



*Improving small ruminant productivity in pastoral systems of Kenya: ODK-based tool for monitoring dynamics in sheep and goat flocks*

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Regional Pastoral Livelihood Resilience Project

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# List of Abbreviations

CIG	Core Innovation Group
COVID	Coronavirus Disease
ILRI	International Livestock Research Institute
IREC	Institutional Research Evaluation Committee
JKUAT	Jomo Kenyatta University of Agriculture and Technology
MALFC	Ministry of Agriculture, Livestock, Fisheries and Cooperatives, State department for Livestock
ODK	Open Data Kit
RPLRP	Regional Pastoral Livelihood Resilience Project

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# Background

This document has been developed to help guide extension personnel who work with pastoral communities to collate information that incorporates gendered perspectives on existing sheep and goats in their areas. It also provides direction on how to monitor changes in flocks over time and on the introduction of new management practices to improve flock productivity. Ideally, this tool should be used for livestock keepers who have previously provided baseline data on their flocks. The information is useful in deriving flock performance indicators to guide targeted interventions. It is anticipated that monitoring of flocks will be implemented once every three months to enable longitudinal documentation of change within the pastoralists' flocks. The exercise needs to be conducted for at least a year to ensure that all seasons are covered and to provide sufficient data to guide the development of appropriate intervention strategies.

The manual presents details to be collated through paperless data capture tools 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.



# Overview of tools

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 specific ODK tool is designed to transmit data electronically and directly to a centralized database managed by the International Livestock Research Institute (ILRI) on behalf of the Ministry of Agriculture, Livestock, Fisheries and Cooperatives State department for Livestock (MALFC) in Kenya. When adopted by different users, they can directly access their data on designated platforms with guidance provided by ILRI. The coding required in ODK is presented in Appendix 1.

Prior to collecting information from any community, permission should be sought from national, regional and community leaders. Data collection activities must be approved by the relevant institutional research evaluation committee (IREC). Additionally, individual livestock keepers must provide consent to have their information documented. See Appendix 2 for a sample participant consent form.

# Monitoring productivity and dynamics in pastoral flocks

## 1 Locating pastoral households

Pastoral livestock keepers herd their animals in communal flocks. However, specific animals belong to individual households which make critical decisions on their own animals. Information on the household composition is obtained through the initial baseline data capture (Tool 1) where details on the household head, their gender and geographical location are noted, and households assigned a unique identifier. In addition to obtaining information on the pastoral household, it is important to identify the communal flock the animals are reared in. Through this tool, information on the community group, household number and geographical location of the flock is collected as illustrated in Figure 1.

Figure 1. Details captured to determine location of the household that owns the flock

The figure displays four screenshots of the RPLRP\_Midterm... mobile application interface, showing the data capture process for household location. The first screenshot shows the 'Site Identification' section with fields for 'Name of data collector' (Gabriel Eyanæ), 'Date of data collection' (Aug 20, 2021), and 'County' (Marsabit). The second screenshot shows the 'Subcounty' (Saku), 'Ward' (Karare), 'Location' (Karare), and 'Sublocation' (Hulahula) fields. The third screenshot shows the 'Sublocation' (Hulahula), 'Village' (Hula), 'Household ID' (007), and 'Unique Questionnaire ID' (MST-007) fields. The fourth screenshot shows a 'Start GeoPoint' button.

In most cases information on the flocks is provided by the head of the household. However, in instances where the household head is not available, a designated member can provide the details (Figure 2). This should be noted, taking cognizance of the gender of the respondent as this may have an impact on subsequent responses to different questions.

Figure 2. Details captured on the respondent

2:39

RPLRP\_Midterm...

Respondent details

\* Name of Respondent

---

\* Respondent gender

Male

Female

---

Mobile number of the respondent

---

\* Is the respondent the household head?

Yes

No

## 2 Current flock size and structure (sheep and goats)

Information on the groups of animals that belong to individual households from each community is collated. This information gives great insights into the flock structures, species and breed preferences associated with specific communities. The data collected here includes the species of animal kept, breed, whether the animal is a pure breed or a cross, and the categories owned.

