ILRI MANUAL

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Improving small ruminant productivity in pastoral systems of Kenya: ODK-based tool for monitoring performance of sheep and goats

Improving small ruminant productivity in pastoral systems of Kenya: ODK-based tool for monitoring performance of sheep and goats

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International Livestock Research Institute–Ministry of Agriculture, Livestock, Fisheries and Cooperatives, State Department for Livestock

Regional Pastoral Livelihood Resilience Project

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List of Abbreviations

CIG	Core Innovation Group
GPS	Global Positioning System
ID	Identification
ILRI	International Livestock Research Institute
JKUAT	Jomo Kenyatta University of Agriculture and Technology
MALFC	Ministry of Agriculture, Livestock, Fisheries & Cooperatives State department for Livestock
ODK	Open Data Kit
RFID	Radio Frequency Identification
RPLRP	Regional Pastoral Livelihood Resilience Project

Background

The Government of Kenya through the Ministry of Agriculture, Livestock, Fisheries & Cooperatives State department for Livestock (MALFC) contracted the International Livestock Research Institute (ILRI) to contribute to the World Bank-aided Regional Pastoral Livelihoods Resilience Project (RPLRP) Kenya. The objective of this initiative is to enhance livelihood resilience of pastoral and agro-pastoral communities in cross-border drought-prone areas. ILRI is contributing to improving livestock productivity in three counties – Turkana, Isiolo and Marsabit – through herd management and community-based breeding. The range of activities being implemented directly contribute to the RPLRP activity – Developing community breeding programs, under the objectives: i) to maintain the genetic diversity of indigenous livestock while improving their productivity and ii) to promote behaviour, change and reorient producers' mindset to be more commercial.

This manual has been developed to help guide extension personnel working among pastoral communities to collate information on existing sheep and goats within these populations, monitor changes over time and guide the introduction of new management practices to improve flock productivity. The publication outlines sections in a paperless data capture tool developed using the Open Data Kit (ODK, https://opendatakit.org/). The ODK was identified as the most optimal format for open source paperless data capture. The tools developed in ODK are available through android-based mobile phones and are presented in Annex 2 of this document.

Overview of the tool

ODK-Collect is a phone-based replacement for paper forms that is built on the android platform. When using the ODK, users need to understand and adhere to basic principles of designing and implementing surveys and the collection of continuous monitoring data. Details on general installation and use of ODK-Collect are available at Using ODK Collect.

This monitoring tool in ODK has been designed to transmit data electronically directly to a centralized database managed by ILRI on behalf of MALFC. Within the tool there are separate modules to enable fast and accurate collection of interrelated information on animals being monitored and requisite management practices implemented. Guidance has been provided on relevant constraints, anticipated range of data values to incorporate, and where necessary, choices for the variables in different sections of the tool.

The data collected is linked to specific activities. These include:

1. Registration
2. Monitoring performance
3. Monitoring management practices
4. Feed and water resources

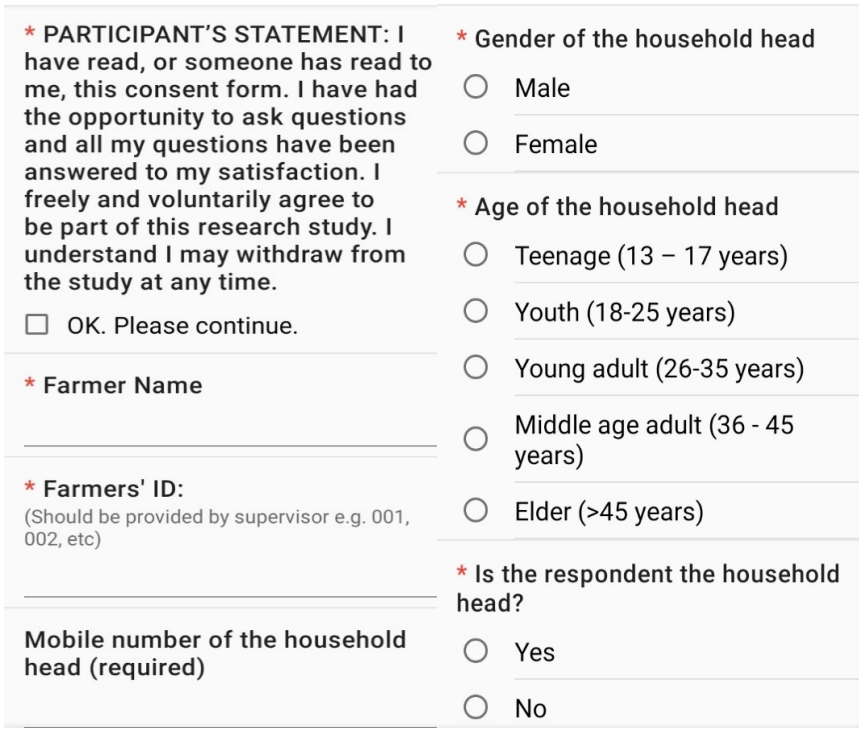
1 Registration

1.1 Registration of households

Pastoralists in targeted communities who are willing to participate in the RPLRP project are required to provide their consent. This is done following interactions with the community (Core innovation groups)[1] through which objectives of the interventions and anticipated outcomes are outlined. The consent form that is signed by each participant is presented in Appendix 1.

Households selected to participate in the monitoring activities need to be rearing sheep and/or goats, and belong to community-based Core Innovation Groups (CIGs). During registration, the livestock keepers provide information as illustrated in Figure 1.

Figure 1. Details provided by livestock keepers when registering for animal performance monitoring



Note

i. The registration of specific livestock keepers is done only once.

1 Ojango, J.M.K., Oyieng, E., Audho, J., Gitau, J., Kangethe, E. and Gachora J. 2020. Core Innovation Groups for Livestock Improvement. Nairobi, Kenya: ILRI

ii. Each registered livestock keeper is allocated a unique identification (ID) number in the system before their animals can be registered. The ID given can be easily related to a specific location for future reference.

Once a livestock keeper has been registered, information on the characteristics of their household is obtained. The demographic data includes details related to members belonging to the household. Individuals who are present in a household for less than three months are not considered members of that household. Information collected on household composition provides an indication of how many people would be affected by the planned intervention.

1.2 Registration of animals

Following registration of the livestock keeper, the animals of interest that belong to the household are registered in the database. It would be desirable to have all the animals owned by the pastoralist household registered. However, the owner is permitted to determine which animals should be registered for monitoring.

Each animal registered must have a unique identification. They can be identified using:

i. a plastic ear tag with an electronically bar-coded or with an alfa-numeric label.

ii. a radio frequency identification (RFID) microchip.

At registration, the following information is obtained on the animal: its species, breed, dentition, sex, date of birth (if not a specific date, then the month and year are adequate), type of birth, body measurements, coat colour, and its parents as illustrated in Figures 2 and 3.

