Health of Ethiopian Animals for Rural Development (HEARD)

Training material on preventing and controlling veterinary ectoparasites for smallholder livestock keepers

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Training material on preventing and controlling veterinary ectoparasites for smallholder livestock keepers

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International Livestock Research Institute

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Introduction

Livestock form the main source of livelihoods for smallholder livestock keepers in Ethiopia. Production diseases are among the major constraints to livestock production. Ectoparasitic infestations are common infectious diseases affecting cattle and small ruminant production having huge economic implications. Good hygienic practices play a significant role in preventing and controlling ectoparasitic infestations. However, smallholder livestock keepers have limited awareness and knowledge of the prevention and control of ectoparasites. Raising awareness and knowledge of livestock keepers through experiential training can help prevent and control ectoparasites resulting in decreased economic losses.

Training objectives and intended outcomes

The overall objective of the training is to increase awareness and knowledge of female and male livestock keepers about the classes, lifecycle and transmission of ectoparasites affecting camel, sheep and goats so that they can take measures to prevent and control infestations and reduce economic and animal welfare impacts.

Specifically, the training aims to:

- Explain veterinary ectoparasites, their types, general lifecycle and the damage they can cause to animals.
- Describe common veterinary ectoparasites affecting camels, sheep and goats.
- Implement herd health intervention developed to prevent and control the deleterious effect of veterinary ectoparasites on camels, sheep and goats.

Training content

- Introduction to ectoparasites
- Common ectoparasites affecting camels, sheep and goats
- Prevention and control measures for common ectoparasites affecting camels, sheep and goats

Training approach and process

The training adopts a participatory, interactive and gender sensitive approach drawing on livestock keepers' knowledge and experiences. The intrahousehold impact of animal diseases and the roles of different household members in the prevention and control of diseases will be explored.

The training will use a mixed and couple's training approach, where applicable, to ensure knowledge application and increase outcomes. Involving development agents in community based training events will ensure better articulation of livestock keepers' problems and contextualization of the training content. This will help facilitate training application

(outcomes) as the development agents continue mentoring and supporting the livestock keepers after the training. Participating couples (both wife and husband) in farmer/pastoralist training events will also increase training application at the household level.

Training methods and materials

- Interactive discussions
- Storytelling/experience sharing among livestock keepers
- Disease leaflets
- Pictures

Training duration

A complete grasp of the training content will take a day training time. It will be delivered in community centres to create easy access to men and women livestock keepers. The training can be delivered in half day sessions to allow livestock keepers time for reflection and catering to farm and household activities (particularly women livestock keepers).

Session 1. Introduction to ectoparasites

In this session, livestock keepers will learn about the classes, general lifecycle and damages of ectoparasites. They will discuss the economic and public health importance of common ectoparasitic infestations.

Learning outcomes

By the end of the session, livestock keepers will be able to:

- Explain what ectoparasites are.
- Identify classes of common ectoparasites.
- Explain the general lifecycle of common ectoparasites.
- Appreciate the damage caused by ectoparasites.

Content

- Definition
- Classes of ectoparasites
- General lifecycle
- Ectoparasite damage

Methods and materials

- Interactive discussion
- Examples/scenarios
- Pictures

Duration: 1 hour

Learning activities

Activity 1. Welcome and expectations

- Welcome participants.
- Introduce yourself.

- Mention that the training is about common ectoparasite prevention and control. Ask participants what they expect from the training and what they hope to change due to the training.

Then, explain the training objectives and expected outcomes.

Activity 2. What are ectoparasites?

Find out the local term for 'parasite' and ask participants to share what they know about parasites.

Then, show the images below and ask participants to discuss it in pairs or trios.

- What do you see in the pictures?
- What could be the problem?

Ask a few pairs to share their discussion results. Summarize the discussion and highlight the main points.

Find out the local term for 'ectoparasite'. Then, ask participants to explain what they think are ectoparasites, giving examples from their experiences.

Mention that a parasite is an organism that lives on or in a host organism and gets its food from or at the expense of its host. Ectoparasites are parasites that live outside the body (skin or coat) of another organism called the host. They are usually located in hard-to-reach places.

