995117	5.0	arriving_market	otpusimonu	farmer	Olekaura	+254727890645	View	2014-11-03 11:48:58.0	uid:5880c8f 03 7787-4860 8172 8634067207

Photo 1: Screenshot of raw data as submitted to the online database from the mobile data collection points.

The database

A relational database was designed to store the data which were collected and automatically submitted from the field. The database includes a visualization module that makes it possible to track and view the animal movements from the markets to the slaughterhouses. This module can be accessed freely from http://azizi.ilri.org/modules/mod_lits.php. Photo 2 shows a screenshot captured from the visualization module.

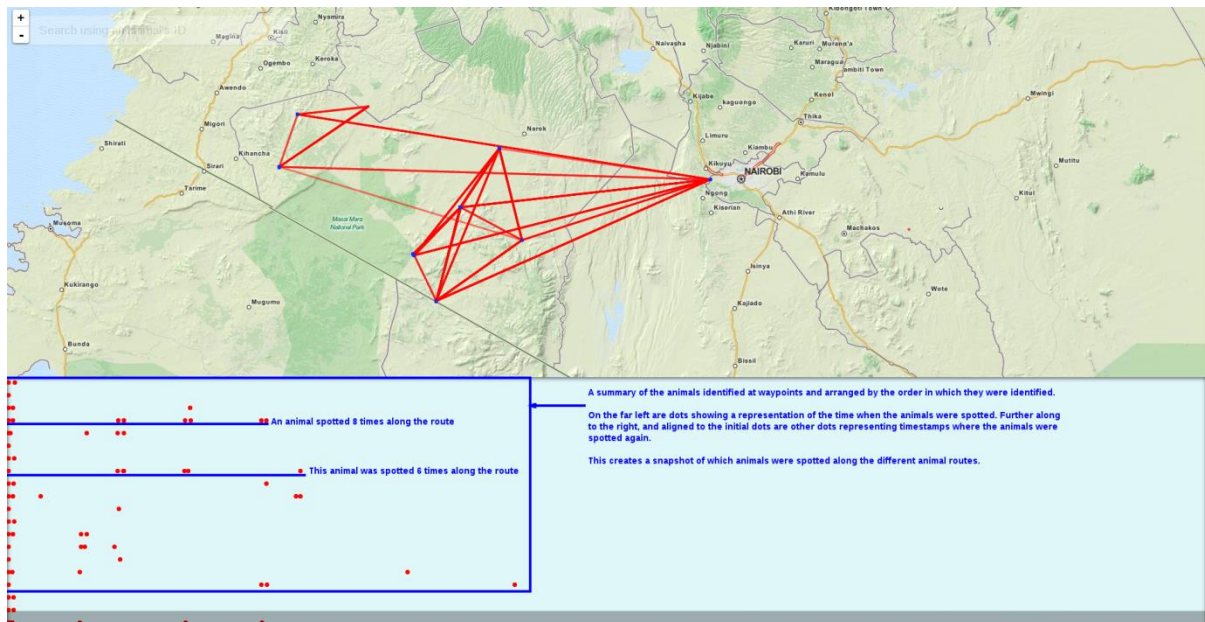


Photo 2: A screenshot showing how animals were tracked along the trade routes.

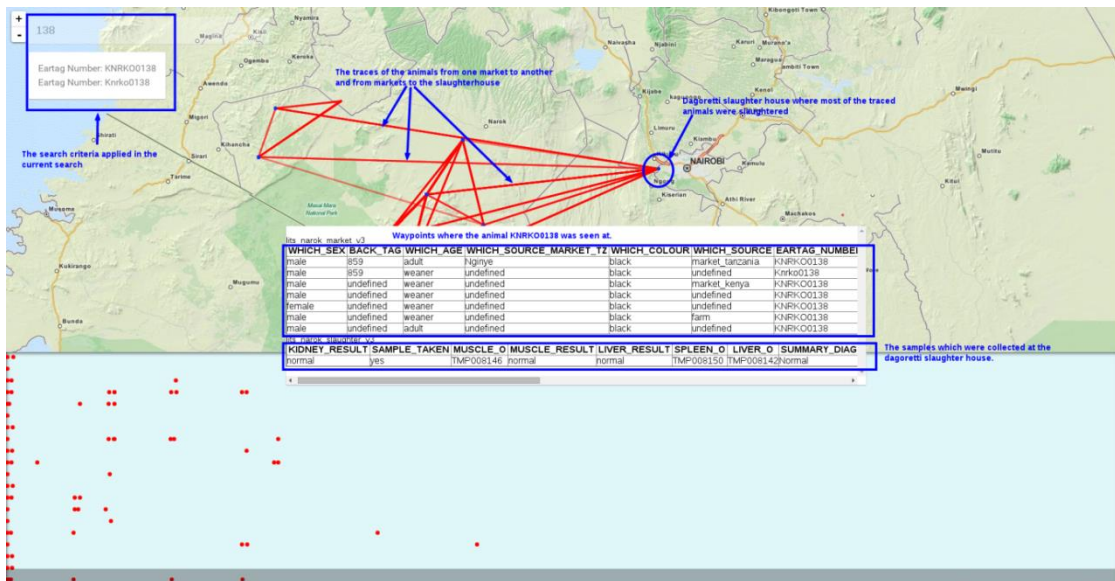


Photo 3: A screenshot showing the different parts of the livestock identification and traceability system visualization module.

Applications of the database

The data have been analysed to show the frequency of live animal movements between markets as illustrated in Table 1 and Photos 1, 2 and 3. The database has 1700 records; over 800 animals were tagged within Narok (records from Tanzania are still being cleaned). This implies that, on average, there are two records per animal representing entry and exit entries made in the markets. From this number, only 146 were recaptured in two slaughterhouses (Ewaso Ng'iro, 73% and Dagoretti, 27%) which had been included in the surveillance. The recapture rates are, however, low (less than 20%) and there is need for enactment or enforcement of policies to enhance increased uptake and coverage. The current database is therefore being prepared for use in stakeholder sensitization workshops involving decision-makers and targeted value chain actors as an initial step to improve knowledge on livestock identification and traceability capabilities.