Figure 2. Details obtained on individual sheep and goats at registration

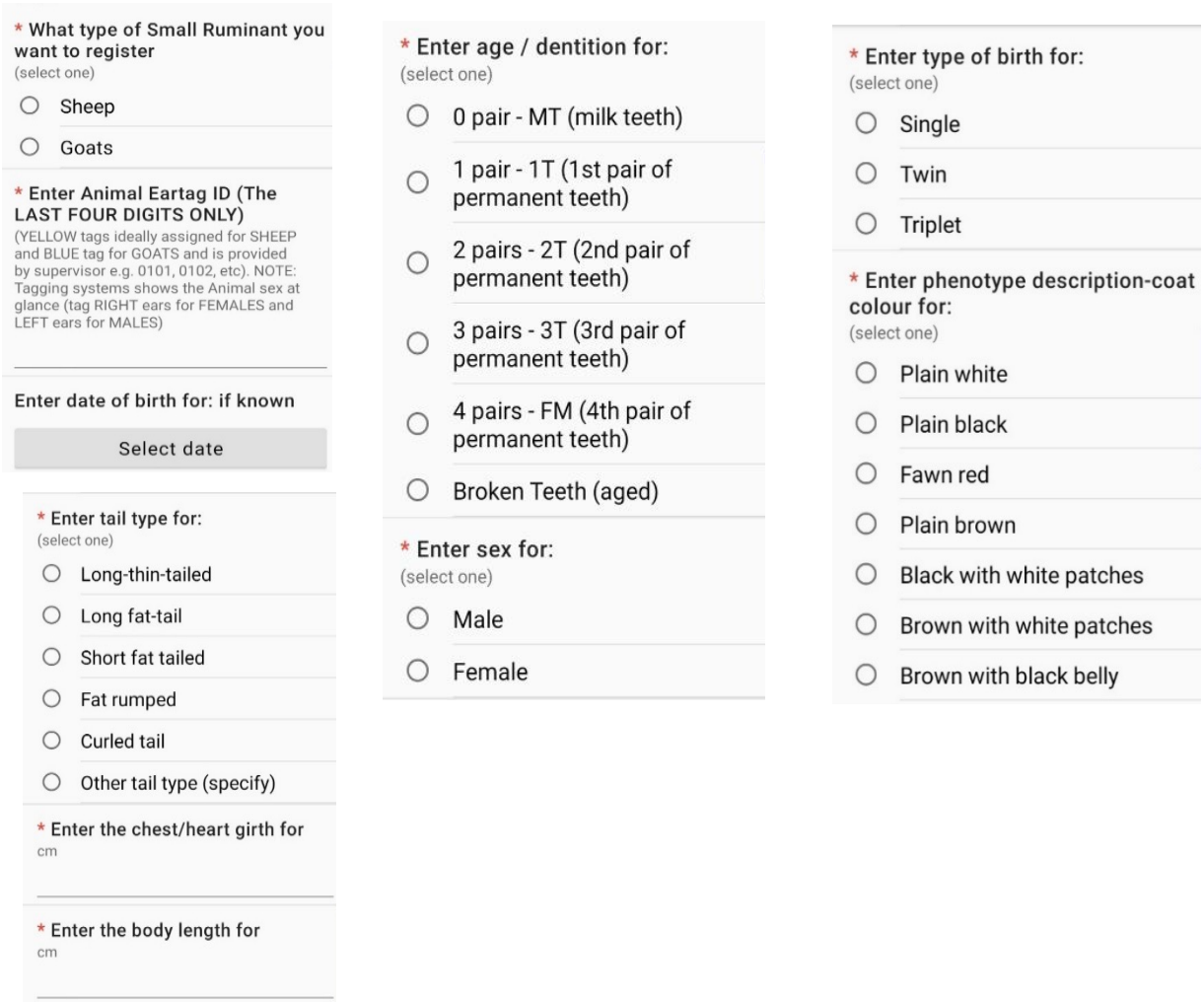
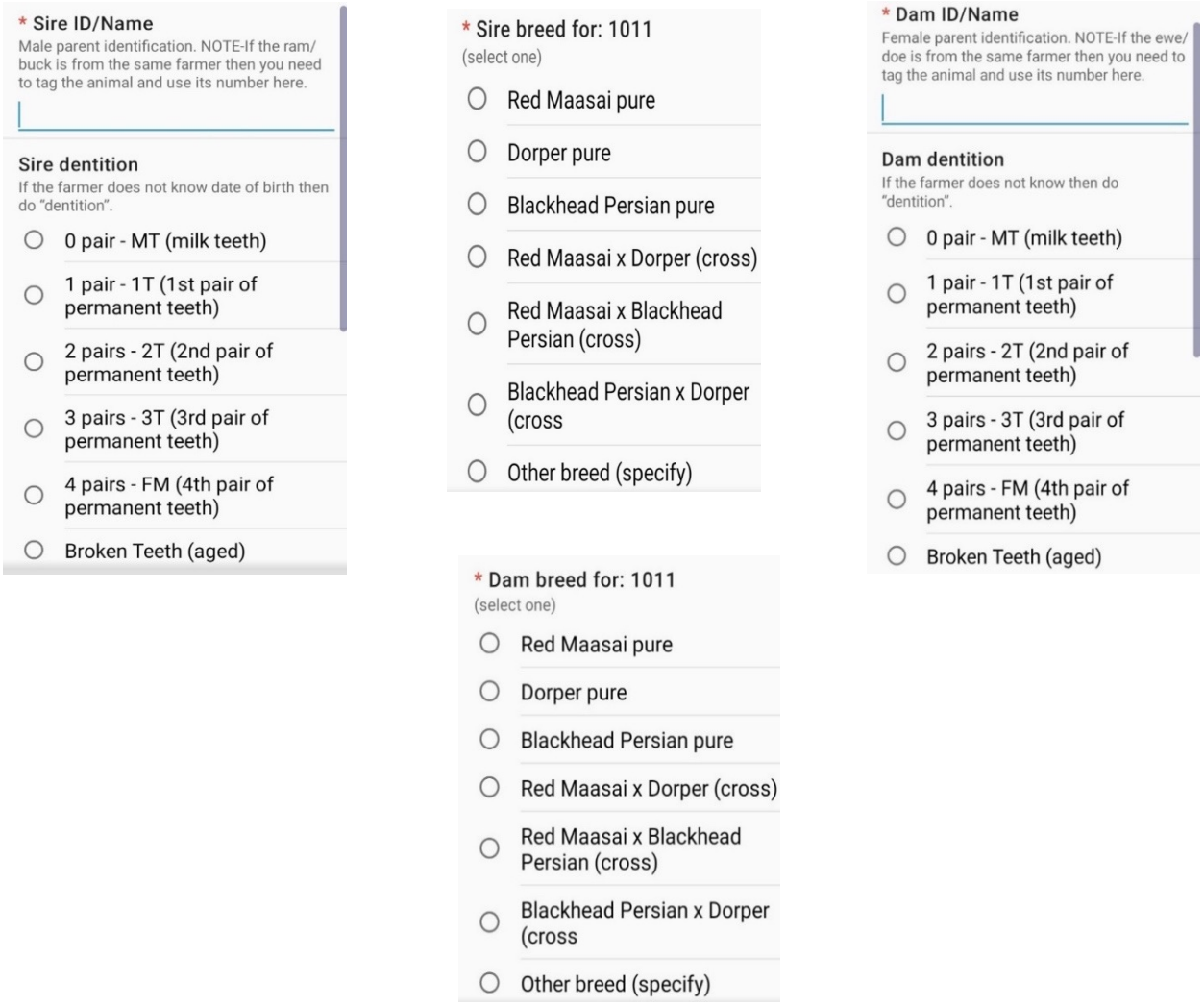


