Annex 1

Handouts for a training course in participatory epidemiology

Catley, A. (2005). Participatory Epidemiology: A Guide for Trainers. African Union/Interafrican Bureau for Animal Resources, Nairobi.

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Handout 1

Why is participation important?

The 100-to-1 Cow Project

The farmers in a small village in the Indonesian province of Irian Jaya in western New Guinea, had rarely, if ever, seen a cow before government representatives announced that a boatload of cattle would soon arrive.

The village had about 300 households most of whom depended on subsistence farming supplemented by raising a pig and a few chickens, and by hunting. Apart from government officials and the occasional trader, the village had little contact with the outside world.

Government development planners were anxious to introduce beef cattle to the region in order to provide a new source of meat for the country's rapidly growing urban centres. As the people of the village had migrated to the coast from upland areas known for breeding pigs, the planners assumed that these people would adapt easily to the challenges of expanded livestock-raising.

The visiting officials convened a one-day training programme and then, 100 beef cattle arrived. Almost at once, the animals began wreaking havoc. Knee-high fences designed to keep pigs from entering the village centre were no barrier to the animals; They trampled gardens, damaged homes, broke tools, and fouled fresh water sources. When the cows were shooed away, many wandered into the bush and disappeared.

Deciding to hunt them down before they did any more damage, the villagers armed themselves with bows and arrows and one-by-one they killed the cows until there was only a single animal left alive. Satisfied that the danger was passed, they spared the lone survivor, a living memory to the danger that government officials had called "development".

Source: Connell (1993)-prepared by Stella Maranga, MS-TCDC.

Handout 2

Participatory approaches: some origins

The participatory approaches in use today have evolved from several sources and traditions. Five of these have been particularly important:

- ***Activist participatory research:*** Inspired by Paulo Freire (1968), this approach uses dialogue and joint research to enhance people's awareness and confidence and to empower them to take action. Although its special focus on the underprivileged and on political action has limited its spread, its key contributions to the current approaches is its recognition that poor people are creative and capable and should be empowered, while outsiders have a role as catalysts and facilitators.

- ***Agroecosystem analysis:*** Developed by Gordon Conway and colleagues (for example see Conway 1987). This approach draws on systems and ecological thinking, combining the analysis of systems (productivity, stability, sustainability, equity) with pattern analysis of space, time, flows and relationships, relative values and decisions. Among its major contributions to current approaches are its use of transects, informal mapping and diagramming and the use of scoring and ranking to assess innovations.

- ***Applied anthropology:*** Although conventional social anthropology has been mainly concerned with understanding rather than changing, applied anthropology became more recognized in the 1980s as a legitimate and useful activity, especially in its ability to help development professionals to appreciate better the richness and validity of rural people's knowledge. It also emphasizes the benefits of unhurried participant observation and conversations and the importance of attitudes, behaviour and rapport.

- ***Field research on farming systems:*** Two branches of this discipline simultaneously revealed on the one hand the rationality of small and poor farmers on the other hand, their activities as experimenters. Farmers' participation in agricultural research therefore became a focus, especially in the context of complex, diverse and risk-prone farming systems.

- ***Rapid rural appraisal:*** Emerging in the late 1970s, this was a reaction to general dissatisfaction with the biases inherent in the "rural development tourist" approach, which tended to hide the worst poverty and deprivation. It was also a reaction to the tediousness, expense and frequent inaccuracy of the conventional process of questionnaire surveys. In answering the question *"Whose knowledge counts?"* it sought to enable outsiders to gain insight and information from rural people about rural conditions in a cost-effective and timely manner.

Sources: Andrea Cornwall, Irene Guijt and Alice Welbourn (1993); Robert Chambers (1992)

Handout 3

Seven types of community participation

Type of participation		Description
1.	Manipulative participation (Co-option)	Community participation is simply a pretence, with people's representatives on official boards who are unelected and have no power.
2.	Passive participation (Compliance)	Communities participate by being told what has been decided or already happened. Involves unilateral announcements by an administration or project management without listening to people's responses. The information belongs only to external professionals.
3.	Participation by consultation	Communities participate by being consulted or by answering questions. External agents define problems and information gathering processes, and so control analysis. Such a consultative process does not concede any share in decision-making, and professionals are under no obligation to take on board people's views.
4.	Participation for material incentives	Communities participate by contributing resources such as labour, in return for material incentives (e.g. food, cash). It is very common to see this called participation, yet people have no stake in prolonging practices when the incentives end.
5.	Functional participation (Cooperation)	Community participation is seen by external agencies as a means to achieve project goals. People participate by forming groups to meet predetermined project objectives; they may be involved in decision making, but only after major decisions have already been made by external agents.
6.	Interactive participation (Co-learning)	People participate in joint analysis, development of action plans and formation or strengthening of local institutions. Participation is seen as a right, not just the means to achieve project goals. The process involves interdisciplinary methodologies that seek multiple perspectives and make use of systemic and structured learning processes. As groups take control over local decisions and determine how available resources are used, so they have a stake in maintaining structures or practices.
7.	Self -mobilisation (Collective action).	People participate by taking initiatives independently of external institutions to change systems. They develop contacts with external institutions for resources and technical advice they need, but retain control over how resources are used. Self-mobilisation can spread if governments and NGOs provide an enabling framework of support. Such self-initiated mobilisation may or may not challenge existing distributions of wealth and power.

(Source: adapted from Pretty 1994)

Handout 4

Is participation always a good thing?

PARTICIPATION LEADING TO VIOLENCE

Devalia Surendranagar District of Gujarat, India is a highly caste stratified village. Rajputs have traditionally owned the large fields and control most common property resources. Gadvis, with their small land holdings form the lowest of the local caste hierarchy. The Rajputs control most surface water resources in an area characterized by low rainfall and cyclical droughts. The Gadvis, who have no access to irrigation, must rely on one rain fed crop annually, and end up working as labourers for the Rajputs at very low wages.

During a participatory mapping exercise, facilitated by an NGO, the Rajputs explained that improving water resources was a priority for them and indicated the need to dig new wells on their lands. The Gadvis prepared their own village map and showed where they wanted to construct a community well.

A complex process of negotiation and bargaining lasting about three weeks took place between the community groups and the NGO. The Gadvis were the first to organize, and given the equity concerns of the NGO, it was felt appropriate to start with supporting them because they were the most disadvantaged group in the village.

The Gadvs started constructing their community well and struck water within 10 days. They developed a land use plan and map and started preparations for cultivating in the winter season. But the Rajputs became annoyed and angry. They had lost their cheap labourers from the Gadvis community who were no longer dependent on the Rajputs for employment. One afternoon, the group of Gadvis working on their well was ambushed and brutally beaten by a group of Rajputs. Two of the Gadvis died on the spot and others sustained serious injuries.

The NGO facilitators felt horrified about having initiated the participatory process without realizing its implications. It took some time for the NGO and Gadvi leaders to restart a dialogue. However the Gadvi leaders felt that the deaths should not stop the NGO from carrying out similar activities. Today, before supporting programme activities, the NGO spends much more time facilitating negotiations between different community groups.

Source: Shah and Shar (1995)- prepared by Stella Maranga, MS-TCDC

Handout 5

PRA versus other research methods

	PRA	**Survey research**	**Ethnographic research**
Duration	Short	Long	Long
Cost	Low to medium	Medium to high	Medium
Depth	Preliminary	Exhaustive	Exhaustive
Scope	Wide	Limited	Wide
Integration	Multidisciplinary	Weak	Weak
Structure	Flexible, informal	Fixed, formal	Flexible, informal
Direction	Bottom-up	Top-down	Not applicable
Participation	High	Low	Medium to high
Methods	Basket of tools	Standardized	Basket of tools
Major research tool	Semi-structured interview	Formal questionnaire	Participant observation
Sampling	Small sample size based on variation	Random sampling, representative	None
Statistical analysis	Little or none	Major part	Little or none
Individual case	Important, weighed	Not important, not weighed	Important, weighed
Formal questionnaires	Avoided	Major part	Avoided
Organization	Very important	Hierarchical	Not applicable
Qualitative descriptions	Very important	Not as important as 'hard data'	Very important
Measurements	Qualitative or indicators used	Detailed, accurate	Detailed, accurate
Analysis, Learning	In the field and on the spot	At office	In the field and on the spot

Prepared by Stella Maranga, MS-TCDC

Handout 6

Notes on attitudes and behaviour in participatory epidemiology

1. Introduction

An important aspect of participatory approaches[1] is the way we interact with other people. This interaction determines the relationship and trust that develops between researchers and local people, and affects the types of issues and information that people are willing to discuss in an open manner.

If we look at this issue from an epidemiological perspective, the relationship between researchers and livestock keepers is a key factor affecting the reliability and validity of data. If informants are concerned that researchers have a 'hidden agenda', will use the information solely for selfish purposes or may pass information to authorities, then their participation will be poor. Also, if informants consider outsiders to be rude or arrogant, or only interested in their own opinions, the discussion will not be very constructive.

Therefore, a crucial feature of participatory epidemiology is that researchers must be constantly aware of their own attitudes and behaviour.

2. Attitudes

The evolution of participatory epidemiology was strongly influenced by social anthropologists and their interest in indigenous knowledge[2]. In short, researchers began to realise that rural communities had a great wealth of knowledge and skills that had developed over generations. Similarly, farmers were experimenters in their own right. They recognised problems and tested different ways to solve these problems.

Consequently, participatory approaches to development aimed to use indigenous knowledge as the basis for development interventions. By understanding what farmers already knew and involving them in problem-solving, projects were better tailored towards local perceptions and capacities. This principle has been widely applied in some of the better community-based animal health projects in pastoral areas.