Communicate the following points to supplement livestock keepers' understanding. As you discuss the points, ask farmers to give examples or share their experiences.

Main learning points:

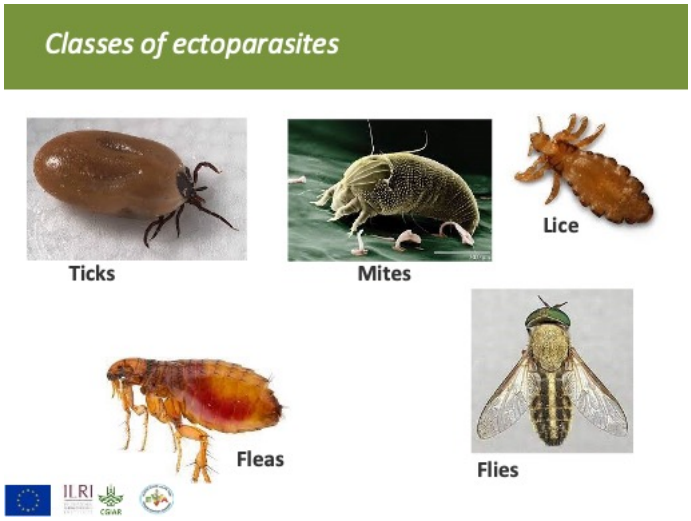
- Ectoparasites are organisms that live on or burrow into the surface of their host's epidermis (superficial layers of the skin) upon which they depend for food, shelter and other basic needs to survive.
- Ectoparasites spend all or some portion of their lives parasitizing their hosts.
- Ectoparasites parasitize a wide range of hosts, including:
    - Livestock (camel, goats, sheep, cattle, equines, poultry)
    - Companion animals (dogs, cats)
    - Fishes
    - Bees
    - Humans

Activity 3. Classes and lifecycle of common ectoparasites

Ask livestock keepers to mention examples of ectoparasites from their experiences.

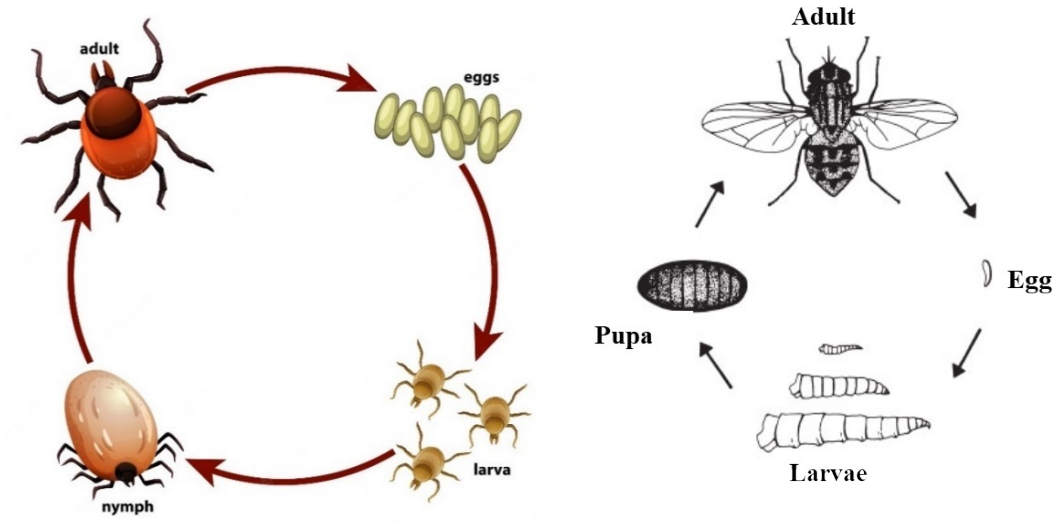
Then, show the image below and explain the common classes of ectoparasites.

Mention that structurally ectoparasites are divided into arachnids (ticks and mites) and insects (flies, mosquitoes, fleas and lice).