Figure 3. Information captured on breeds of sheep and goats and the different categories of animals owned

2:39

RPLRP\_Midterm...

\* Which animal species do you own?

Select ALL that apply

Sheep

Goats

Camels

Cattle

---

\* Select All Sheep category owned

Animal categories

Rams (Adult males >1 year )

Castrated (Adult Males)

Immature male (Weaned male < 1 year)

Ewe (mature female, lambd at least once)

Hoggets(Mature female but have not lambd)

Immature female (Weaned female < 1 year)

Ram Lamb (pre-weaning male)

Ewe Lamb (pre-weaning females)

Rams

Male Castrates

Immature males

Ewe

Hoggets

Immature female

---

\* Select All goats category owned

Animal categories

Buck (Adult males >1 year )

Castrated adult male

Immature male (Weaned male < 1 year)

Doe (mature female, lambd at least once)

Hoggets

Immature female (Post weaning, no lambing)

Buck kid (pre-weaning male)

Doe kid (pre-weaning females)

Buck

Male Castrates

Immature males

Doe

Hogget

Immature females

---

Sheep Details > 1 > Sheep Owned

\* Breed of Rams owned

Dorper pure

Blackhead Persian pure

Red Maasai\*Dorper (cross)

Red Maasai\*Blackhead Persian (Cross)

Blackhead Persian\*Dorper (cross)

other specify

\* Number of Rams Owned

---

goats Details > 1 > Goats Owned

\* Breed of Buck

Galla pure

Galla cross

Small East African

Alpine pure

Alpine cross

Other (specify)

\* Number of Buck Owned

## 3 New animals in flocks and how they were acquired

The presence of new animals that have entered the flock in the last six months is registered. New animals could either have been born in the flocks, bought or received as gifts. Through the tool, information is collected on the number, breed and category of new animals, their means of entry and the reason for their acquisition as illustrated in Figure 4 and Box 1.