From the perspective of meaningful research, researchers must believe that an informant has something useful to say. This means respecting local views and opinions, and being open to ideas that may not necessarily agree with modern science. This does not mean that as veterinarians, we must automatically accept all indigenous knowledge as valid and useful. The idea is to identify local knowledge and skills that seem to agree with our professional know-how, and develop this

[1] Note that this also applies to conventional methods such as interviews used during questionnaire surveys.
[2] Sometimes called 'ethnoveterinary medicine' when related to animal health and production topics.

existing local capacity further. At the same time, possible gaps in local knowledge can be identified and discussed.

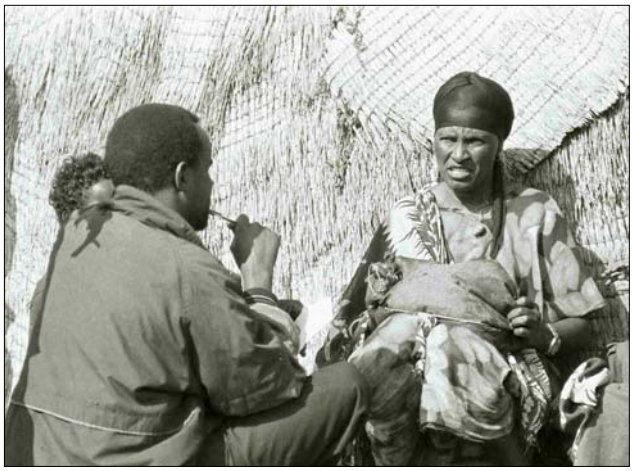
3. Non-verbal communication and listening skills

As outsiders, everything we do in a community influences information flow. This doesn't only mean what we say, but how we behave. This 'non-verbal communication' can take many forms, for example:

- how we dress and appear
- what we carry with us - our possessions
- how we travel – on foot, bicycle, matatu or project vehicle (bearing the project logo)
- our body posture
- our behaviour

Outsiders always give visual signals about who they are and their reasons for visiting an area. When project vehicles bear logos, people may have false expectations. These expectations need to be discussed. Everyone should clear about the purpose of a piece of work and the likely benefits at the onset.

When using participatory methods, researchers need to think carefully about their behaviour and how this influences the interaction with local people. This interviewer is doing well, but does he really need to take notes during the interview or could it wait until afterwards?



During the workshop, participants will be asked to identify specific examples of non-verbal communication that can have a negative or positive impact on the use of participatory methods.

Common examples include:

- Dressing formally or in expensive clothes – this can create an impression that the researchers are more wealthy and powerful than informants
- Sitting at a higher level – this makes the researchers automatically look down on the informants
- Failing to make proper personal introductions and begin meetings according to local customs and manners – this can give the impression that local customs are not important
- Failing to arrange meetings and interviews at times which suit local people – people are often busy and are only available at certain times of days
- Showing signs of boredom or fatigue – for example, by yawning
- Showing signs of impatience – for example, foot tapping or repeatedly looking at a wrist watch
- Dominating a discussion or interview by lecturing people
- Refusing to accept offers of local food or drink

4. Do-it-yourself

One way to show people that you're interested in their way of life is to take part in some of the everyday working tasks that they perform. This can show people that you're not too proud to work alongside them and at the beginning of project, helps to create good rapport. In many cases, researchers have to be taught how to perform a certain job. This 'role reversal', with vets learning from local people, shows people that their knowledge and skills are valuable.

If you're in a pastoral area, why not try milking a camel, making some butter or building a local house?

A veterinarian in Ethiopia tries (and fails) to make butter using a traditional method. He did this to show people that although he was university-educated, there were some things that he couldn't do well.

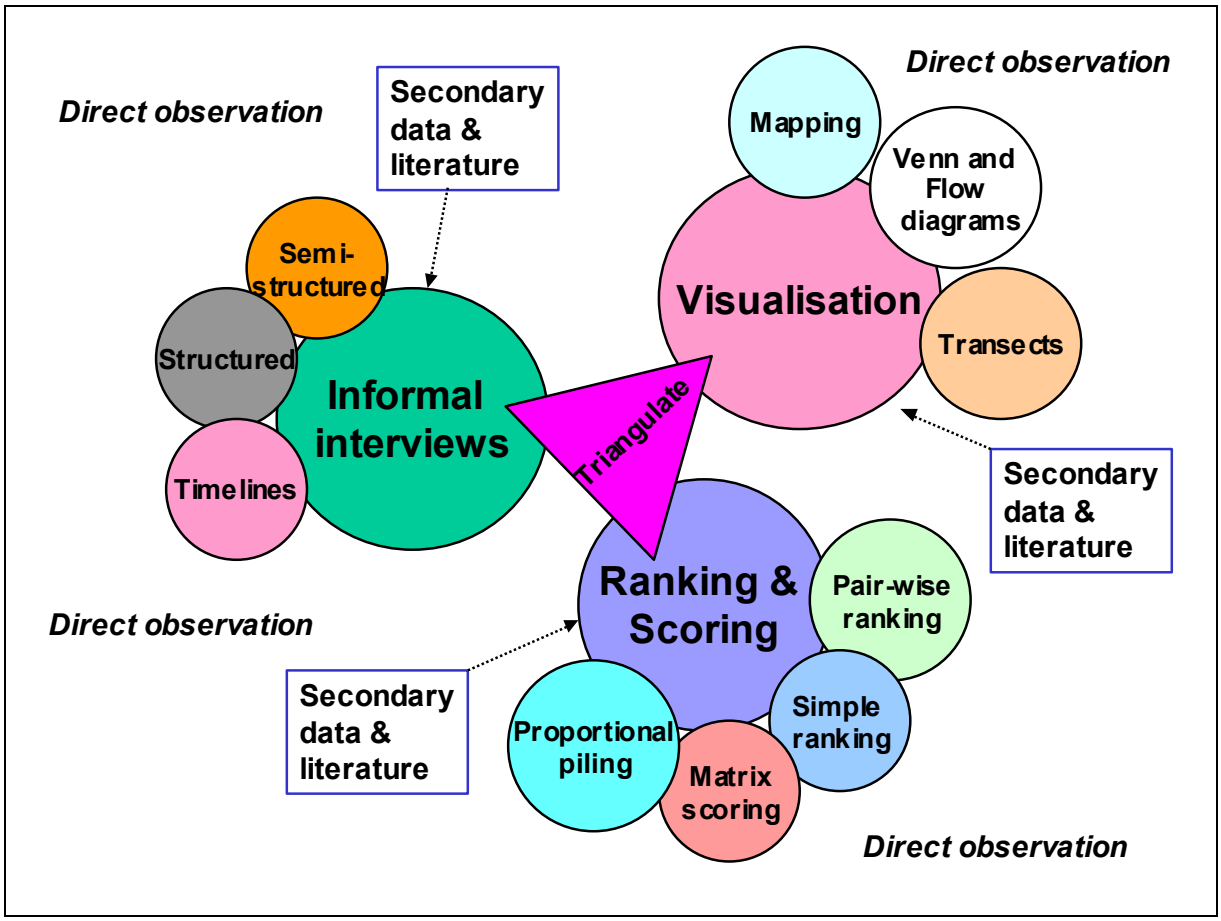
Overview of Participatory Methods

The three main groups of participatory methods are:

- ***Informal interviewing methods***
- ***Visualization methods***
- ***Ranking or scoring***

All these methods are supported by knowledge of ***secondary literature*** and ***direct observation***.

Ideally, the methods are used together. The results from one method are compared with the results of one or more other methods. This process of comparison and cross-checking is called ***triangulation***.



Triangulation can be compared with the process of making a diagnosis in veterinary medicine. When making a diagnosis a clinician collects and compares information from different sources, including the case history, owner interview, direct observation of the farm environment, clinical examination of the animals and so on. All this information is mentally combined to provide a provisional or final diagnosis.

The use of key informants

Within communities, certain local people are recognised as possessing particular knowledge and skills. These local experts or ***key informants*** can be identified by asking people to identify others who know most about a certain topic and then seeing which names are mentioned repeatedly by different informants. Key informants can be used to provide very detailed information on specialised areas such as specific aspects of crop production, animal husbandry or human health.

Handout 8

Working as a team when using participatory methods

Many PE methods work best when a team of two or more researchers work together. Within the team, roles should be clearly defined.

- One person should be the ***facilitator.*** The facilitator introduces the session, asks questions, explains the method and checks the information as it arises from the informants. Therefore, the facilitator interacts directly with the informants and does not need to write anything during the method. In other words, the communication flow is not interrupted because the facilitator keeps stopping the discussion in order to write down what has been said.

- Another team member acts as the ***recorder***. This person usually sits slightly back from the group and records the discussion or results of scoring methods as they arise. The recorder also watches the group dynamics and keeps a watch on who talks in the group and who doesn't. If necessary, the recorder can remind the facilitator to include people who are not contributing to the discussion.

The team members need to carefully prepare how they are going to run each session and who is going to say what. It can be very confusing for informants if, for example, the team members interrupt or contradict each other when explaining how a particular method should be conducted.

Managing groups

When working with groups of people, researchers need to pay attention to group dynamics. For example, during a particular method, who is talking and who remains silent? Various methods can be used to encourage less willing participants to contribute their views. Researchers also need to know how to handle dominant talkers in groups i.e. those people who talk to such an extent that other people are excluded from the discussion.

How to manage groups will be discussed during the workshop.