Mention that ectoparasites are generally arthropods that live and feed on the exterior of the host. The most common ectoparasites that infest camel, sheep and goats are ticks, mites, lice and fleas.

Show the image below and discuss the lifecycle of common ectoparasites. Ask participants to share their experiences on the distribution and prevalence of common ectoparasites.



Mention that ectoparasites can reproduce and spread in several ways. The most common form of reproduction is through contact with another host. This can happen when an animal rubs against another animal, encounters a contaminated surface or shares sleeping quarters with another animal.

Key learning points:

- Generally, ectoparasites reproduce by laying eggs and the biological developmental process through which they pass is called metamorphosis.
- Metamorphosis includes various morphological changes through the developmental stages.
- Understanding the life cycle of ectoparasites is essential to preventing their spread and keeping animals healthy and in good condition.

Activity 4. Economic and public health importance of ectoparasites

Ask participants to mention what they think are the effects of ectoparasites on camel, sheep and goat production, their livelihoods and health.

Use the following discussion questions:

- What could be the effects of ectoparasites on camel, sheep and goat production?
- What could be the effect of ectoparasites on livelihood and public health?
- How could ectoparasitic infestations affect men, women, boys and girls differently?

Summarize the discussion and highlight the main points.

Mention that ectoparasites are involved in mechanical damage, anaemia, loss of condition, irritation, allergic reaction, toxicosis, morbidity and mortality. They are detrimental to the life of the host, causing cutaneous lesions and transmitting pathogens.

Communicate the following main points, asking farmers to share their stories.

Main learning points:

- Effect on animal health and production
    - Blood loss (anaemia)
    - Myiasis: the infestation of the living tissues with fly larvae
    - Skin inflammation and pruritus
    - Toxic and allergic responses
    - Disturbance and self wounding
    - Serve as a vector for several diseases
- Economic effect
    - Skin damage causes poor skin and hides quality
    - Additional cost for treatment and control
- Public health effect
    - Ectoparasites affecting animals may also parasitize humans and cause diseases (e.g. infestation of mites)
    - Some ectoparasites serve as vectors of human diseases (e.g. Hyalomma species transmit Anaplasma pathogens to humans)
    - Ectoparasites can also cause a social nuisance

Session 2. Common ectoparasites affecting camels, sheep and goats

In this session, smallholder livestock keepers will learn about common ectoparasites affecting camels, sheep and goats and how they spread.

Learning outcomes

By the end of the session, livestock keepers will be able to:

- Explain how ectoparasites of camels, sheep and goats spread.
- Explain the damage ectoparasites cause on camels, sheep and goats.
- Identify species of common ectoparasites of camels, sheep and goats.
- Explain transmission pathways of mange mites and lice.
- List parasitic flies of camels, sheep and goats.

Content

- Common ticks affecting camels, sheep and goats
- Common mites affecting camels, sheep and goats
- Common lice affecting camels, sheep and goats
- Common flies affecting camels, sheep and goats
- Common fleas affecting camel, sheep and goats

Methods and materials

- Interactive discussion
- Storytelling/experience sharing
- Pictures/posters
- Cases/scenarios

Duration: 2 hours

Learning activities

Activity 1. Common ticks affecting camels, sheep and goats

Show the image below and ask participants what they think about it.

Discussion questions:

- What do they see in the picture?
- What is happening in the picture?
- Why is it happening?