Figure 4. Information collected on new animals entering pastoralist flocks

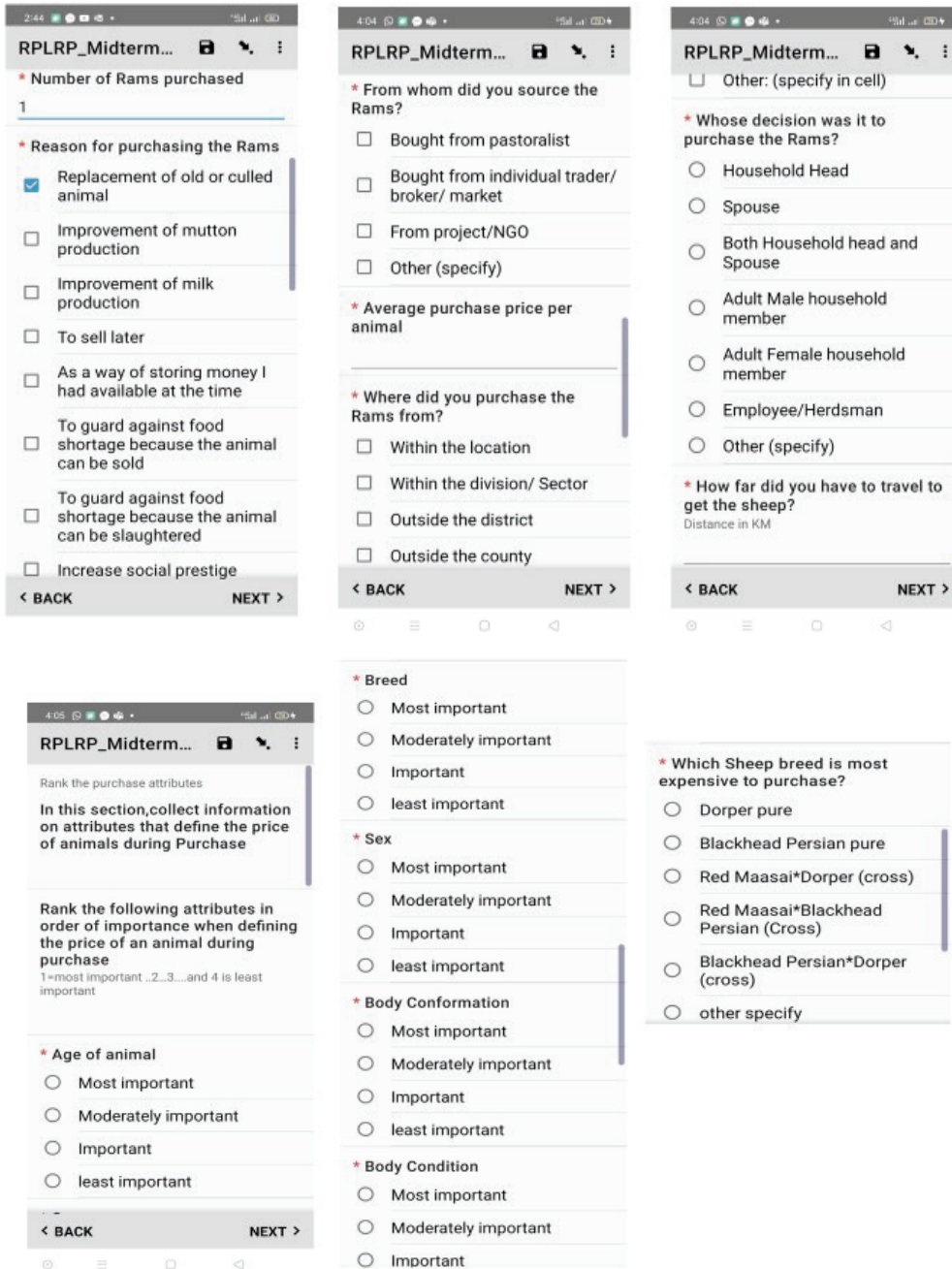
The figure displays three sequential screenshots of a mobile application interface for data collection on sheep and goat flocks. The interface is titled 'RPLRP\_Midterm...'.  
 The first screenshot (2:29) asks: '\* Have any sheep entered the household herd during the past 6 months?'. The 'Yes' option is selected. Below this, it asks: '\* Select the sheep categories that have entered the herd in the last 6 months. Select ALL that apply'. The 'Rams' category is selected, along with 'Male Castrates', 'Immature males', 'Ewe', 'Hoggets', 'Immature female', 'Ram lamb', and 'Ewe lamb'.  
 The second screenshot (2:29) shows 'Sheep inflows' and asks: '\* How did the Rams join the herd?'. The 'Birth' option is selected. Other options include 'Gift In', 'Exchange In', 'Loan In', 'custodian on behalf of others', 'Purchase', and 'other,specify'.  
 The third screenshot (2:30) asks: '\* Number of Rams born in the last 6 months'. The value '1' is entered. It then asks: '\* Breed of the Rams born'. The 'Dorper pure' option is selected. Other options include 'Blackhead Persian pure', 'Red Maasai\*Dorper (cross)', 'Red Maasai\*Blackhead Persian (Cross)', 'Blackhead Persian\*Dorper (cross)', and 'other specify'. Finally, it asks: '\* How many times in a year do the ewes give birth?'. The value '1' is entered. At the bottom, there are '< BACK' and 'NEXT >' navigation buttons.

### Box 1: Additional details obtained on new animals in flocks

- a) How many sheep/goats were born in your flock in the last six months?
  - i. During which month were the sheep/goats born? Dry/wet season?
  - ii. Did any animals give birth to twins? How many animals in your flock birthed twins? Which breed produced the twins?
- b) How many sheep/goats did you receive at no cost from elsewhere?
  - i. What was the reason for giving the gift?

In cases where the animals are purchased for herd expansion, information is obtained as illustrated in Figure 5.

Figure 5. Information obtained when animals are purchased for flocks



## 4 Animals leaving flocks and reasons for exit

The movement of animals out of flocks ('animal exits'), and reasons for exit is of great interest in animal production. This is because it has an impact on productivity of the flock. Information captured on animals that have left flocks over the past six months include species and category of animals as illustrated in Figure 6.

Figure 6. Details captured on animals that have left the flock

The figure displays two screenshots of a mobile application interface for monitoring sheep and goat flocks. The interface is titled "RPLRP\_Midterm..." and includes a status bar at the top showing the time and battery level.