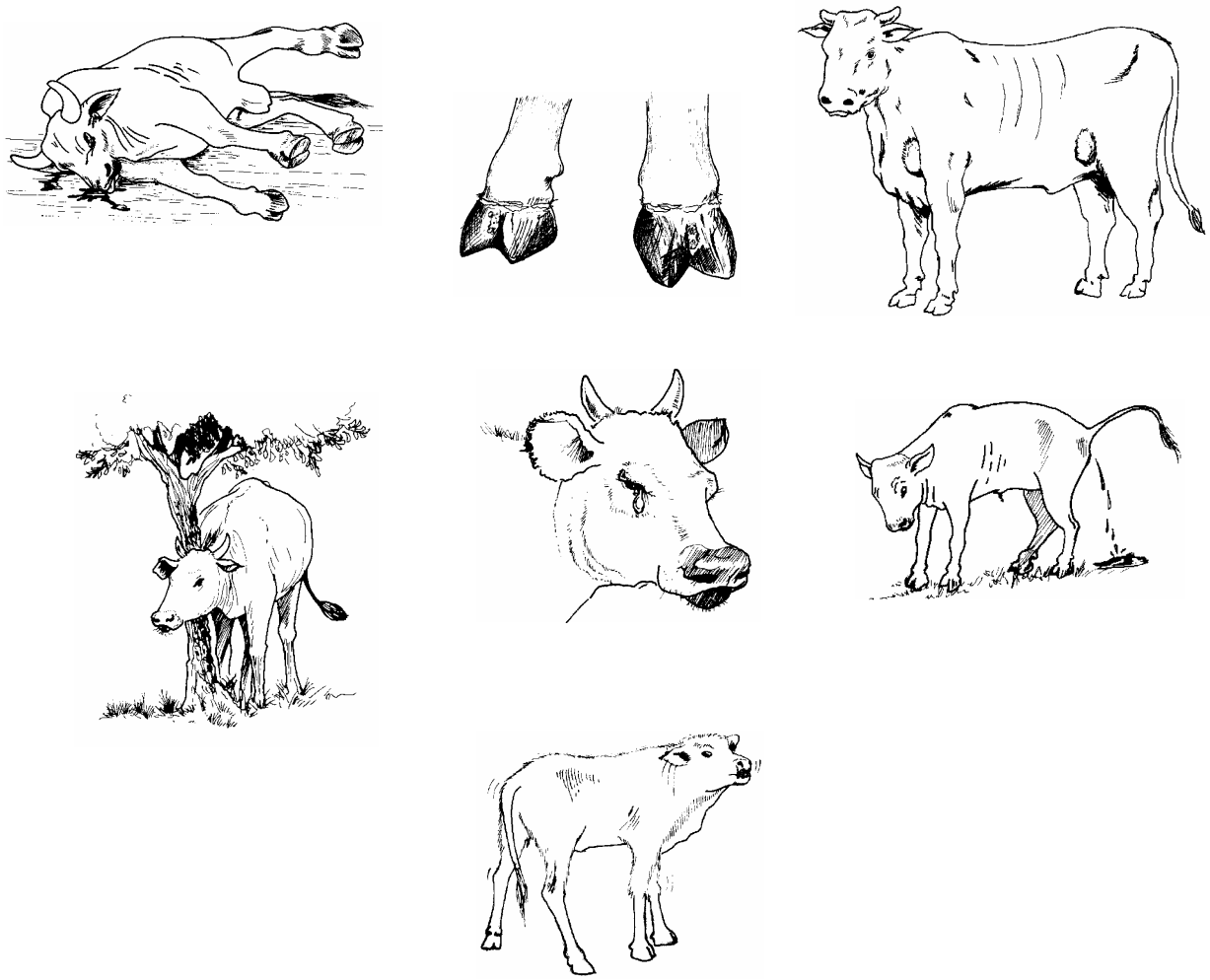
Handout 9

Using pictures and other aids to assist participatory epidemiology methods

An important aspect of PE methods is their capacity to reach illiterate people and involve them in description and analysis of local problems. With methods requiring people to either write or understand text, illiterate people can easily become isolated and may not contribute because they're embarrassed, or because literate people dominant the discussion.

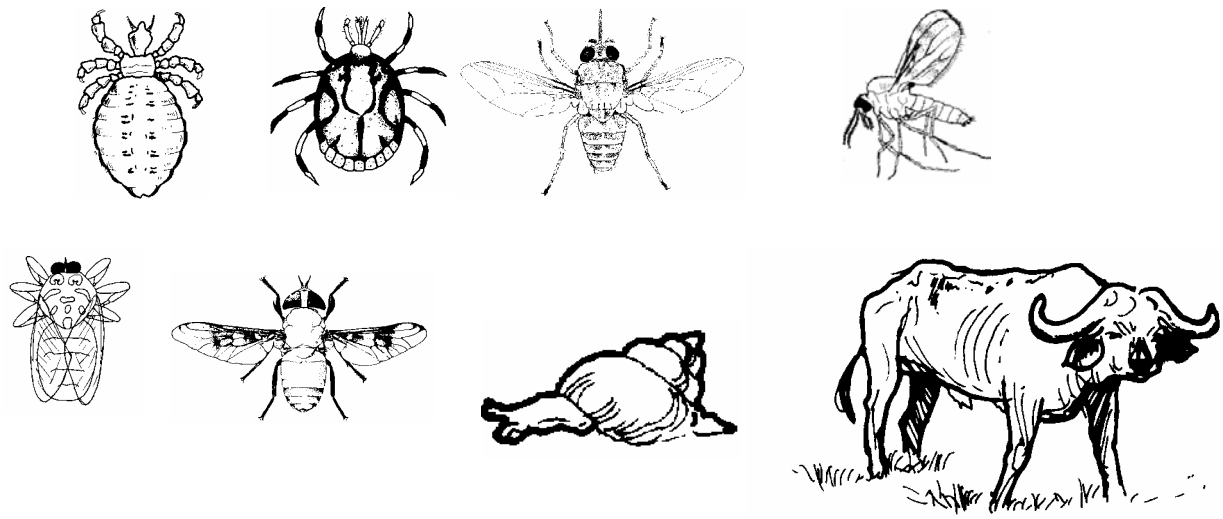
Many PE methods, such as interviews, matrix scoring, mapping, seasonal calendars and proportional piling can be conducted using no written words. With these methods, disease-signs or causes, parasites, livestock types and other items can be represented by either everyday objects or pictures. Pictures can be drawn or printed on to pieces of card and these cards form the 'labels' for the method.

<u>Examples of pictures of clinical signs</u>



When using pictures, it is always necessary to check that the informants understand the meaning of the pictures. The facilitators need to show each picture to the group and explain it's meaning e.g. 'this is a picture of a bull that has died suddenly' or 'this picture shows a cow with wounds on it's feet'.

<u>Examples of pictures showing 'causes' or sources of disease</u>



When discussing causes or sources of diseases associated with parasites, actual specimens of parasites can help to ensure that the researchers and informants are talking about the same parasite. It is easy to carry a few preserved specimens to the field and show these to informants. Alternatively, specimens can be collected during post mortem examination. Biting flies can often be captured in the vicinity of livestock.

In all cases, the local names for parasites and disease vectors can be determined using:

- Informal interviews
- Examination of clinical cases, post mortem examination, viewing parasites and naming with livestock keepers
- Matrix scoring of livestock diseases

When all these methods are used, we begin to triangulate (cross-check) the local names for disease and parasites.

Handout 10

Summary guidelines for semi-structured interviews

1. **Prepare yourself:** this is possibly the most important! Define the topic you want to investigate, work out the key 4 or 5 questions you want to ask and who it is you want to interview. If possible bring an assistant along as a note-taker.

2. **Introduce yourself and the purpose of the meeting:** Your informants will want to know why you have come and why you have an interest in the selected topic.

3. **Watch your body language throughout:** Be friendly, informal, respectful and try to sit on the ground! Stay calm: there is never any need to become emotional!

4. **Start with general questions/comments:** This will put people at ease. The easiest is to start with something visible that everybody can agree with. Use simple language. Ask only one question at a time.

5. **Mix questions with general discussion:** By introducing variety, you will keep up the interest of your informants. Casual dialogue will ensure good communication.

6. **Use diagrams, symbols and other drawings:** These will help in keeping people interested and ensuring everybody participates and understands.

7. **Use simple language:** Avoid "scientific" words. Ask only one question at a time, avoid leading questions, long or complicated questions, or questions which can be answered with simple "yes" or "no".

8. **Probe:** This is the most difficult. If an interesting point comes up, try and discover more. Six small words (why, how, who, what, when, where?) will help you to probe: keep them in mind throughout!

9. **Observe:** to make sure that everybody participates (especially women) and the conversation is not dominated by a few individuals. Also make sure that people are not getting restless (a sign they are getting tired): normally, 90 minutes is a maximum for group interviews.

10. **When the interview is over:** thank your informants and give them an opportunity to ask their own questions: this is polite and also will give you valuable clues!

11. **Make full notes after the interview:** (unless you have a note taker). By just writing down the main points you will not slow down or interrupt the conversation.

(Source –unknown)

Handout 11

Participatory Mapping

Contents

1. Introduction

Mapping is a type of visualisation method which is a popular participatory tool among animal health workers.

Examples of maps include:
- livestock mobility and grazing maps
- natural resource maps
- opportunities and service maps
- social maps

Mapping is a useful method for the following reasons:
- both literate and non-literate people can contribute to the construction of a map (as it is not necessary to have written text on the map)
- when large maps are constructed on the ground, many people can be involved in the process and contribute ideas. People also correct each other, and make sure that the map is accurate
- maps can represent complex information that would be difficult to describe using text alone
- maps can act as a focus for discussion

In pastoral communities, livestock mobility maps are useful for prompting discussion on topics such as animal health problems that are location-specific, and access to veterinary services when herds are in different places at different times of year.

Also, if you are trying to learn about contact between herds from different communities, maps can show when herds are in close contact with each other or with wildlife. This information is particularly useful when developing strategies for control of epizootic diseases.