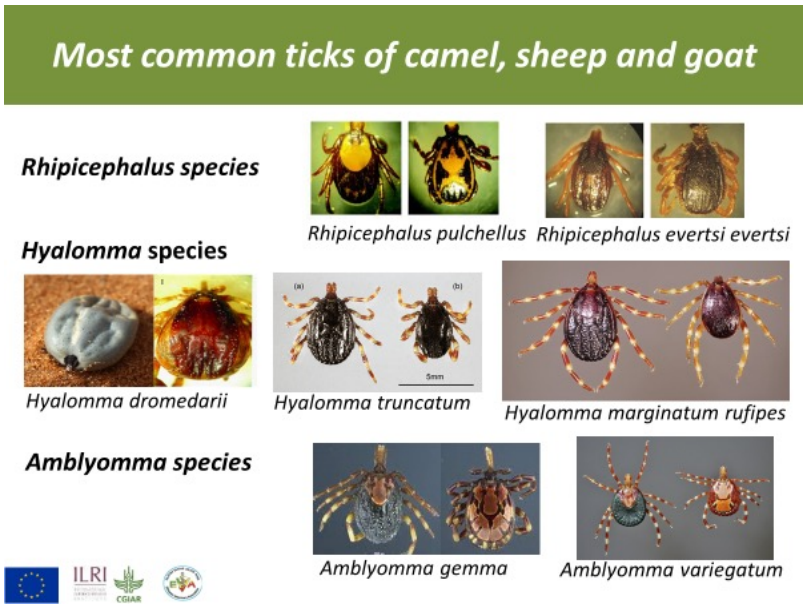
Encourage participants to share their views.

Summarize the discussion and highlight the main points.

Mention that ticks are external parasites, living by feeding on the blood of mammals, birds and sometimes reptiles and amphibians.

Find out the local term for 'tick' and why it is named like that.

Using the image below, discuss the common species of ticks that affect camels, sheep and goats.



Discuss the following points, asking farmers to give examples or share their experiences.

Check for understanding and ask farmers if they have any questions.

Main learning points:

- Ticks are obligate, blood feeding ectoparasites of camel, goat, sheep, cattle, horse, donkey, humans, birds, wild animals and others.
- They remove large amount of blood from their hosts, transmit several diseases and their saliva cause irritation and sometimes paralysis in animals.
- Ticks can transmit different diseases from animals to humans.
- There are two types (families) of ticks:
    - The hard ticks (Ixodidae) and
    - The soft ticks (Argasidae)
- Hard ticks have a hard covering (scutum), which extends over the whole dorsal surface of the adult male (small) but covers only a small area in the larva, nymph and female (big).
- Some ticks have coloured enamel like areas on the body and some are not.
- Some ticks stay on one host and others move from one animal to another in their development (life) cycle.

Activity 2. Common mites affecting camels, sheep and goats

Show the images below and ask participants what they think about them.

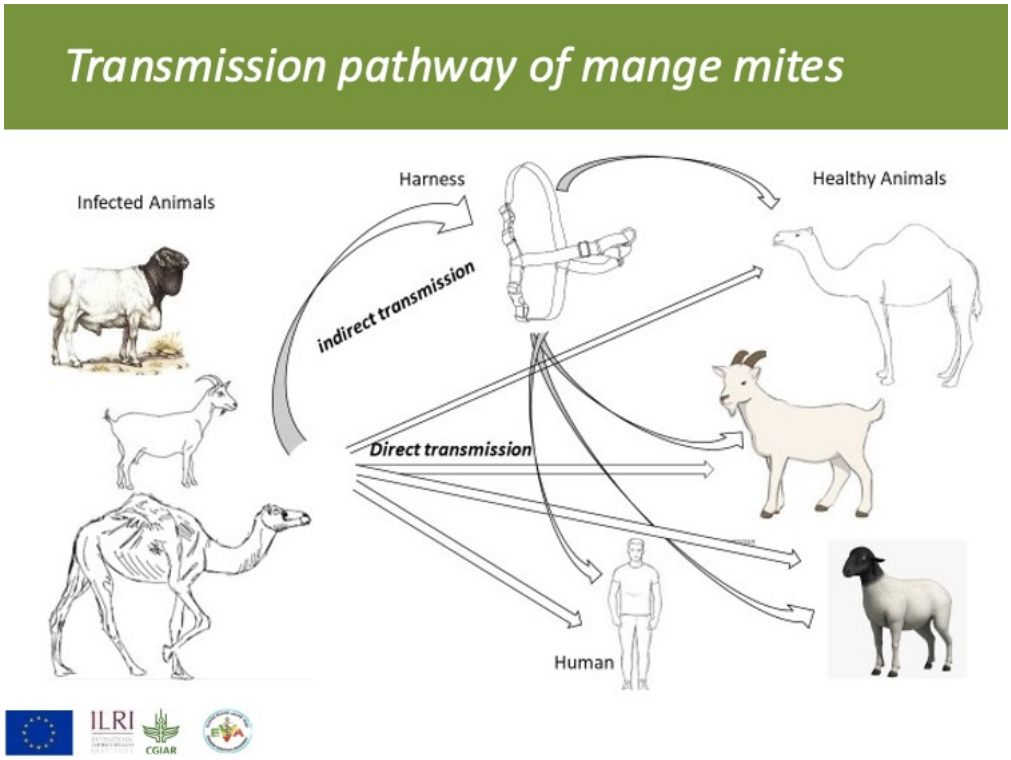
Discussion questions:

- What do you see in the pictures?
- What is happening in the pictures?
- Why is it happening?

Summarize the discussion and highlight the main points.

Find out the local term for 'mite'.

Using the poster below, discuss the transmission of mange mites, asking participants to share their experiences.



Main learning points:

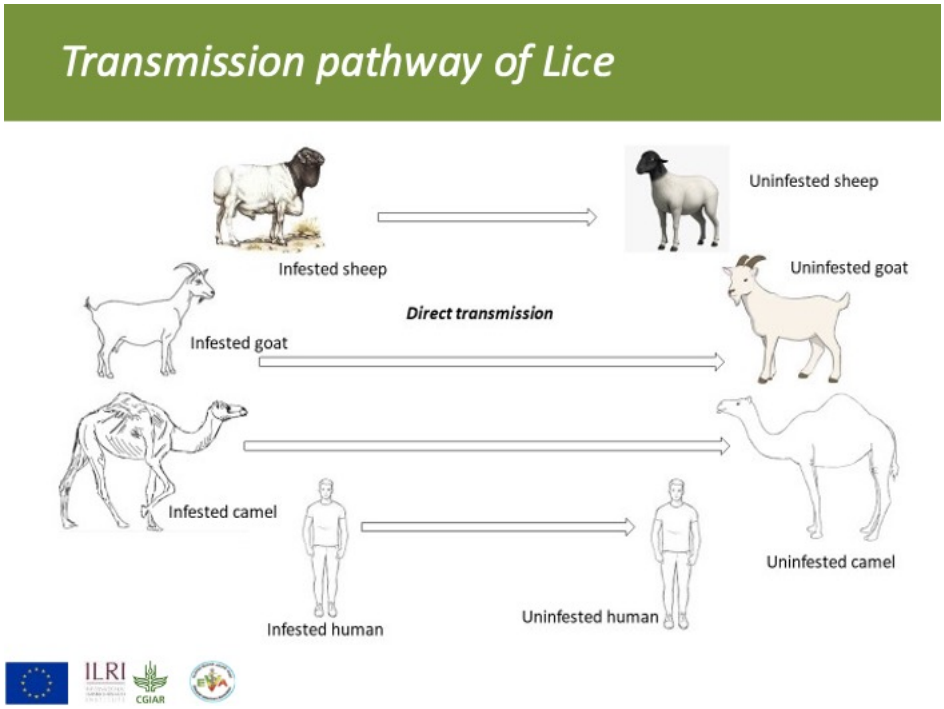
- Ectoparasitic mites are microscopic organisms that inhabit the skin and feed on blood, lymph, skin debris or sebaceous.
- Infestation by mites can result in severe dermatitis (known as mange) which is characterized by itching, hair loss, skin thickening and scab formation.
- Most ectoparasitic mites spend their entire lives in intimate contact with their host, so transmission from host to host is primarily by physical contact with infected animals or with contaminated harnesses.
- Mange is a zoonotic disease and can be transmitted to humans from camels, sheep and goats by direct contact or from contaminated harnesses.
- Sarcoptes species, Chorioptes species and Demodex species are the most common mite species responsible for causing mange in camel, sheep and goats.

Activity 3. Common lice affecting camels, sheep and goats

Show the image below and ask participants what they think about it. Ask them to give examples of insects that feed on human and animal blood.

Find out the local term for 'lice'.

Using the poster below, discuss the transmission of lice, asking participants to share their experiences of how lice spread and cause damage in humans and animals.