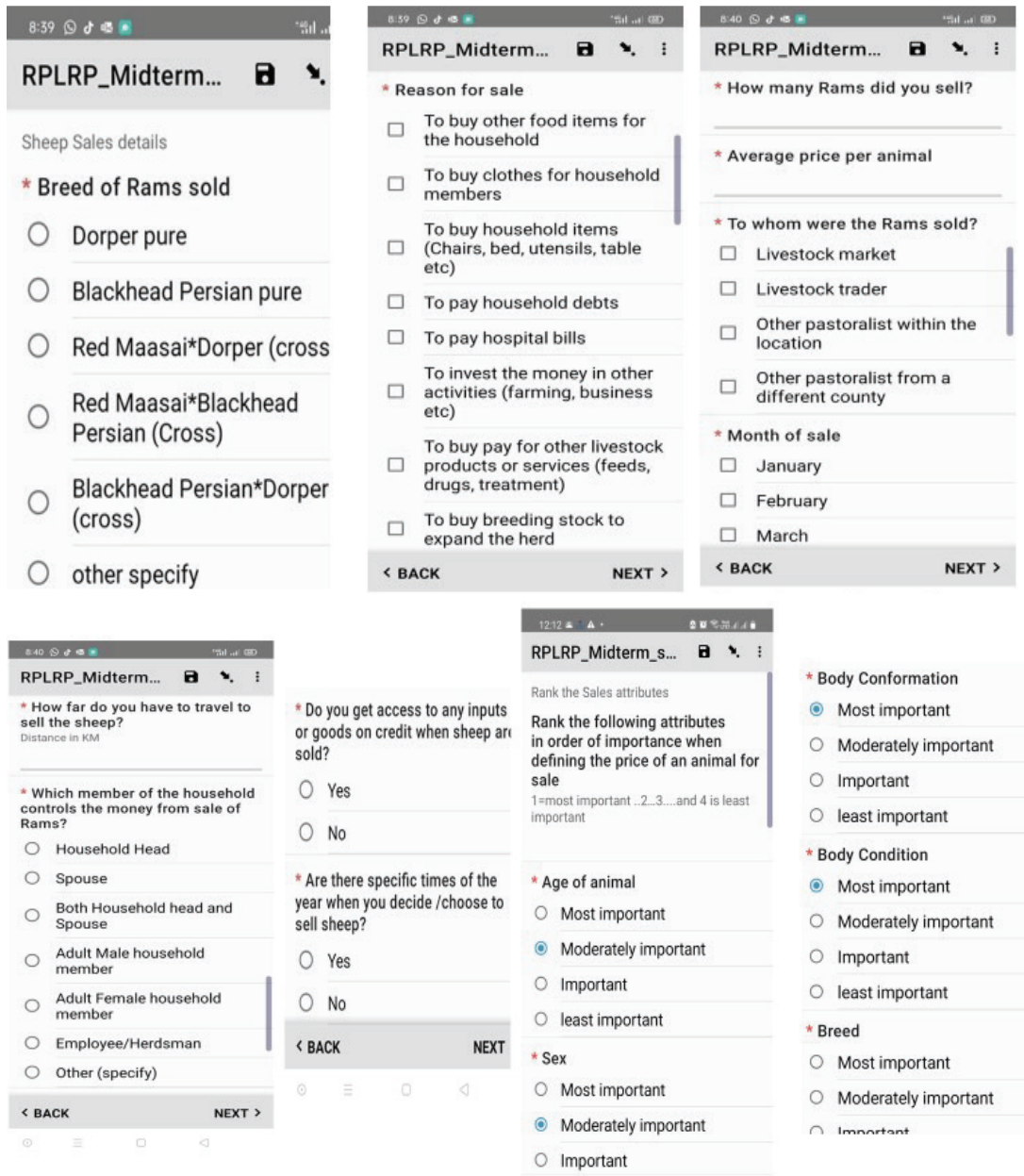
The left screenshot shows a question: "\* Have any sheep exited the household flock during the past 6 months?". Below the question are two radio button options: "Yes" (selected) and "No". Below this is a section titled "Sheep Outflows" with a question: "\* What were the exit reasons?". Below this question is a list of checkboxes for reasons: "Slaughter - household needs", "Slaughter - because sick", "Given away (e.g. dowry)", "sold", "Died", "Stolen", "Predators", and "Other: (specify in cell)".