Figure 3. Details obtained on the parents (sire and dam) of animals at registration



Note

i. Each individual animal is only registered once in its lifetime.

ii. Even if an animal is sold or moved to a different owner, it will retain its original identification and related information within the database.

iii. Feedback is provided to the pastoralist based on the information obtained on animals that are registered.

iv. When only a sample of animals in the flocks are selected for monitoring, pick animals in the following categories:

- Mature females that have never been bred and are ready for breeding
- Ewes/does that have been previously bred and are less than 4 years old
- New lambs/kids born to any female animal being monitored
- Rams/bucks used for breeding in the flocks

v. All lambs/kids born to registered animals are included in the database. Information collected on animals when born:

- Parents of lamb/kid
- Date of birth
- Weight at birth
- Type of birth (whether single or twins).

2 Monitoring of animal performance

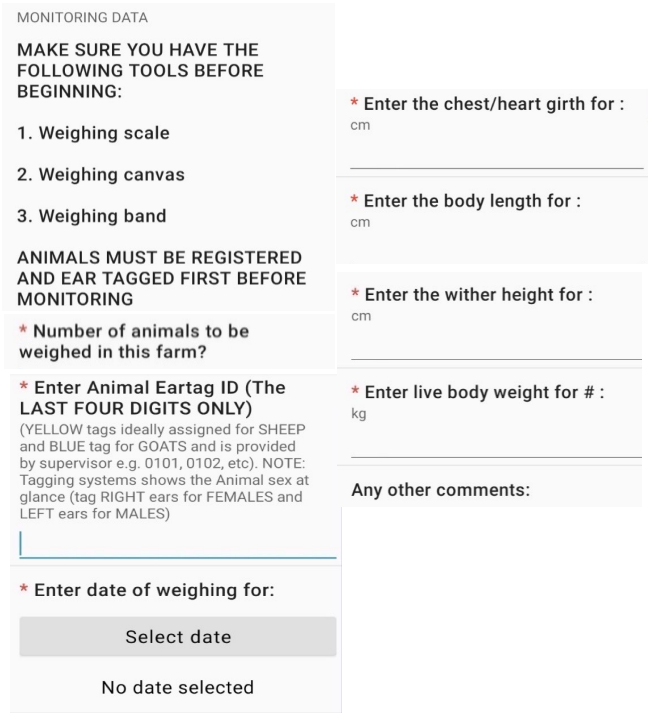
It is important to monitor the performance of animals in a flock. This will help determine those that should parent the next generation, and will enable producers ensure that desired traits are maintained in the flock. Over time, many pastoral flocks have been negatively affected by the practice of 'selling off the fastest growing animals'. These animals tend to reach a desirable market weight earlier, hence are sold to generate cash. The practice has resulted in pastoral flocks retaining animals that are smaller in size and take a longer time to reach market weight. Through objective measurements, monitoring reproduction and selection of future parents at an early age, it is anticipated that communities will adopt good practices and in the long term improve the productivity of their flocks.

2.1 Monitoring growth

Registered animals are monitored at regular intervals and their weight and body condition recorded. Due to the mobility of pastoral flocks and challenges in regularly accessing the animals, monitoring of mature animals should be implemented at least once every three months. Younger animals that tend to be grazed in closer proximity to the community living quarters may be monitored more regularly during the first year of their lives. However, this should take into consideration the availability of personnel to document the information. Any measurement on animals should be undertaken together with the pastoral household that owns the animals.

Data related to growth performance of the animals is documented as illustrated in Figure 4.