Main learning points:


Linognathus


Bovicola

- Lice are permanent obligate ectoparasites, which are highly host specific.
- They are small wingless insects and possess stout legs and claws for clinging tightly to fur and hair.
- Transfer of lice from animal to animal or from herd to herd is usually by direct physical contact.
- Lice are blood feeders and heavy infestations can significantly reduce weight gain and milk production.
- Light infestation may have no obvious effects, but pruritis, dermatitis and hair loss are usually evident at heavier parasite loads.
- *Linognathus* species and *Bovicola* species are the most common lice specious infesting sheep and goats.
- *Microthoracius cameli* is the most common louse infesting camels.


Microthoracius

Activity 4. Common fleas affecting camels, sheep and goats

Show the images below and ask participants what they think about them.

Discussion questions:

- What do you see in the pictures?
- What is happening in the pictures?


Summarize the discussion and highlight the main points.

Then, show the picture below and tell participants that it is a flea. Find out the local term for a 'flea'. Encourage participants to share their experiences with fleas in humans and animals and how they spread and cause damage.

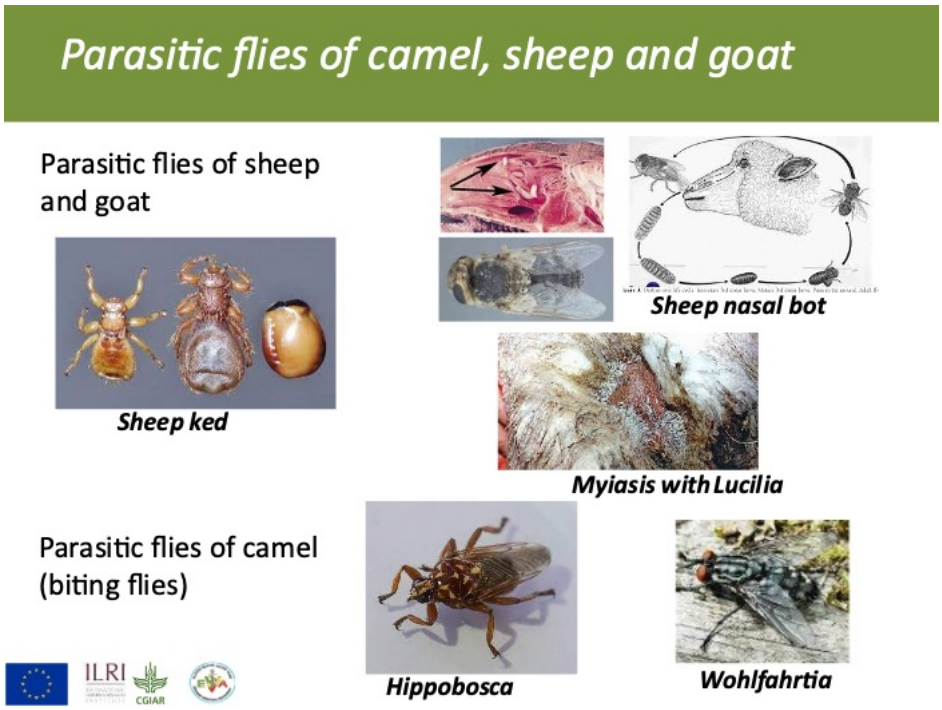
Main learning points:

- Fleas are small, wingless, obligate blood feeding insects.
- Many species of fleas can parasitize a range of hosts.
- They have powerful hind legs allowing them to jump great distances and this allows them to move easily between hosts.
- Ruminants, horses and pigs do not have their own species of fleas.

Activity 5. Common flies affecting camels, sheep and goats

Show the image below and ask participants what they think about it.

Then, using the poster below, discuss common parasitic flies that affect camels, sheep and goats. Explain how they spread and the damage they cause to animals, asking for examples and experiences from participants.



Main learning points:

- Flies have one pair of wings and they can be parasites as larvae or adults.
- Some adult flies feed on body secretions, blood and tissue fluid of their hosts.
- The larvae of certain dipterans can develop in the tissues of many domestic animals. This results in a condition called myiasis.
- The larvae of myiasis producing flies are extremely host and site specific.