Mapping can be useful during the early stages of participatory analysis. The method tends to prompt much discussion and activity among informants, and enables them to define the area under consideration. Although when copied to paper maps become useful outputs of mapping methods, it is important to note that maps can act as the focus for much discussion and follow-up questioning.

2. The Method

1. Mapping is best used with a group of informants, say between 5-15 people. Find a clean piece of open ground. Explain that you would like the group to produce a picture showing features such as:
   - geographical boundaries of the community. In pastoral areas, these boundaries should include the furthest places where people go to graze their animals
   - main human settlements
   - roads and main footpaths
   - rivers, wells and other water sources
   - grazing areas, farmed areas, forests and other natural resources
   - services e.g. veterinary clinics, duka or Agrovet shops
   - ethnic groups
   - seasonal movements of livestock by livestock type
   - seasonal and spatial contacts with herds from other communities or wildlife
   - areas of 'high risk' for parasites e.g. tsetse flies or ticks

   Explain that the map should be constructed on the ground using any materials that are to hand. For example, lines of sticks can be used to show boundaries.

2. When you are confident that the group understands the task they are being asked to perform, it is often useful to explain that you will leave them alone to construct the map, and return in 30 minutes. At that point, leave the group alone and do not interfere with the construction of the map.

3. After 30 minutes, check on progress. Give the group more time if they wish.

4. When the group is happy that the map is finished, ask them to explain the key features of the map. The process of '***interviewing the map'*** enables researchers to learn more about the map and pursue interesting spatial features. Hence, when used imaginatively, mapping methods yield both diagrams and discussion of diagrams. It is important than one member of the team takes notes during this discussion.

5. It is often useful to add some kind of scale to the map. This can be done by taking a main human settlement and asking how many hours it takes to walk to one of the boundaries of the map. A north-south orientation can also be added to the map.

6. Makes two large copies of the map on to flip chart paper. Give one copy to the group.

When maps are used to show seasonal variations in livestock movements and locations of tick or tsetse-infested areas, information can be cross-checked using seasonal calendars.

The increasing use of computer scanners means that copies of maps can easily be added to reports.

Figure 1
Map of Pyutar Village Development Committee area, Ward 9 by Krishna Bahadur Thing and Iman Singh Ghale

This map was produced by two farmers in a sedentary community in India. The map shows the location of the main livestock types, areas of cultivation and other features.

(source: Young, Dijkema, Stoufer, Ojha, Shrestha and Thapa, 1994, RRA Notes 20)

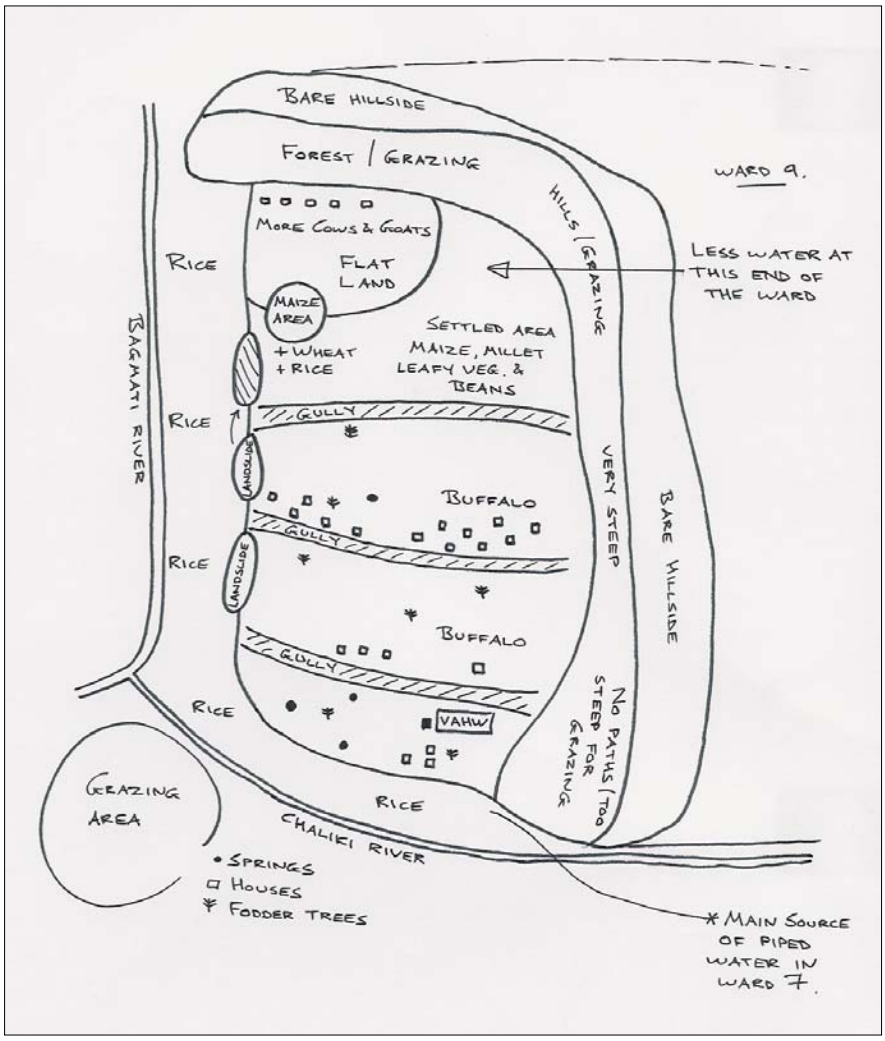


Figure 2
Map showing cattle movements around Thiet, southern Sudan

This map was produced by a research team investigating trypanosomiasis in cattle. The map shows that people avoided the areas around the Chual Forest and Aden Pool and further questioning revealed that they associated these areas with tsetse. Also, tsetse were present along the river system between Gezira and Lolakol. At the onset of the rains, tsetse numbers increased and people were forced to move northwards.

This map was useful for indicating some local knowledge on tsetse populations and helped the researchers to identify 'best-bet' places to catch tsetse. The map was also used for a discussion on the use trypanocidal drugs in different seasons. (source: IIED/UNICEF/KETRI/IBAR study, southern Sudan 2001)