Figure 4. Details captured on animals during monitoring of growth

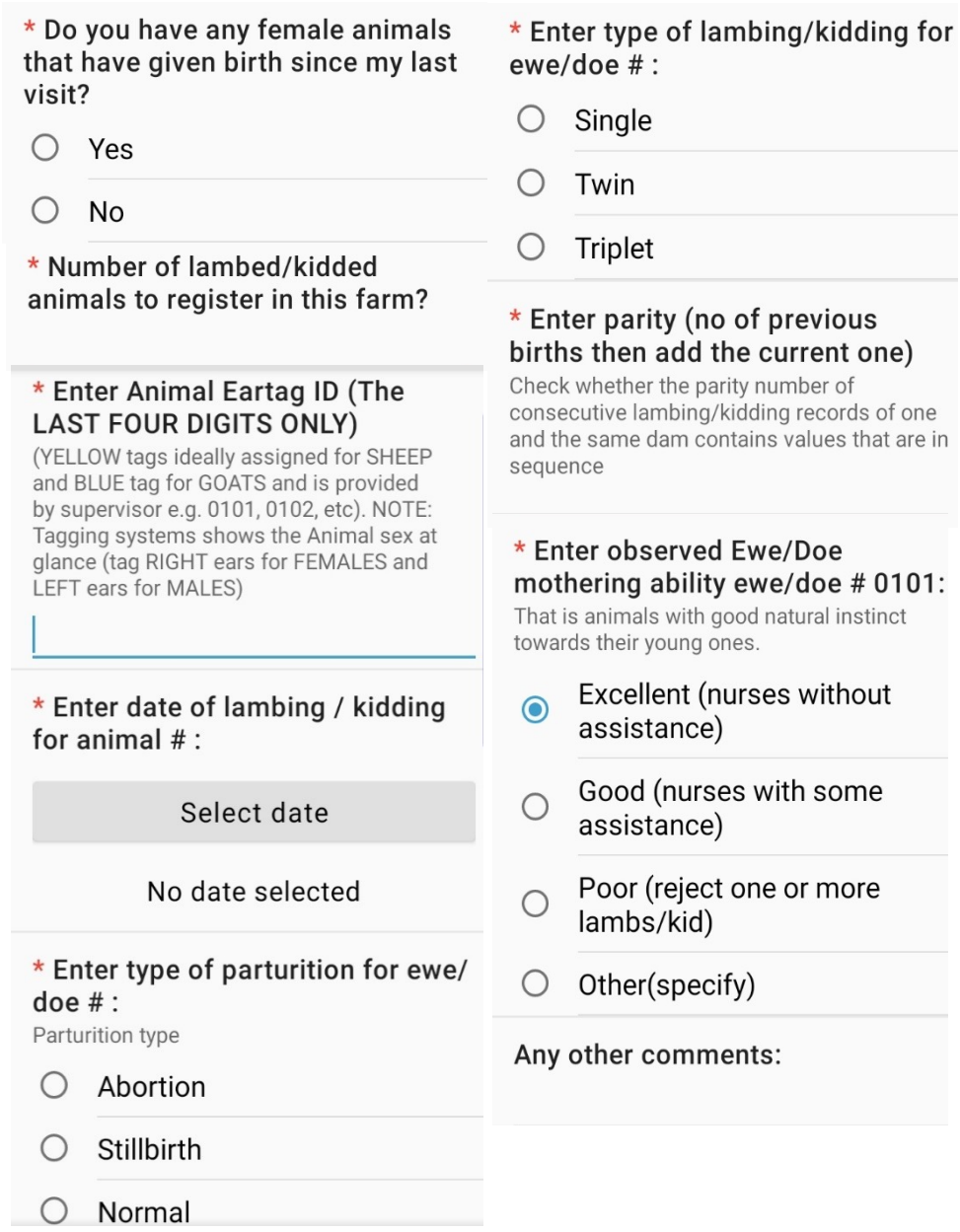


2.2 Monitoring fertility in female animals

Fertility in female animals is critical to flock productivity. In pastoral systems, female animals that lamb/ kid with ease and have good mothering ability are desirable. Due to the harsh conditions in arid lands, most pastoralists indicate that female animals lamb/kid once a year. It would be desirable if they could achieve up to THREE lambings/kiddings in two years; however, this would require greatly improved availability of feed resources. The lambing/kidding rates in the flocks greatly depend on the body condition of the animals.

Selection of male animals to use in the flocks, and the matching of which males to use on which females is outlined in the training module 3-Act[2]. Information to be noted when monitoring fertility of female animals in the flocks is illustrated in Figure 5.

Figure 5. Details captured on fertility in female animals

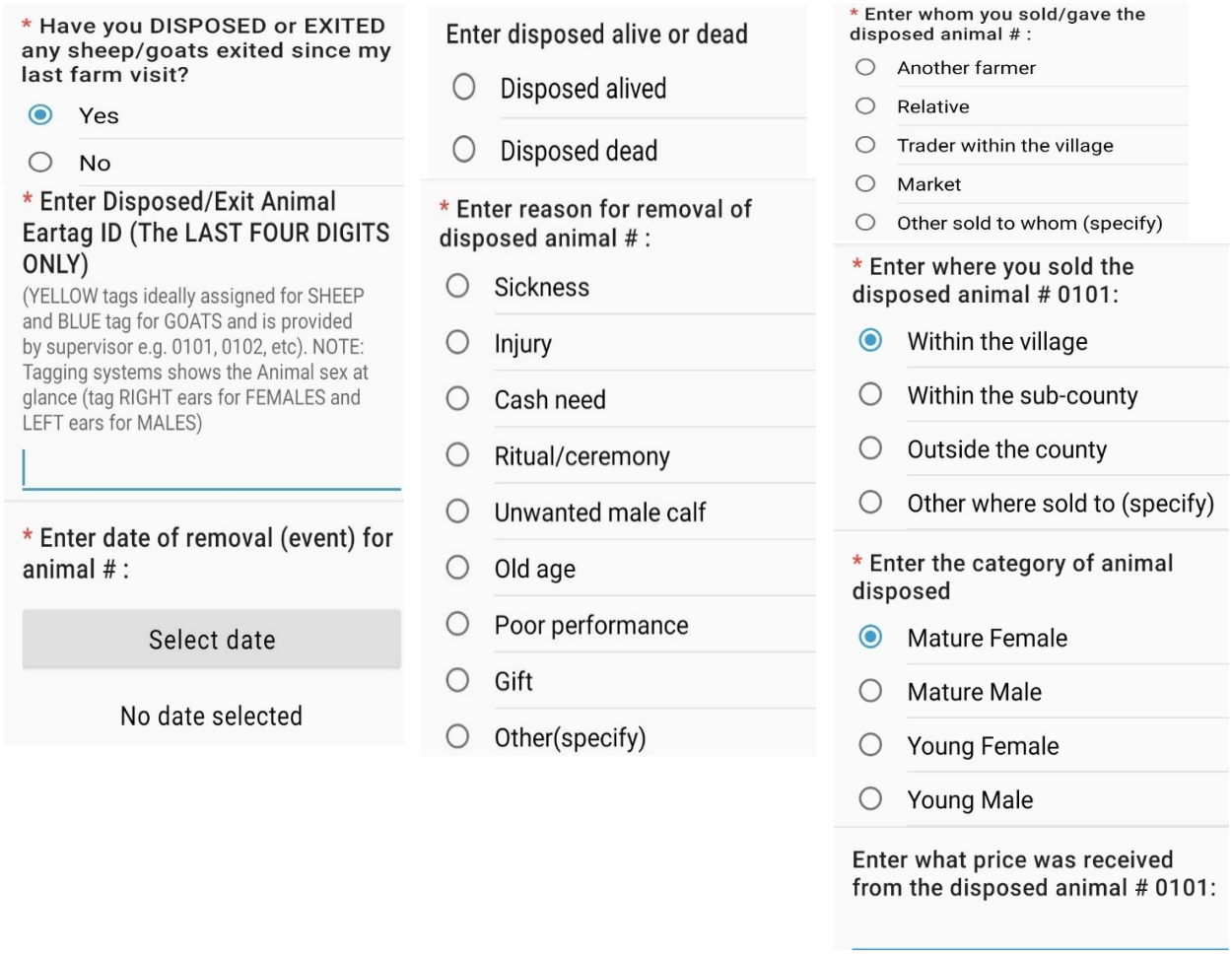


2 Ojango, J.M.K., Gitau, J., Oyieng, E., Audho, J., Gachora J. and Muigai A.W.T. 2021. Best practices for selective breeding for improved livestock productivity, Module 3: Act. . Nairobi, Kenya: ILRI (in press)

2.3 Monitoring animal exits

Data is captured on any animals that may have been disposed of for any reason. Animals generally exit the pastoral flocks through sale, death, predators, socio-cultural events or as gifts to other livestock keepers. Dates and reasons for animals leaving the flocks should be recorded. If other data on the animals is accurate, then through the database information on the age at disposal and the weights of the animals disposed can be calculated. When animals are sold, livestock keepers should be encouraged to document the weight of the animal during the sale, and the price at which each animal was sold as illustrated in Figure 6.