The right screenshot shows a question: "\* Which sheep category has exited the herd?". Below the question is a list of checkboxes for categories: "Rams", "Male Castrates", "Immature males", "Ewe", "Hoggets", "Immature female", "Ram lamb", and "Ewe lamb".

Additional information including the breed of the animals exiting and the reasons why is also obtained as illustrated in Figure 7.

Livestock producers are also requested to indicate what information they use to guide decisions on when to sell animals.

Figure 7. Additional details obtained when animals are sold



Note: Information on prices of animals is obtained for each different category of animal sold.

In cases where animals have died, additional details are obtained as illustrated in Figure 8.

Figure 8. Details obtained on animals that died in the flock

The figure displays two screenshots of a mobile application interface for recording sheep deaths. The left screenshot, titled "Deaths", shows a form with the following sections: "Sheep Deaths details", a required field for "How many Rams died?", a required field for "Breed of the Rams" with radio button options for "Dorper pure", "Blackhead Persian pure", "Red Maasai\*Dorper (cross)", "Red Maasai\*Blackhead Persian (Cross)", "Blackhead Persian\*Dorper (cross)", and "other specify", and a "Month of death" section with checkboxes for "January" and "February". The right screenshot, titled "RPLRP\_Midterm\_s...", shows a list of radio button options for the cause of death: "Died due to disease" (selected), "Died due to injury, accidents", "Died due to poisoning (acaricide, snake bite)", and "Other (specify)\_" (with a blank line). Below this is a required field for "If died due to disease, what disease?" with radio button options for "CCPP(Contagious Caprine Pleuropneumonia)", "Sheep and goat pox", "Rift Valley Fever", "PPR (Peste des Petits Ruminants)", "Blue tongue", "Lumpy skin", and "Other, specify".

When animals in the flock are reported to have been slaughtered or given away, additional information is obtained on the category of animal disposed of, purpose for disposal and who made the decision.



## 5 Impact of drought on flocks

The pastoral livestock keepers are requested to provide information on any dynamics in the flock that were directly related to any drought season that they may have experienced in the course of the year. Information collected here includes the number of animals lost and reasons why the animals died.