Session 3. Preventing and controlling common ectoparasites affecting camels and shoats

In this session, livestock keepers will learn about a herd health approach to preventing and controlling common ectoparasites affecting camels and small ruminants. Drawing on their experiences, participants will discuss integrated prevention and control measures for common ectoparasites affecting camels and shoats.

Learning outcomes

By the end of the session, participants will be able to:

- Attend community based strategic ectoparasite control programs.
- Seek treatment of infested animals from professional personnel.
- Improve hygienic practices within the herd.

Content

- Community based strategic ectoparasite control program
- Treating ectoparasite infested animals
- Improving hygienic practices within the herd

Methods and materials

- Illustrations
- Sharing experience/storytelling
- Buzz sessions

Duration: 2 hours

Learning activities

Activity 1. Community based strategic ectoparasite control program

Find out what ectoparasite control services participants receive in their community.

Discussion question:

- What ectoparasite control services do you receive in your community?
- Who provides the service?
- Do you get the service individually as you need it or the service is provided for the whole community at a time of the year?
- What do you think is the benefit of a community based ectoparasite control program as opposed to individuals accessing the service as they need it?
- What will a community based strategic ectoparasite control program require community members and service providers?

Summarize the discussion and highlight the main points.

Then, discuss the following points, asking farmers to share their experiences.

Main learning points:

- Spraying/dipping the whole herd with acaricide just before and one month after the rainy season.
- Spraying insect repellents on all animals.

Activity 2. Treating ectoparasite infested animals

Find out what traditional methods participants use to control veterinary ectoparasites. Explore the gender dynamics in traditional methods.

Discussion questions:

- What plant based traditional methods do you use to control ectoparasites that affect animals?
- What mechanical methods do you use to control or eradicate ectoparasites?
- How do the biological and mechanical methods differ by animal species and the gender of the caregiver?
- Do you seek veterinary advice to control ectoparasites that affect the welfare and productivity of your animals?

Summarize the discussion and highlight the main points.

Main learning points:

- Treating clinically sick animals with ivermectin 1%.

Activity 3. Improving hygienic practices within the herd

Find out the livestock husbandry and hygiene practices of participants within their herds.

Discussion questions:

- Do you frequently clean the sheds of animals?
- Do you allow animals to crowd under tree shades?
- Do you isolate mange affected animals from the herd?
- Do you monitor and treat the wounds of animals?

Summarize the discussion and highlight the main points.

Then, discuss the following points, asking farmers to give examples or share their experiences.

Main learning points:

- Isolating clinically diseased animals (in the case of mange)
- Avoiding sharing of harnesses between animals
- Early treatment of a wound to avoid myiasis
- Do not pick ticks with your hand

Activity 4. Learning integration and action plans

Recap and communicate key action messages that livestock keepers should take to prevent and control ectoparasites affecting camel and shoats.

Ask a few female and male livestock keepers to reflect on their learning experiences and identify key home take action messages.

Then, encourage them to identify practical actions that they can take to prevent and control common ectoparasites affecting camels, sheep and goats.

Further readings

Alanazi, A.D., Nguyen, V.N., Alyousif, M.S., Manoj, R.R.S., Alouf, A.S. et al. 2020. Ticks and associated pathogens in camels (*Camelus dromedarius*) from Riyadh Province, Saudi Arabia. BMC. *Parasite Vectors* 13(1): 110. https://doi.org/10.1186/s13071-020-3973-y.

Gebre, S. and Kaaya, G.P. 2006. Prevalence of camel ticks and Haemoparasites in southern rangelands of Ethiopia. *Biosciences Biotechnology Research Asia* 3(2a). Available from: https://bit.ly/2PFXKOE.

Heinemann, B. 2001. Veterinary parasitology. The practical veterinarian. United States of America.

Taylor, M.A., Coop, R.L. and Wall, L. 2007. *Veterinary parasitology*. 3rd Edition. Oxford, England: Blackwell Science, Ltd.

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