Figure 6. Details captured on animals that have exited the flocks

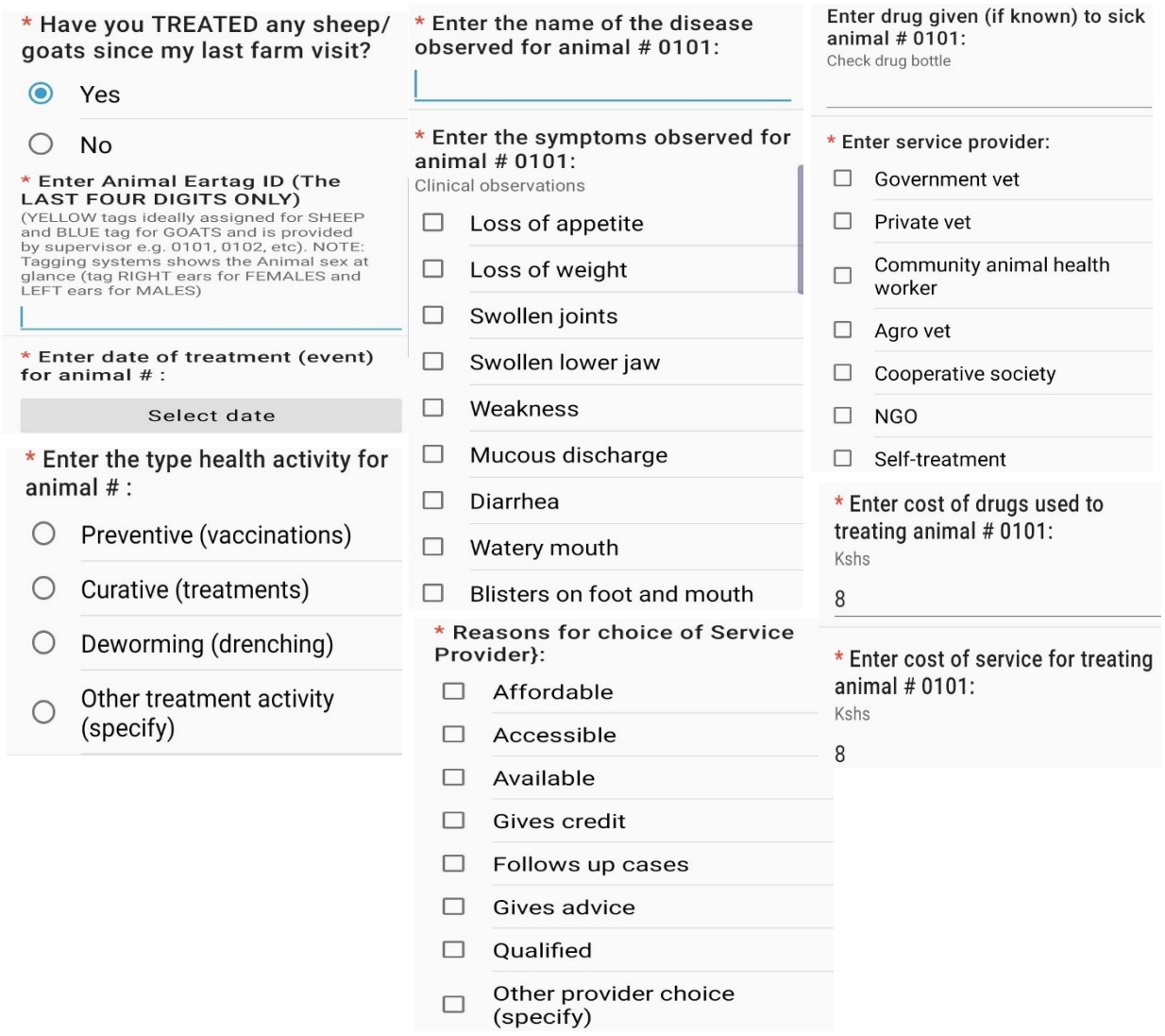


3 Monitoring management practices

3.1 Animal health management

Good livestock management requires an understanding of the well-being of the animals. Poor body condition and diseases have a negative impact on productivity. Gaps are often found in the provision of animal health services and availability of inputs for disease control. In this section, information is obtained on various measures used to control diseases and the animal health services available through different service providers. Pastoralists are also asked to give an indication of the reliability and cost of each service depending on the service providers available (Figure 7).

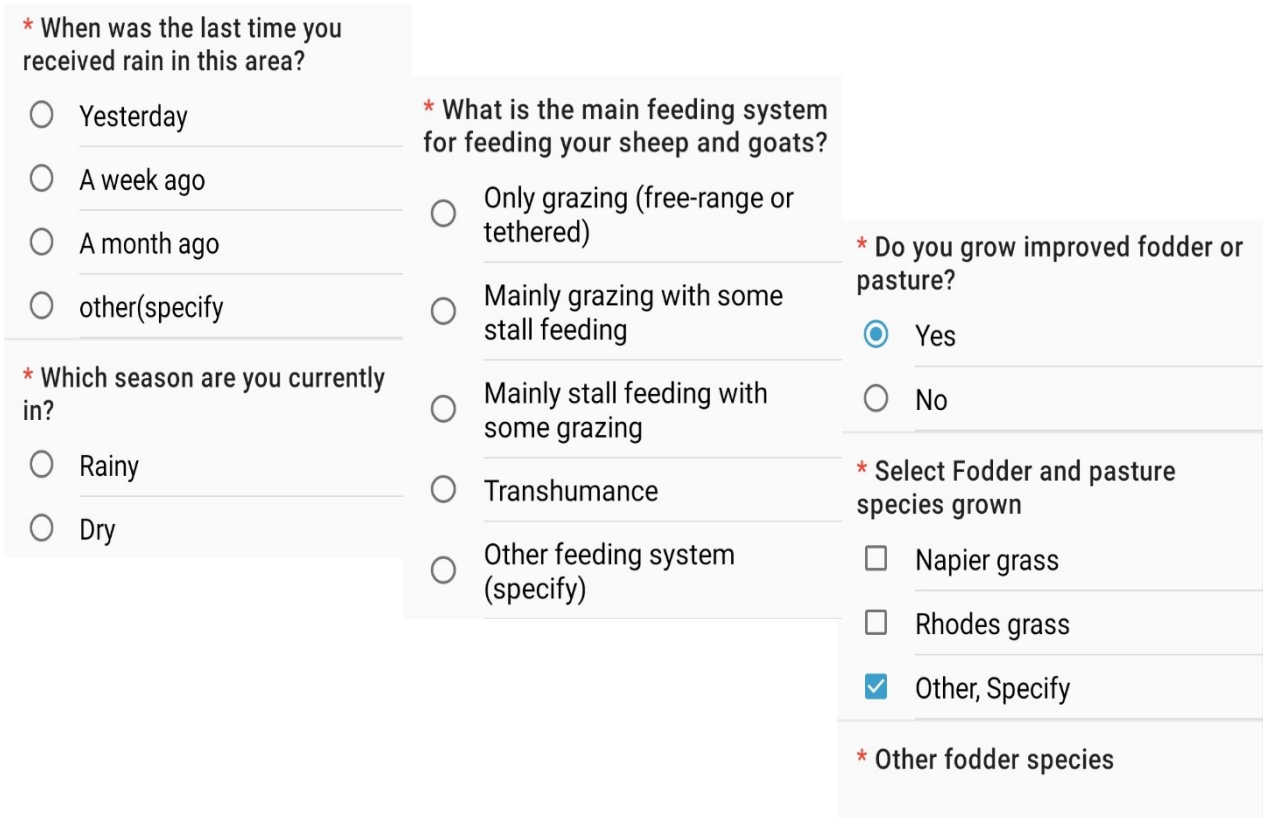
Figure 7. Details captured on animal health management in the flock



3.2 Feeding practices

To get an indication of the grazing resources available, pastoralists are asked to provide information on the feeding system and quality of feeds available at the time of monitoring (Figure 8). This information, alongside data on rainfall patterns in the course of the year, is used to document seasonal differences in pasture availability for sheep and goat production.