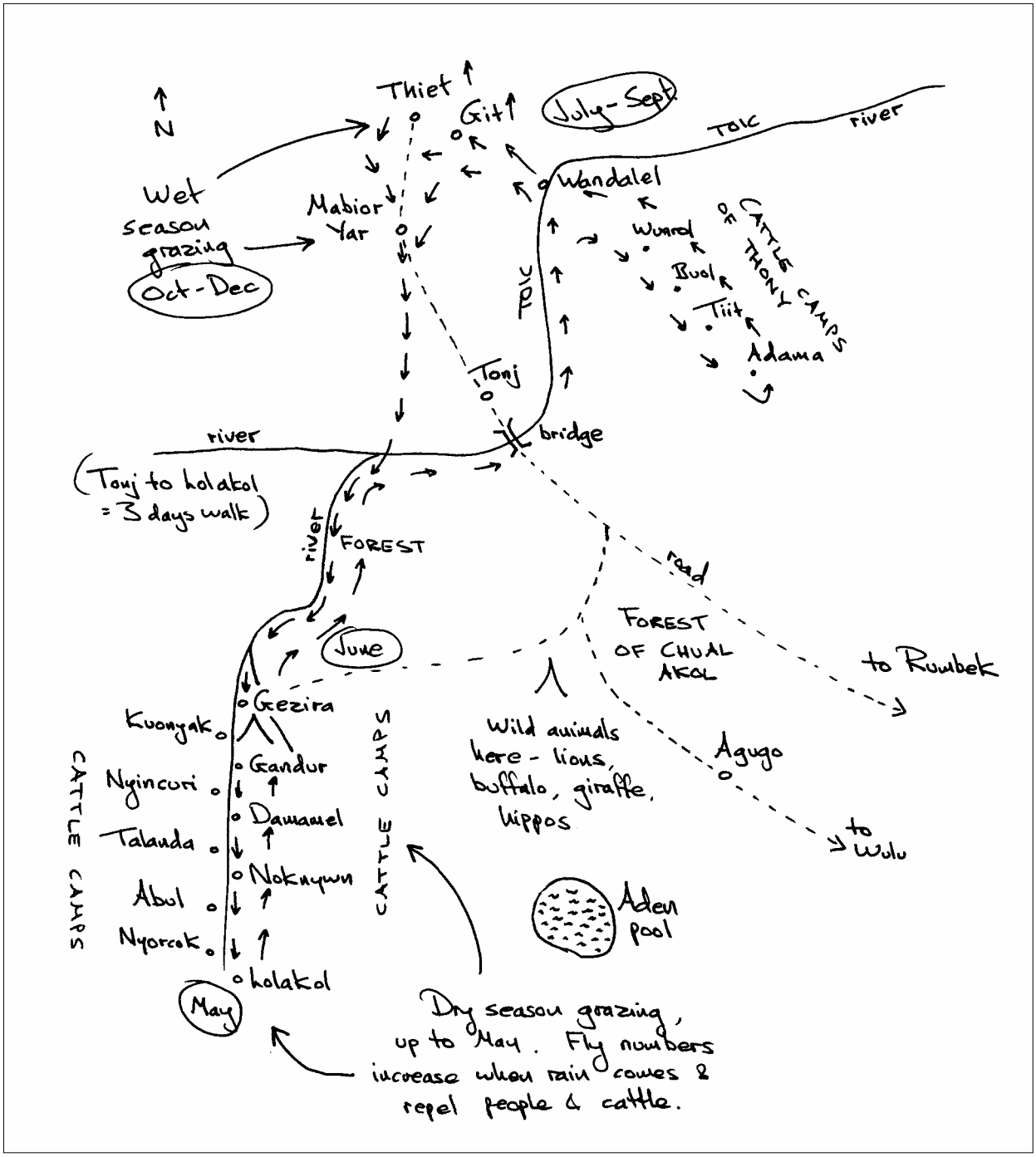
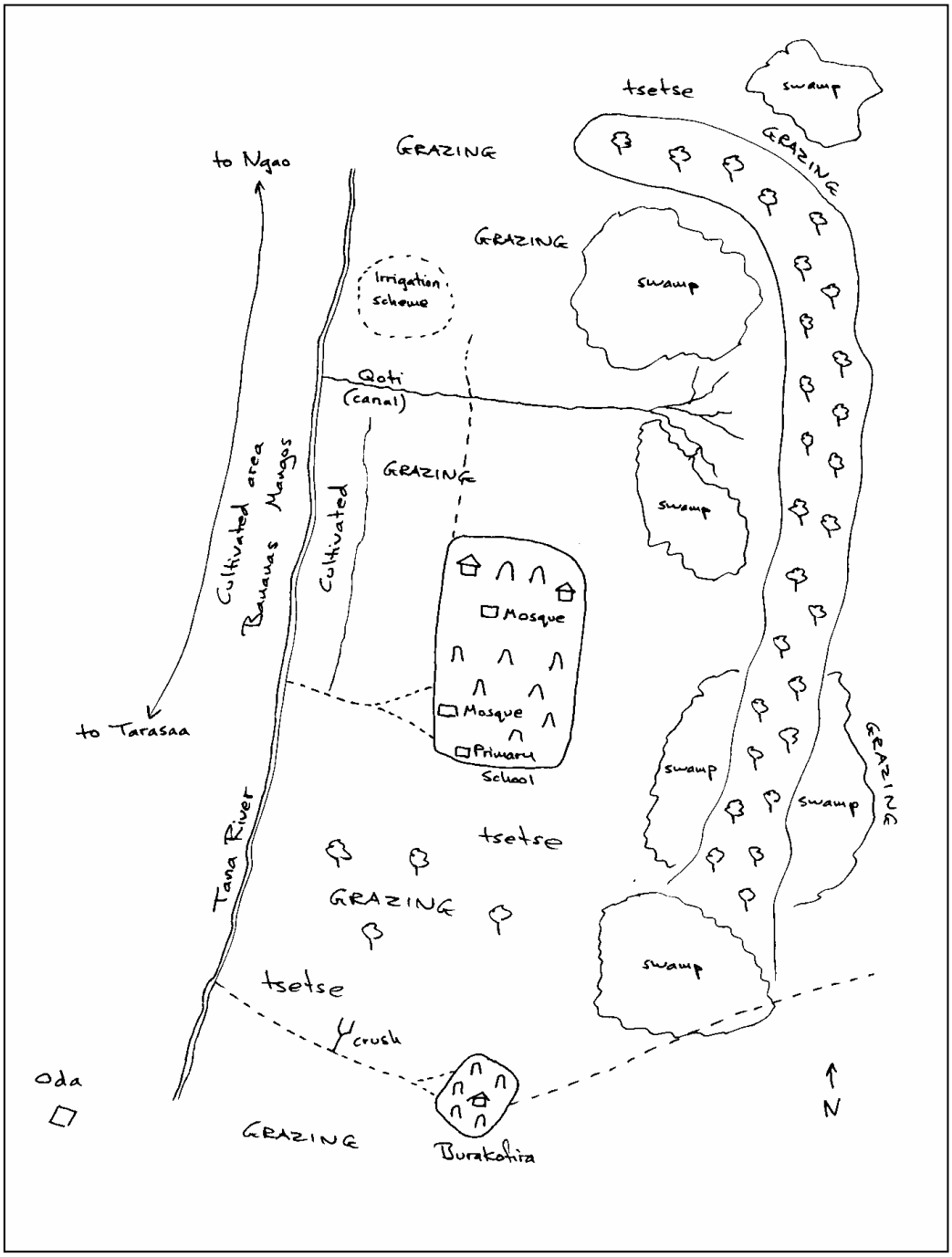


Figure 3
Map of Kipao village, Garsen Division, Tana River District.

This map was constructed by Orma herders during a study on bovine trypanosomiasis. It shows the dry season grazing areas for cattle around Kipao and proximity to tsetse-infested areas. During the wet season, the area became marshy and cattle were moved to remote grazing areas.

(source: KETRI/IIED/IBAR study, 2001)



Matrix scoring

Contents

1. Uses of matrix scoring in veterinary epidemiology

This method is used for understanding local characterisation of livestock diseases and meanings of local disease-names.

The method can help to answer the question: *Are the researchers and livestock keepers talking about the same diseases?*

There are two main contexts in which this method is used:

- as part of a general disease survey, in which a number of priority diseases are studied. The method explores local descriptions of these diseases.

- as part of a study on a specific disease, such as trypanosomiasis or CBPP, in which various control diseases are used in the method to help avoid bias. In this situation, *the informants are not told that the researchers are interested in a specific disease* when the method is started.

2. The Method

Stage 1 - Identification of items to be scored

<u>If conducting a general disease survey</u>
Ask the informants to name the items under investigation. For example, if investigating cattle diseases, ask a question such as, *"What are the five most important diseases affecting your cattle throughout the year?"*

<u>If conducting a disease-specific survey</u>
Use informal interviews to get an idea of the local disease name or names which are used to describe the disease or syndrome that you're interested in. Also, use the same interviews to learn some local names for other diseases. These diseases should be considered by the informants to be priority diseases and will be used as 'controls' in the matrix. It is important these 'other' or 'control' diseases are local priorities, because then people are more likely to be willing to sit and discuss these diseases during the matrix scoring.

Whichever type of survey you are conducting, record the diseases named by the informants on to separate pieces of card using the local language. Check that at least one informant is literate. If all informants are illiterate use every-day different objects to represent each named item.

Stage 2 - Pair-wise comparison of the named items

2.1 First, choose two of the named diseases (represented as name cards or objects). Show this pair of diseases to the informants and check that they understand the meaning of the name cards or objects.

2.2 Ask the question *"Which of these two diseases is most important?"* The informants will discuss among themselves and choose one of the diseases.

2.3 Ask the question *"Why is that disease more important than the other?"* The informants will provide a list of reasons why they consider the disease to be important. Record these reasons.

2.4 Ask the question *"How do you tell the difference between these two diseases?"* The informants will provide a list of reasons why they consider the disease to be important. Record these reasons.

Note – in participatory methods, the 'reasons' provided by informants are usually called **'indicators'.** When you have asked questions 2.3 and 2.4, you should have a list of indicators like clinical signs (diarrhoea, coughing etc.), extent of the disease with regards morbidity and mortality, production or economic losses, types of species or age groups affected and so on.

2.5 Record all the responses and repeat the question until each disease has been compared with every other disease. At the end of the pair-wise comparisons, you should have recorded a long list of indicators.

Note – if you are planning to use matrix scoring several times during your research, pair-wise comparison is only conducted once, at the beginning of the research. The same diseases and indicators are used for each matrix scoring i.e. a 'standardised' matrix is used.

Stage 3 - Scoring of diseases verses indicators

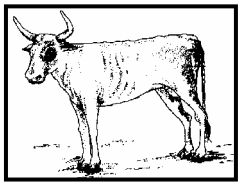
3.1 Place the disease name cards or objects in a row on the ground. Once again, check that the informants understand the meaning of name cards or objects. Collect a pile of stones. You will need 5 stones per disease e.g. if 6 items are being scored, 30 stones are required. Remind the informants of the first indicator mentioned during the pair-wise comparison. Write this indicator on to a piece of card or use a ***picture*** to represent the indicator.

Ask the informants to distribute the stones according to relationship between this indicator and each of the diseases represented by the name cards or objects. Explain that all stones must be used.

3.2 After the stones have been allocated to each item, check the scoring with the informants and allow them to alter the scoring if they wish. Record the final number of stones allocated to each disease.

At this stage of the method, you should have the beginnings of a matrix on the ground. The matrix might look like this:

Clinical sign being scored, represented by a diagram



3.3 Do not remove the stones. Take a second indicator and place this below the first. Repeat the scoring procedure.

3.4 Repeat this procedure, gradually building a line of indicators down the side of the matrix. The matrix should gradually evolve until a complete matrix

containing all indicators down the y-axis of the matrix is produced and all the indicators have been scored (see Figure 1).

Note – it is useful to pre-prepare all the pictures for the indicators before hand. Draw the pictures on to strong pieces of card that will not become damaged in the field. Also see the handout 'Using picture to assist PE methods'.

A final matrix scoring will look something like this. At the bottom of the picture the various objects can be seen representing 5 diseases. Along the left side are various picture cards depicting the indicators. Stones have used to show the associations between the diseases and the indicators.

Stage 4 – Interviewing the matrix

The facilitator can use the matrix on the ground to ask questions and develop discussions. By physically pointing to particular scores, the facilitator can summarise all the indicators associated with a particular disease. Open and probing questions can be used to explore the knowledge of the informants.

Note – this is the most difficult stage of the method. Researchers often forget to ask additional questions about the matrix.

<u>Additional notes</u>

As with many PE methods, it is useful to practise and refine the matrix scoring method in the field before using it 'for real'. Try out the method on a group of animal health workers or livestock keepers to check that they understand the method. Make adjustments to the way you explain the method if it is not clear. This is like pre-testing a questionnaire.