Figure 9. Details collated on flocks related to periods of drought

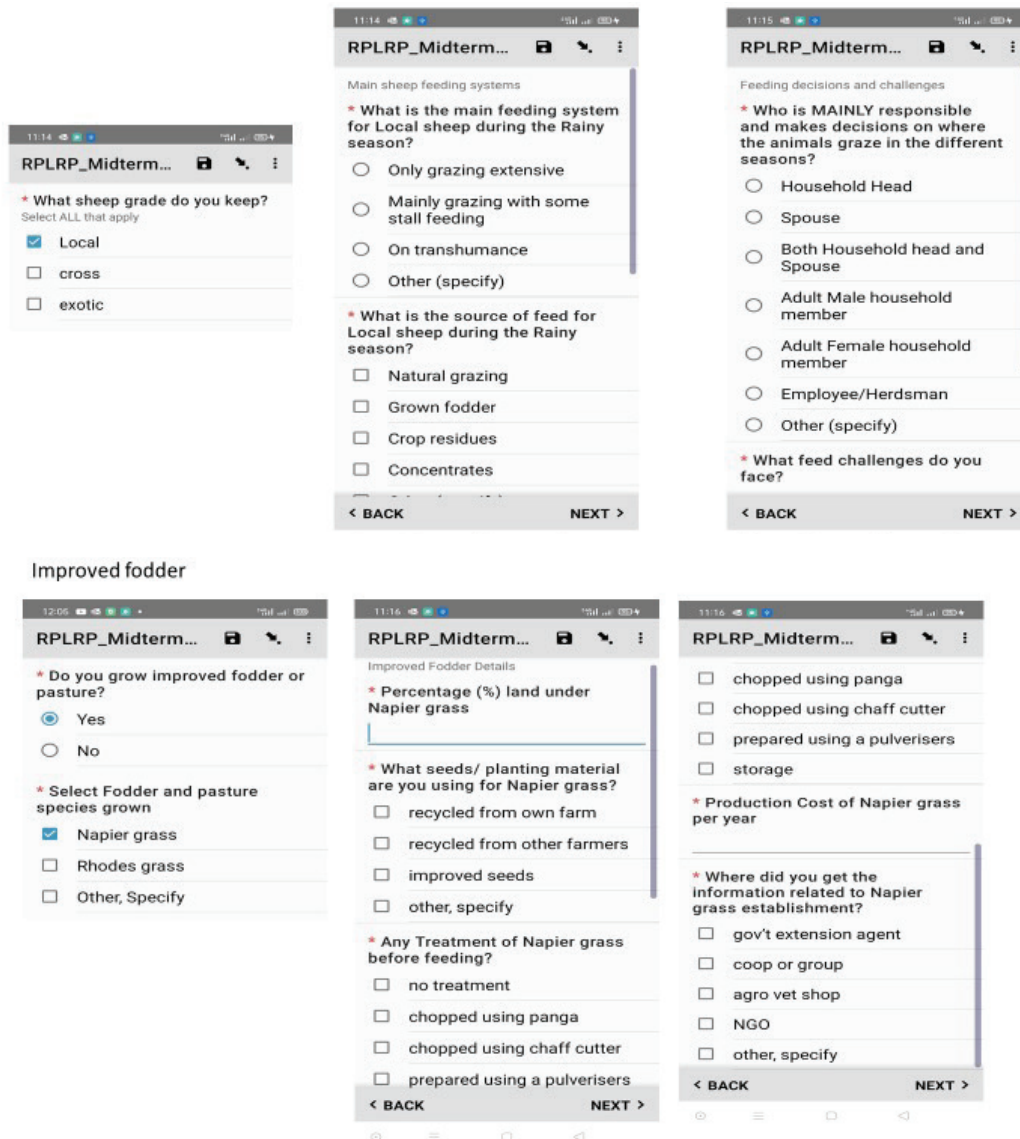
The figure displays five screenshots of a mobile application interface for data collection, titled 'RPLRP\_Midterm\_s...'. The screenshots show the following content:

- Screen 1 (17:37):** 'Animal loss details'. Questions include:
  - \* Have you lost any sheep during the drought in the last one year? (Yes/No)
  - \* Have you lost any goats during the drought in the last one year? (Yes/No)
  - \* During the last one year, which months did you have the worst drought? (January, February, March, April)
- Screen 2 (10:51):** 'Sheep loss details'. Questions include:
  - \* Number of immature sheep that died (Sheep less than one year old)
  - \* Number of mature sheep that died (sheep more than one year old)
  - \* What sheep breed died most during the worst drought period? (Dorper pure, Blackhead Persian pure, Red Maasai\*Dorper (cross), Red Maasai\*Blackhead Persian (Cross), Blackhead Persian\*Dorper (cross))
- Screen 3 (10:51):** Questions include:
  - \* Why do you think this sheep breed died the most? (Dorper pure, Blackhead Persian pure, Red Maasai\*Dorper (cross), Red Maasai\*Blackhead Persian (Cross), Blackhead Persian\*Dorper (cross), other specify)
  - \* Why do you think this sheep breed survived better? (Dorper pure, Blackhead Persian pure, Red Maasai\*Dorper (cross), Red Maasai\*Blackhead Persian (Cross), Blackhead Persian\*Dorper (cross), other specify)
- Screen 4 (10:52):** 'Indicate how the animals were affected'. Questions include:
  - \* Camel (Least affected, Moderate affected, Most affected)
  - \* Goat (Least affected, Moderate affected, Most affected)
- Screen 5 (11:15):** 'Drought Management practices'. Questions include:
  - \* Are you able to know when the dry/drought period is approaching? (Yes/No)
  - \* From whom do you source information on when the dry/drought period is approaching? (Government agencies e.g NEMA, Metereological department, Media stations e.g radio, TV, Internet, Own forecast of the weather patterns, Other (specify))
  - \* If you know a drought/dry period is approaching, what management practises do you put in place BEFORE the drought?
  - \* What management practises do you adopt AFTER the drought?
  - \* Do you use some special breeding practises BEFORE drought? (Yes/No)
  - \* Do you use some special breeding practises AFTER drought? (Yes/No)