Figure 8. Details captured on grazing practices adopted for the flocks



3.3 Water resources and their use

Lack of water is a critical constraint in arid lands. In monitoring flock productivity, it is important to understand the main sources of water available for the community, and whether or not the water is used for both domestic consumption and animal production. It is also important to understand seasonality in availability of the water. This information is very useful in planning interventions to help mitigate the harsh environmental conditions in arid areas. Details captured in relation to water resources are presented in Figures 9 and 10.

Figure 9. Details captured on sources of water for household use and animals

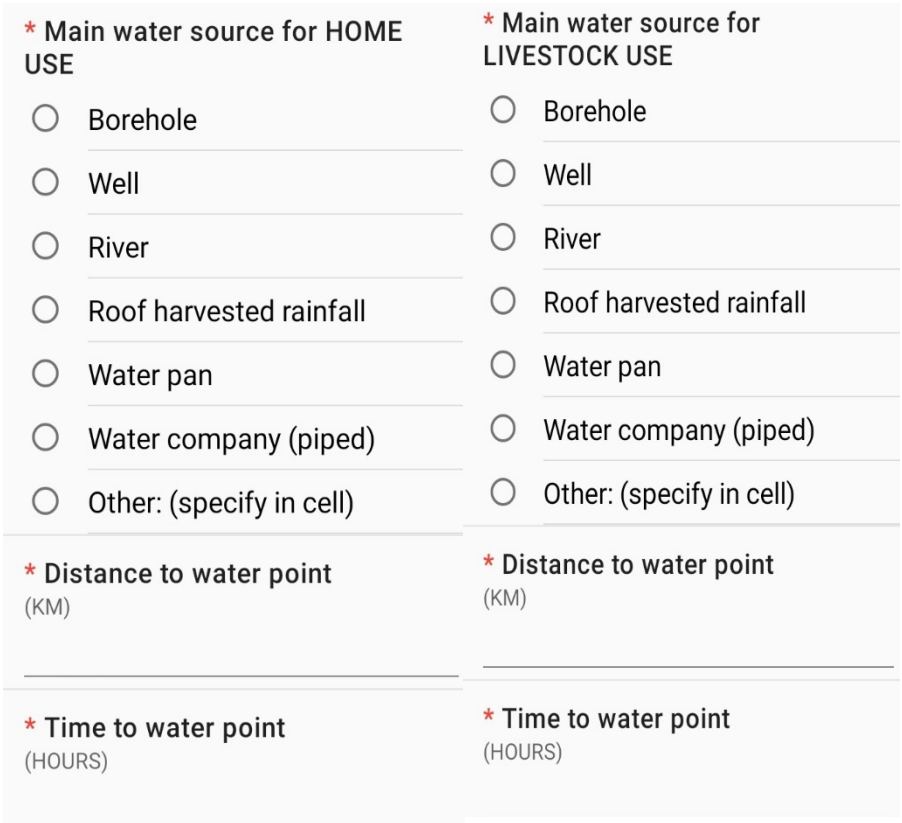
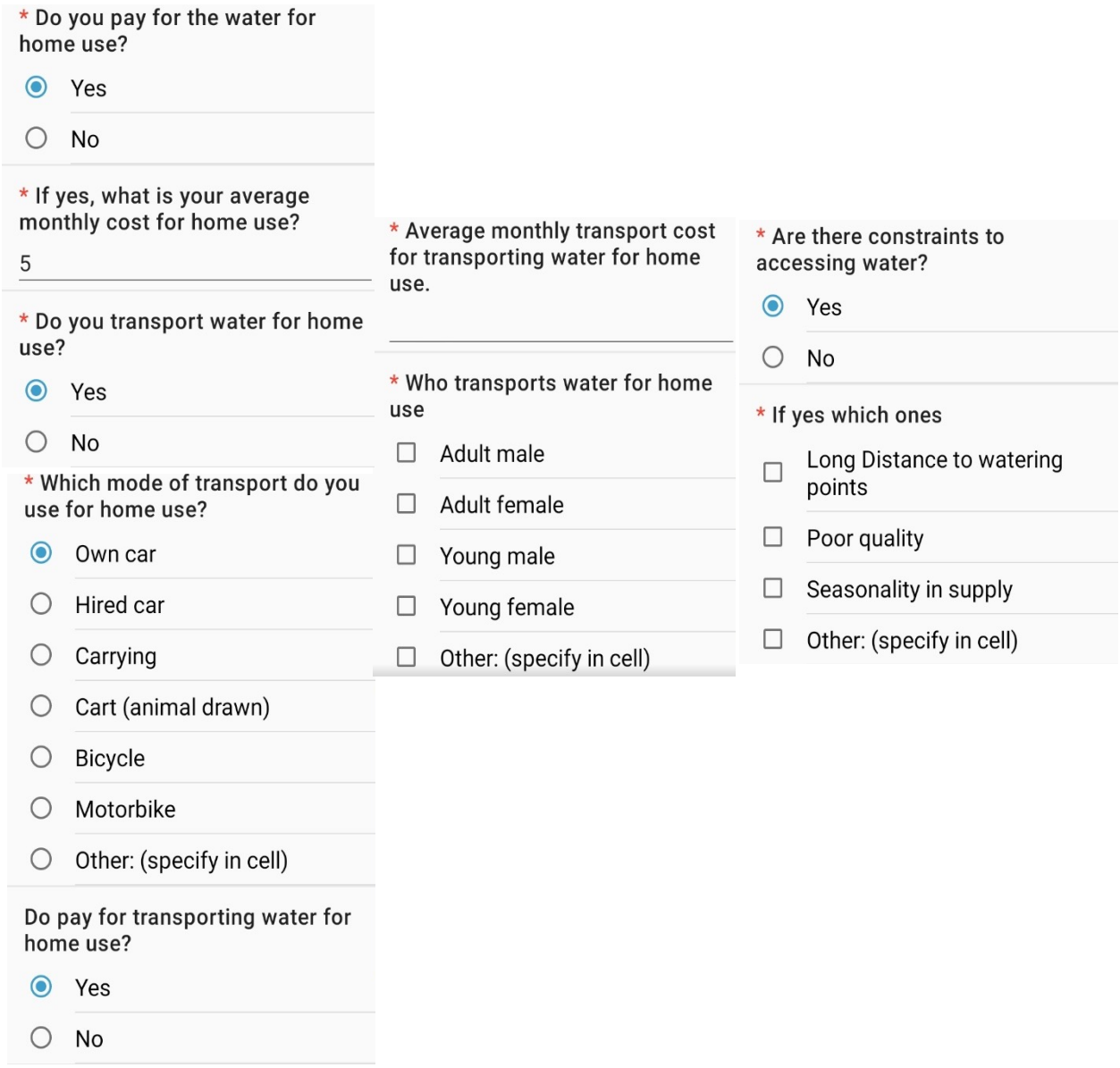