3. Presenting the results: example of a completed matrix scoring

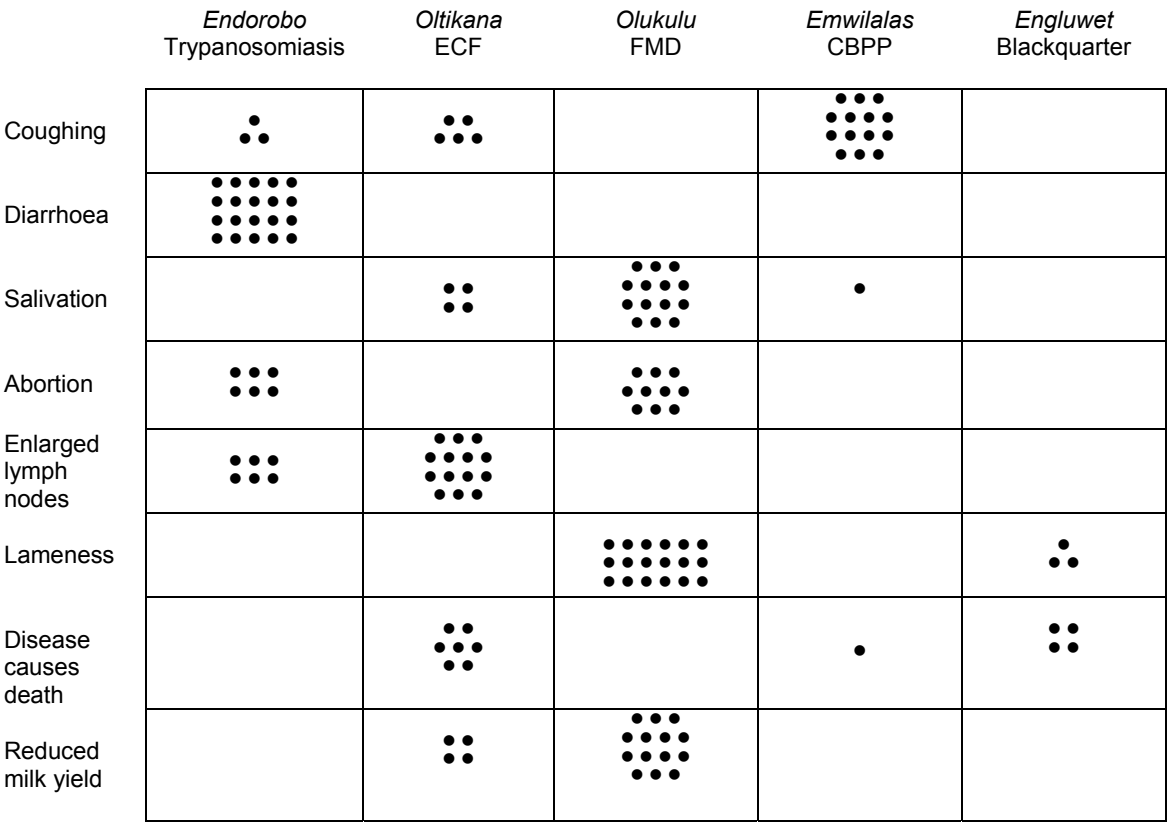
Copies for informants

First and foremost, it is important to make a copy of the matrix scoring diagram and leave this copy with the informants. This is their record of events and helps to overcome some of the problems of 'extractive' research, in which researchers disappear back to towns and never feed back information to local people. After the researchers have left a community, it is common for these diagrams to reappear in teashops, bars and people's houses, and for more discussion to follow. These copies can be made on A4 paper or flip chart paper.

Presenting the results in reports

There are various ways to present seasonal calendars in reports. A simple line drawing can be glued into a report and photocopied, or a drawing or photograph can be scanned and added to the report. Alternatively, word processing software can be used to produce a version of the diagram (see examples below and overleaf).

Figure 1
Matrix scoring of cattle diseases against disease-signs by 8 Maasai herders near Morogoro, Tanzania



4. Methodological variations

Repeating the matrix scoring to improve reliability

The matrix scoring method produces numerical scores. The scoring part of the method can be standardised and repeated with different informants (groups or individuals).

Standardisation means that the diseases and indicators used in the matrix scoring are kept constant. Similarly, the number of stones or seeds used as counters is also kept constant.

The method should be repeated with at least 10 informant groups (group size 5 –10 people)

Scores can be summarised using median scores, minimum and maximum scores and 95% confidence intervals. The Kendal coefficient of concordance (W) can be used to assess agreement between informant groups and give a measure of reliability.

An example of a standardised and repeated matrix scoring method is provided in Figure 2 overleaf.

Assessing validity

Results from matrix scoring can be compared with standard textbook descriptions of diseases, and judgements made by veterinarians concerning the relationship between local disease descriptions and 'scientific' disease descriptions.

<u>Using control diseases in the matrix</u>

As mentioned previously, matrix scoring can be used to investigate specific diseases (e.g. trypanosomiasis). In these cases, it is useful to introduce at least one or two 'control' diseases into the matrix.

Figure 2 overleaf shows an example of this. This matrix scoring was used to study local perceptions of a chronic wasting disease in adult cattle. Interviews indicated that herders identified three diseases which caused cows to become thin, called *liei, maguar* and *maceuny*. In order to find out how herders distinguished between these three diseases, a matrix scoring was developed using these three disease plus two control diseases.

The control diseases used were *dat* (FMD) and *dop* (CBPP) because these diseases had already been characterised by veterinarians working in southern Sudan.

The use of control helps to show whether the informants understand the matrix scoring method, because the researchers can check whether expected results for the controls are produced. For example, in Figure 2 the control disease *dop* (CBPP) should be strongly associated with coughing.

Figure 2
Example of matrix scoring of disease signs for diseases of adult cattle in Nyal, southern Sudan

Signs	Diseases				
	Liei	*Dat* (FMD)	*Maguar*	*Doop* (CBPP)	*Macueny*
Chronic weight loss (W=0.51***)	10 (6.0-16)	1 (0-2.5)	3 (0-3.0)	1 (0-2.5)	1 (0-2.0)
Animal seeks shade (W=0.88***)	0 (0)	20 (17-20)	0 (0)	0 (0-3.0)	0 (0)
Diarrhoea (W=0.52***)	4 (0-8.5)	0 (0)	11 (6.0-16)	0(0)	4 (0-7.5)
Reduced milk yield (W=0.51***)	2 (0-4.0)	13 (7.0-20)	3 (0-9.0)	1 (0-2.5)	0 (0-1.0)
Coughing (W=0.76***)	0 (0-0.5)	0 (0-0.5)	0 (0-2.0)	19 (16.5-20)	0 (0-0.5)
Reduced appetite (W=0.54***)	0 (0)	13 (7.0-20)	0 (0)	5 (0-10)	0 (0)
Loss of tail hair (W=0.89***)	20 (16.5-20)	0 (0)	0 (0-3.5)	0 (0)	0 (0)
Tearing (W=0.28*)	6 (3.0-13)	2 (0-6.5)	4 (0-8.5)	0 (0-1.5)	3 (0-8.0)
Salivation (W=0.50***)	2 (0-3.0)	14 (7.0-20)	3 (0-6.5)	1 (0-2.0)	0 (0-0.5)

Notes for Figure 2
Number of informant groups = 12; W = Kendal coefficient of concordance (*p<0.05; **p<0.01; ***p<0.001). The black dots represent the scores (number of seeds) that were used during the matrix scoring. Median presented (95% confidence limits). A high number of dots indicates a relatively strong association between a sign and a disease whereas a low number of dots indicates a weak association.

Further reading

Detailed methodologies and applications of matrix scoring can be found in these papers:

Admassu, B., Nega, S., Haile, T., Abera, B., Hussein, A. and Catley, A. (2005). Impact assessment of a community-based animal health project in Dollo Ado and Dollo Bay districts, southern Ethiopia. *Tropical Animal Health and Production*. In press.

Catley, A., Irungu, P., Simiyu, K., Dadye, J. Mwakio, W., Kiragu J. and Nyamwaro, S.O. (2002). Participatory investigations of bovine trypanosomiasis in Tana River District, Kenya. *Medical and Veterinary Entomology*, 16, 1-12.

Catley, A., Okoth, S., Osman, J., Fison, T., Njiru, Z., Mwangi, J., Jones, B.A. and Leyland, T.J. (2001). Participatory diagnosis of a chronic wasting disease in cattle in southern Sudan. *Preventive Veterinary Medicine*, 51/3-4, 161-181.

Catley, A., Chibunda, R.T., Ranga, E., Makungu, S., Magayane, F.T., Magoma, G., Madege, M.J. and Vosloo, W. (2004). Participatory diagnosis of a heat-intolerance syndrome in cattle in Tanzania and association with foot-and-mouth disease. *Preventive Veterinary Medicine.* 65/1-2, 17-30.