## 6 Livestock feed resources

Availability of feed resources has a direct impact on livestock productivity. It is therefore important to collect information on whether these resources were easily available, and any measures the pastoral livestock keepers came up with for mitigation. Information on feeding the animals is obtained for both the wet and dry seasons as presented in Figure 10. This revolves around the type of feed resources, their availability and the person responsible for making decisions with regard to their use.

Figure 10. Details obtained on the feeding system and main feed resources



## 7 Animal health management

Information on animal health management practices, diseases that affect the animals and the main service providers who support animal health management is key to improving livestock productivity. This information is obtained from the pastoralists by asking questions to gauge the type of animal health practices that are implemented at the household level, and the person who makes the key decisions as illustrated in Figure 11.

Figure 11. Details obtained on animal health management

The figure displays four screenshots of a mobile application interface for 'RPLRP\_Midterm...'. The first screenshot (12:11) shows a questionnaire about animal health activities, with 'Deworming' selected. The second screenshot (11:16) shows the 'Deworming' section, asking for the provider of the service and the decision maker. The third screenshot (11:17) shows the 'Prevalent Diseases' section, asking for diseases affecting livestock in the last 6 months. The fourth screenshot (17:45) shows the 'Vaccination' section, asking for the provider of the service and the disease it was against.

**Screenshot 1 (12:11):** RPLRP\_Midterm...  
 \* Do you practice animal health activities e.g deworming, vaccinations etc?  
 Yes  
 No  
 \* Select the animal health activities that you practise.  
 Deworming  
 External parasite control  
 Vaccination  
 Traditional treatment

**Screenshot 2 (11:16):** RPLRP\_Midterm...  
 Deworming  
 \* Who provided the deworming service?  
 Self/Neighbour with professional advice  
 Self/Neighbour without professional advice  
 Government veterinarian  
 Project/NGO staff  
 coop/group staff  
 Private Animal health service provider  
 Community dip  
 Other, specify  
 \* Who made the decision to use the service provider?  
 < BACK NEXT >

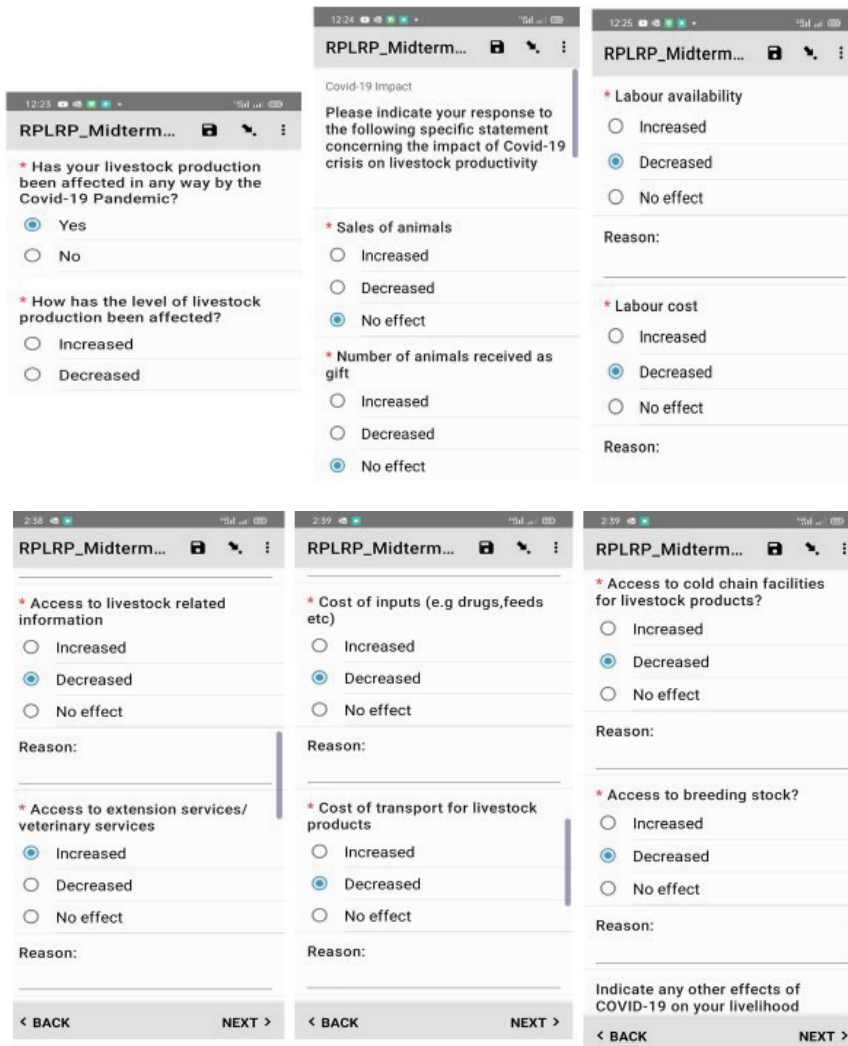
**Screenshot 3 (11:17):** RPLRP\_Midterm...  
 Prevalent Diseases  
 \* Which diseases affected your livestock in the last 6 MONTHS?  
 CCPP(Contagious Caprine Pleuropneumonia)  
 Sheep and goat pox  
 Rift Valley Fever  
 PPR (Peste des Petits Ruminants)  
 Blue tongue  
 Lumpy skin  
 Other, specify