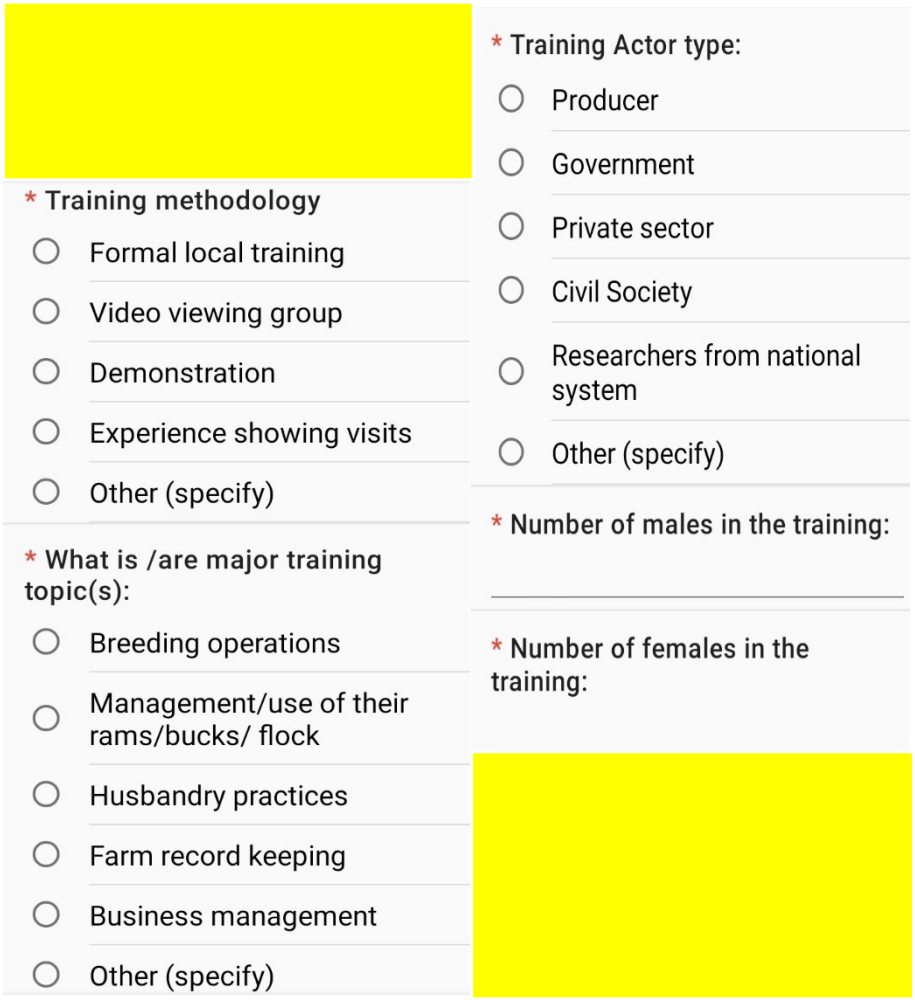
Figure 10. Details captured on costs and constraints in accessing water



Capacity development activities

It is important to document any training or capacity development activity provided for the communities being monitored. This information is useful in determining impacts of different interventions over time. Details on capacity development including the method used in training, the topics covered in the training and producers trained are captured as illustrated in Figure 11.

Figure 11. Details captured on training provided to the pastoral community

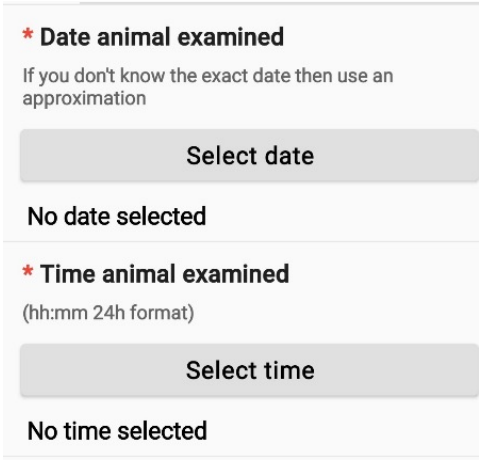


Recording dates, time, images and GPS coordinates

The ODK tools enable easy documentation of dates and times. This is through different options as illustrated below.

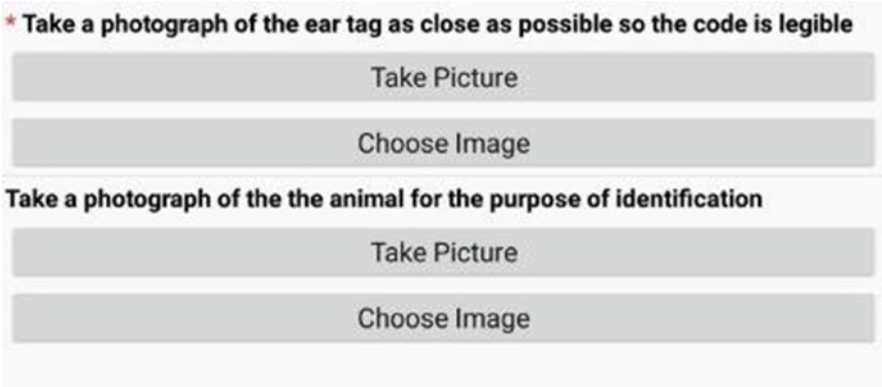
i. To record the date and/or time for an event, use the options 'select date' or 'select time' as illustrated in Figure 12.

Figure 12. Example of options for selecting the date and time of an event



ii. *Images:* The photograph of an animal can be taken directly within the ODK tool or using the camera on the device used for data capture and later uploading images onto the tool (Figure 13). This is then sent to the database.

Figure 13. Example of options for taking and storing photographs in the tools



iii. GPS coordinates: The GPS coordinates of the location from which the information was generated are documented as illustrated in Figure 14. ***Ensure the location*** ***setting on your android device is active.***

Figure 14. Option for recording GPS coordinates

Appendices

Appendix 1: Participant consent form

My name is ***(name of enumerator)*** and I work with the International Livestock Research Institute (ILRI) and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives State department for Livestock (MALFC) as part of the Regional Pastoral Livelihoods Resilience Project (RPLRP). I will take time to explain more about the project; please stop me whenever you need any clarification.