Handout 13

Example of a summarized disease matrix

		Endorobo Trypanosomiasis	*Oltikana* ECF	*Olukulu* FMD	*Emwilalas* CBPP	*Engluwet* Blackquarter
Acute disease signs	Coughing (W=0.793)	2.5 (0-4)	5.0 (0-15)	0 (0-1)	14.0 (3-16)	0 (0-1)
	Diarrhoea (W=0.774)	20.0 (3-20)	0 (0-17)	0 (0-0)	0 (0-0)	0 (0-0)
	Salivation (W=0.780)	0 (0-2)	4.0 (0-6)	14.0 (6-20)	1.0 (0-8)	0 (0-0)
	Abortion (W=0.900)	6.0 (3-8)	0 (0-4)	10.0 (5-14)	0 (0-4)	0 (0-0)
	Enlarged lymph nodes (W=1.000)	6.0 (3-8)	14.0 (12-17)	0 (0-0)	0 (0-0)	0 (0-0)
	Lameness (W=0.865)	0 (0-0)	0 (0-0)	17.5 (10-20)	0 (0-0)	2.5 (0-10)
	Disease causes death (W=0.533)	0 (0-4)	7.0 (0-20)	0 (0-3)	1.0 (0-5)	3.5 (0-20)
	Reduced milk yield (W=0.602)	0 (0-10)	0 (0-4)	14.0 (7-20)	0 (0-0)	0 (0-0)
Chronic disease signs	Cow seeks shade (W=0.949)	0 (0-6)	0 (0-0)	20 (14-20)	0 (0-0)	0 (0-0)
	Weight loss (W=0.324)	7.5 (0-20)	0 (0-5)	2.0 (0-15)	5.0 (0-20)	0 (0-0)
	Hair overgrowth (W=1.000)	0 (0-0)	0 (0-0)	20 (20-20)	0 (0-0)	0 (0-0)
	Panting (W=0.836)	0 (0-0)	0 (0-4)	20 (10-20)	0 (0-0)	0 (0-0)
	Reduced fertility (W=0.627)	0 (0-9)	0 (0-0)	15.5 (0-20)	0 (0-0)	0 (0-0)
	Overgrowth of hooves (W=1.000)	0 (0-0)	0 (0-0)	20 (20-20)	0 (0-0)	0 (0-0)
	Loss of tail hair (W=1.000)	20 (20-20)	0 (0-0)	0 (0-0)	0 (0-0)	0 (0-0)
	Wallows in water (W=0.949)	0 (0-5)	0 (0-0)	20 (15-20)	0 (0-0)	0 (0-0)

Seasonal calendars

Contents

1. Uses of seasonal calendars in veterinary epidemiology

Temporal variations in disease occurrence are a common aspect of epidemiological investigation. Seasonal calendars are a useful method for understanding local perceptions of seasonal variations in disease incidence or populations of ticks, biting flies or other factors.

When informants have well-developed indigenous knowledge, seasonal calendars can help to overcome some of the difficulties of conducting expensive and logistically demanding longitudinal studies. Seasonal calendars can also generate new hypotheses about associations between diseases, environmental factors, and interactions with wildlife and vectors.

2. The Method

- In order to use seasonal calendars the researchers should understand and use local names for seasons or months.

- This requires some preliminary interviews with key informants to learn local names and relate these names to the Gregorian calendar

- Using months creates a more detailed seasonal calendar but is more time consuming. Often, translation of months into a working language is complicated and it is easier to use seasons.

- This method can be used with a single informant or a group of informants. If a group has more than 10 people, it is difficult to get everyone to contribute to the method.

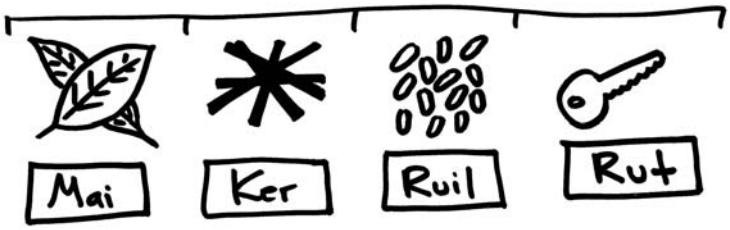
Stage 1 – Construct a one-year time line

Explain to the informants that you are interested in learning about how diseases change throughout the year.

Draw a horizontal line on the ground to represent 1 year. The line should be at least 1 metre in length. Divide the line according to local definitions of month or season.

Label each month or season using either a piece of card with the local name or an every-day object to represent each month or season. Carefully explain the meaning of the cards or objects to the informants and ask them questions to check that they understand these meanings.

In the diagram here, four seasons called *Mai, Ker, Ruil* and *Rut* have been represented using different objects (so that illiterate informants can still understand the diagram) and also, labels with written words are used.



Stage 2 – Showing rainfall patterns

It is useful (though not essential) to choose rainfall as the first event to be illustrated on the calendar. Why? This is because in the tropics where temperature variations are relatively mild, rainfall is often the main determinant of livestock movements, animal interactions and populations of disease vectors such as biting flies, snails and so on.

Give the informants a pile of stones, say 30 stones, and ask them to divide the stones against the seasons (or months) to show the pattern of rainfall throughout a typical year. The greater the rainfall in a particular season, the greater the number of stones assigned to that season. Similarly, a season with no rain should have no stones assigned to it. All the stones should be used.

When the informants have placed all the stones against the seasons, check the scoring by asking questions such as ‘You’ve placed most of the stones against season x, so season x receives most rainfall?’ Give the informants the chance to change their scores if they wish.

Record the final scores and leave the stones in place.

Stage 3 – showing seasonal patterns of diseases and vectors

Ask the informants to illustrate on the diagram the occurrence of the events under investigation. Events might be the livestock diseases previously identified during a livestock-disease scoring or ranking.

Each disease or vector should be represented by written labels, ***pictures*** or ***actual specimens***. It is often useful to pre-prepare the pictures on pieces of card – see the handout **'Using pictures to assist PE methods.'** Remember that written labels are only understood by literate informants. Illiterate informants, although very knowledgeable on animal health matters, can become isolated from the method if written labels are used.

Take each disease or vector in turn, and ask the informants to show the seasonal variation using piles of stones. Keep the numbers of stones constant for each item scored.

How do I know the meaning of the local names for disease or vectors?

In all cases, the local names for diseases and disease vectors or parasites should been pre-determined using:

- Informal interviews
- Examination of clinical cases, post mortem examination, viewing parasites and naming with livestock keepers
- Matrix scoring of livestock diseases

When all these methods are used, we begin to triangulate (cross-check) the local names for disease and parasites – see the handout on triangulation.

Therefore, the seasonal calendar methods should be used at a late stage in the study, after other methods have determined the meanings of local terminology.

When discussing disease vectors such as flies, ticks and so on, it is very useful to carry preserved specimens in clear glass bottles, or, ask people to collect specimens during the study. This often creates much interest and enthusiasm amongst livestock keepers.

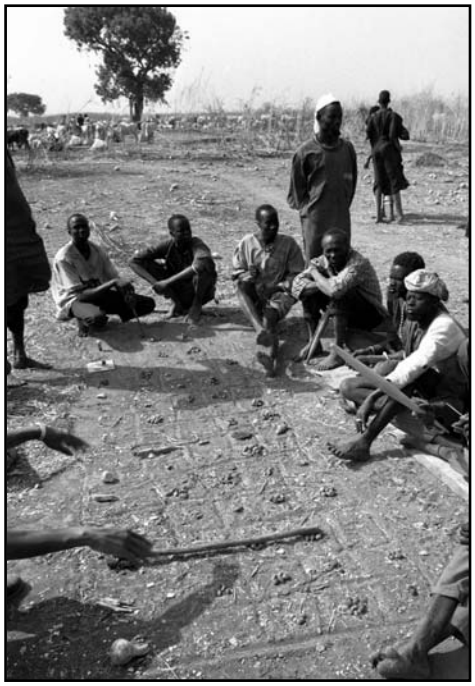
Key point

It is important to be clear in your own mind what you are going to ask the informants to do. If your interested in seasonal variations in disease incidence, the advice to the

informants should be something like, 'Divide the stones to show me when cases of disease x are seen'.

After each disease or vector has been scored against the seasons, check the scoring with the informants. Give them an opportunity to change the scoring if they wish and record the final scores that they are comfortable with.

The seasonal calendar will slowly grow as more diseases or vectors are added to it.



Seasonal calendars can 'grow' into large diagrams on the ground.

In this example, the diseases and vectors are represented using every-day objects as seen down the left side of the diagram. The 4 seasons are also represented using objects (difficult to see, furthest from camera). Various piles of stones can be seen representing the seasonal patterns of each variable.

Stage 4 – Interviewing the diagram

Ask the informants to explain interesting aspects of the diagram i.e. the positioning and relative scores of the various diseases and parasites. Use probing questions (e.g. *Why? How?*) to follow-up interesting leads.

<u>Examples of questions</u>

'Why do you mainly see the disease liei in the wet season?'

'You've shown me that the disease called dop is seen mainly in the wet season – when is the best time to prevent this disease?'

'Why do you see the disease called kud in the dry season?'

This stage of the method is crucial. It helps to cross-check the information presented in the diagram and enables the researchers to explore the reasoning behind the scores. It also ensures local analysis of the information.

The researchers should take detailed notes of the questions and discussion – these notes are part of the 'results' of the seasonal calendar and should be presented in any reports arising from the use of the method.

Additional notes

In addition to the method for a seasonal calendar described here, there are other ways to construct this type of diagram. Some people simply draw the whole diagram on the ground and then copy the diagram on to paper.

Whichever method is used, it is important to ***practise the method*** before using it 'for real' in the field. Try out the method on some animal health workers or livestock keepers to make sure that the method is understood and the questions you ask are clear. This is like pre-testing a questionnaire.

3. Presenting the results: example of a completed seasonal calendar

Copies for informants

First and foremost, it is important to make a copy of the diagram and leave this copy with the informants. This is their record of events and helps to overcome some of the problems of 'extractive' research, in which researchers disappear back to towns and never feed back information to local people. After the researchers have left a community, it is common for these diagrams to reappear in teashops, bars and people's houses, and for more discussion to follow. These copies can be made on A4 paper or flip chart paper.

Presenting the results in reports

There are various ways to present seasonal calendars in reports. A simple line drawing can be glued into a report and photocopied, or the drawing can be scanned and added to the report. Alternatively, word processing software can be used to produce a version of the diagram (see examples overleaf).

Whichever method is used, it is important to include not only the diagram itself but also the notes on the questions and discussion which took place both during the construction of the diagram and when 'interviewing the diagram'.