**Screenshot 4 (17:45):** RPLRP\_Midterm\_s...  
 Vaccination  
 \* Who provided the vaccination service?  
 Government  
 Private vet/animal health provider  
 Other (specify)  
 For which disease did you vaccinate against?  
 CCPP(Contagious Caprine Pleuropneumonia)  
 Sheep and goat pox  
 Rift Valley Fever  
 PPR (Peste des Petits Ruminants)  
 Blue tongue  
 Lumpy skin  
 < BACK NEXT >

# 8 Documenting the impact of the COVID-19 pandemic on flocks

In 2020 Kenya implemented measures to curb the spread of the corona virus that affected all communities across the country. The pastoral livestock keepers involved in learning best practices for their flocks were requested to provide information on how the pandemic had affected their sheep and goat enterprise as illustrated in Figure 12.

Figure 12. Information obtained on how the COVID-19 pandemic affected flock management



## 9 Assessment of the interview process

At the end of each engagement with the pastoralists, enumerators are requested to provide an overall opinion on the quality of responses provided as illustrated in Figure 13. The aim is to gauge the efficacy of obtaining information from the community and willingness of the community to provide this information.

Figure 13. Assessment of the interview process by the enumerator

The figure consists of three screenshots of a mobile survey application. The first screenshot shows the 'INTERVIEW ASSESSMENT' section with two questions. The first question is 'In your opinion, how did you establish rapport with this respondent?' with four radio button options: 'with ease', 'with some persuasion', 'with difficulty', and 'it was impossible'. The second question is 'Overall, how did the respondent give answers to your questions?' with four radio button options: 'willingly', 'reluctantly' (which is selected), 'with persuasion', and 'it was hard to get answers'. The second screenshot shows the same 'INTERVIEW ASSESSMENT' section with a different question: 'How often do you think the respondent was telling the truth?' with four radio button options: 'rarely', 'sometimes' (which is selected), 'most of the times', and 'all the time'. The third screenshot shows the end of the survey with the text 'You are at the end of RPLRP\_Midterm\_survey.' Below this, there is a text input field for 'Name this form' containing 'RPLRP\_Midterm\_survey', a checked checkbox for 'Mark form as finalized', and a 'Save Form and Exit' button. At the bottom, there is a '< BACK' button.



## Appendix 2: 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 project and should continue within the community supported by extension personnel from MALFC when the project ends. As a CIG member, we would like to request you to begin monitoring the performance of sheep and goats within your flock. The project team will strive to provide feedback regularly on the progress of your flock improvement. It is our hope that this information 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 gather from implementing this initiative 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 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 all queries 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 \_\_\_\_\_

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