We would like to help improve the productivity of livestock in pastoral communities. This is through engaging with you a community member belonging to a Core Innovation Group (CIG) introduced at the start of the project.

The livestock improvement activities will take place during the course of the RPLRP project and should continue within the community supported by extension personnel from MALFC when the project ends. As a CIG member, we now request you to begin to monitor the performance of sheep and goats within your flock. The project team will strive to provide regular feedback on the progress of your flock. It is our hope that the feedback will help you improve your management practices and hence the productivity of your sheep and goats.

Any personal information that we collect about you as part of this activity will be kept confidential. Only the researchers in this project will have access to it. The knowledge that we obtain from implementing this project will be shared through community meetings before it is made widely available, both within and outside Africa, to help understand the impacts of changing practices in sheep and goat production under pastoral systems. Participation in this research is entirely voluntary, and refusal to participate will not result in a penalty or a loss of benefits to which as a CIG member you are otherwise entitled. As reflected when you became a CIG member, you may discontinue participation at any time. No risks are anticipated in this study, except for your time undertaking monitoring actions of your flock.

Consent

I have read the foregoing information, or it has been read or translated to me. I have had the opportunity to ask questions about it, and any questions that I have asked have been answered to my satisfaction. I consent voluntarily to participate in this project**.**

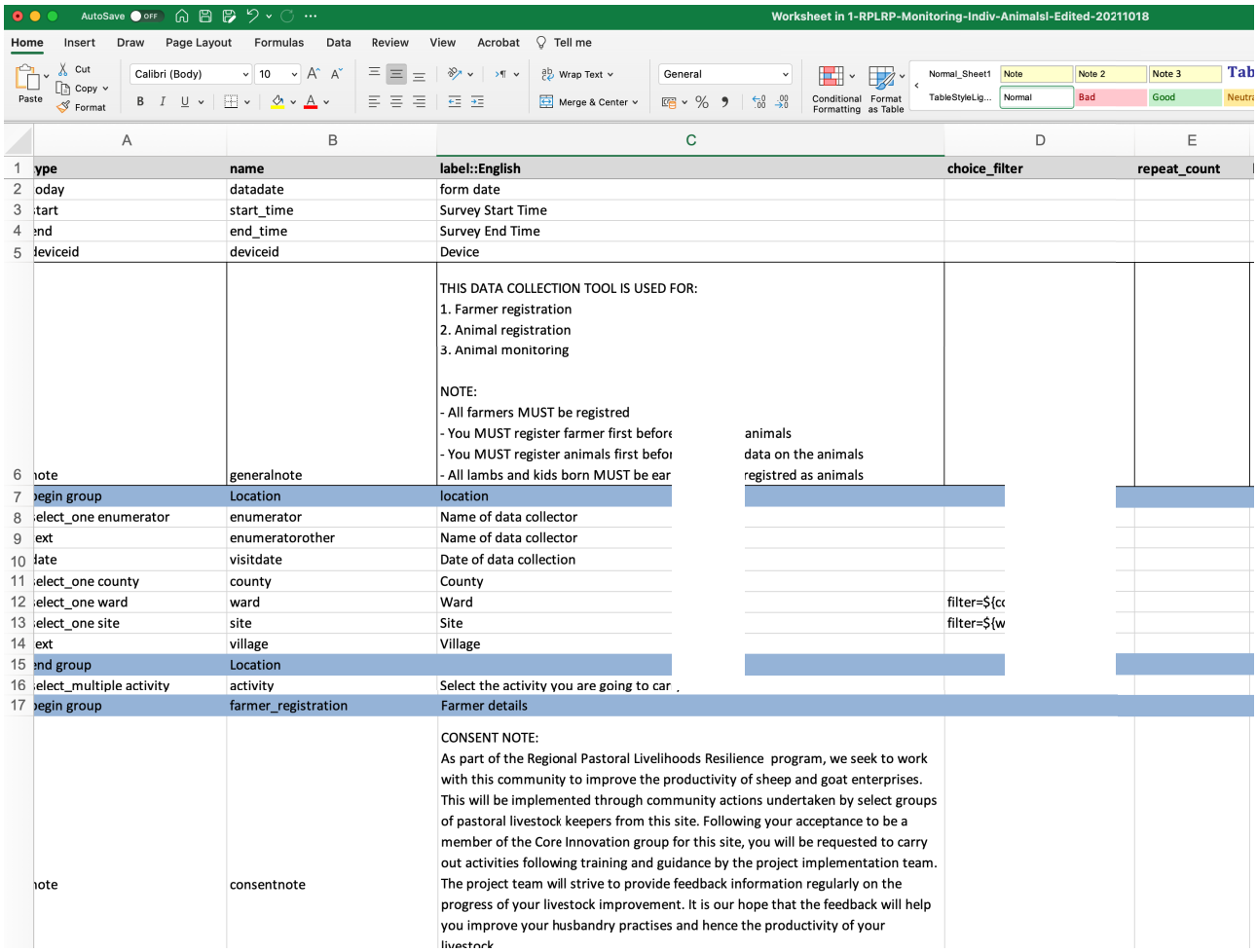
Name of participant _____ _____ Date_____

Signature/thumb print _____

Name of person obtaining consent_____ _____ Date_____

Signature _____

Appendix 2: ODK tool for monitoring animal performance



Worksheet in 1-RPLRP-Monitoring-Indiv-AnimalsI-Edited-20211018

	A	B	C	D	E
1	**ype**	**name**	**label::English**	**choice_filter**	**repeat_count**
2	oday	datadate	form date		
3	tart	start_time	Survey Start Time		
4	nd	end_time	Survey End Time		
5	deviceid	deviceid	Device		
6	note	generalnote	THIS DATA COLLECTION TOOL IS USED FOR: 1. Farmer registration 2. Animal registration 3. Animal monitoring NOTE: - All farmers MUST be registred - You MUST register farmer first before animals - You MUST register animals first befor data on the animals - All lambs and kids born MUST be ear registred as animals		
7	egin group	Location	location		
8	elect_one enumerator	enumerator	Name of data collector		
9	ext	enumeratorother	Name of data collector		
10	date	visitdate	Date of data collection		
11	elect_one county	county	County		
12	elect_one ward	ward	Ward	filter=${cc	
13	elect_one site	site	Site	filter=${w	
14	ext	village	Village		
15	nd group	Location			
16	elect_multiple activity	activity	Select the activity you are going to car		
17	egin group	farmer_registration	Farmer details		
	note	consentnote	CONSENT NOTE: As part of the Regional Pastoral Livelihoods Resilience program, we seek to work with this community to improve the productivity of sheep and goat enterprises. This will be implemented through community actions undertaken by select groups of pastoral livestock keepers from this site. Following your acceptance to be a member of the Core Innovation group for this site, you will be requested to carry out activities following training and guidance by the project implementation team. The project team will strive to provide feedback information regularly on the progress of your livestock improvement. It is our hope that the feedback will help you improve your husbandry practises and hence the productivity of your livestock		

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