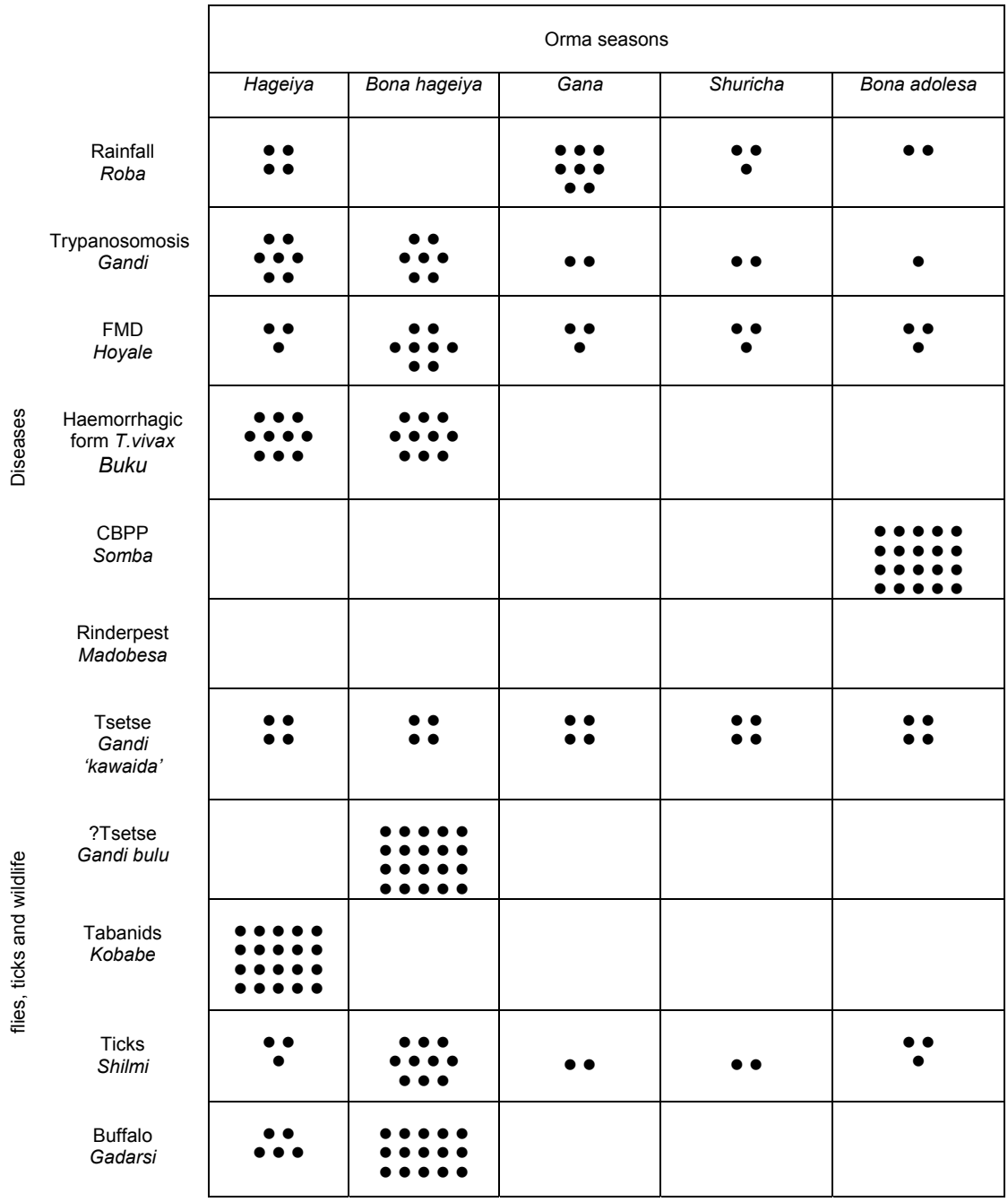
Example

The seasonal calendar overleaf was constructed by a group of 5 Orma pastoralists in Tana River District, Kenya. The five Orma seasons are written along the top of the diagram and the various diseases and vectors are placed down the left side of the diagram.

The black dots represent the stones that were used by the informants to show the seasonal patterns. This example is interesting because it includes seasonal interactions between cattle and buffalo.

Notes on the discussion are included to help explain key aspects of the diagram.

Figure 1
Seasonal calendar for livestock diseases, biting flies, ticks and cattle-wildlife contact in Danissa, Tana River District, Kenya (5 Orma informants)



Notes on discussion

- More cattle are present in the delta and permanent villages during *hageiya* and *bona hageiya.* As the delta is wet (during *hageiya*) and hot (during both *hageiya* and *bona hageiya*) during these seasons, exposure to biting flies and ticks is high.
- As the main rains (g*ana*) begin, cattle move out of the delta to avoid flooded areas, and into the hinterland. As the hinterland is drier than the delta and has different vegetation, exposure to biting flies and ticks reduces.
- This pattern of seasonal movement into and out of tsetse and tick-infested areas in the delta determines the level of contact between cattle and these vectors. Although the *hawicha* milking herds can be permanently in the delta, these herds are relatively small in size.
- Contact between cattle and buffalo peaks during the dry periods *bona hageiya* and *bona adolesa* because animals congregate around dry season water points.

4. Methodological adaptations and developments

Repeating the seasonal calendar method to improve reliability and validity

In most animal health studies, seasonal calendars are used with only a small number of informants or informant groups. However, like the matrix scoring method, seasonal calendars generate numerical scores very early in the method.

Repetition of a standard method allows results to be summarised using medians and measures of spread such as 95% confidence intervals. Agreement between individual informants or informant groups can be determined using nonparametric tests such as the Kendal coefficient of concordance (W).

<u>How to standardise?</u>

A standardised method can be developed in the field.

1. First, try out a seasonal calendar on a trial basis and include the disease and vectors that you as a researcher are interested in, and/or which livestock keepers have identified as important.

2. Limit the number of diseases or vector to no more than 15. Otherwise, the method becomes too time-consuming and cumbersome.

3. Always include some diseases or vectors which may not be of much interest to you or the informants. These diseases and vectors act as a type of control in the method.

4. Always keep the seasons, diseases and vectors, and number of stones constant.

5. Repeat the method with at least 10 informant groups.

6. Follow-up questions can vary for each group and do not need to be standardised. This allows for some flexibility in the method and provides space for researchers to follow interesting leads and ideas as they emerge.

Example

A standardised seasonal calendar was developed in southern Sudan during a study on a chronic wasting disease called *liei*. The method was repeated with 10 informant groups

See Figure 2 overleaf.

Notes for Figure 2

Number of informant groups = 10; W = Kendal coefficient of concordance (*p<0.05; **p<0.01; ***p<0.001). The black dots represent the number of seeds that were used during the construction of the seasonal calendars. Medians are presented (95% confidence limits). A high number of dots indicated a relatively strong association between a disease or parasite and season, whereas a low number of dots indicated a weak association.

Assessing the validity of data from seasonal calendars

Data derived from seasonal calendars can be assessed in various ways.

Rainfall patterns can be compared with official measures of rainfall as gathered by meteorological stations. This official data should be compiled on a seasonal basis to allow direct comparison with the seasonal calendar data. Programmes such as USAID's Famine Early Warning System (FEWS) also collect rainfall data and make this data available to the public.

Disease and vector patterns can be compared with standard, textbook descriptions of seasonal patterns. For example, FMD outbreaks can occur during the dry season when cattle and wildlife interact around water holes; fascioliasis is associated with the wet season; mosquito and some tick populations increase in the wet season, and so on. Ultimately, longitudinal studies can be used to define seasonal patterns of diseases or vectors, although such studies can be difficult to implement in some areas and production systems e.g. mobile pastoral systems.

Further reading

Catley, A., Osman, J., Mawien, C., Jones, B.A., Leyland, T.J., 2002. Participatory analysis of seasonal incidences of diseases of cattle, disease vectors and rainfall in southern Sudan. *Preventive Veterinary Medicine,* 53/4, 275-284.

Conway, G., 1991. Diagrams for farmers. In: Farmer First: Farmer Innovation and Agricultural Research. Chambers, R., Pacey, A. and Thrupp, L.A. (Eds). Intermediate Technology Publications, London. pp. 77-86.

Hadrill, D., Haroon Yusuf, 1994. Seasonal disease incidence in the Sanaag region of Somaliland. RRA Notes 20, 52-53.

Mearns, R., Shombodon, D., Narangerel, G., Tuul, U., Enkhamgalan, A., Myagmarzhav, B., Bayanjargal, B., Bekhsuren, B., 1994. Natural resource mapping and seasonal variations and stresses in Mongolia. RRA Notes 20, 95-105.

Figure 2
Summarised seasonal calendar for livestock diseases, biting flies, ticks and snails in Thiet, Tonj County (a Dinka area in southern Sudan, 2000)

	Seasons			
	Mai (Feb-Apr)	*Ker* (May-Jul)	*Ruil* (Aug-Oct)	*Rut* (Nov-Jan)
Rainfall (proportion of total annual rainfall) (W=0.96***)	0 (0)	7 (5.0-9.0)	11 (10.0-13.5)	1 (0-2.5)
Liei Mixed parasitism (W=0.32*)	4 (1.0-7.0)	1 (1.0-2.0)	7 (3.0-11.5)	7 (3.5-10.5)
Abuot pou CBPP (W=0.41**)	3 (1.5-4.5)	4 (2.5-5.0)	8 (6.5-10.0)	5 (3.0-7.0)
Jul Chronic foot-and-mouth disease (W=0.38*)	3 (0-10.0)	3 (0-5.5)	11 (5.5-15.5)	3 (0-5.5)
Jong acom Fasciolosis (W=0.50**)	0 (0-0.5)	7 (0-11.5)	9 (4.5-11.0)	4 (0-6.5)
Cual Brucellosis (W=0.21)	3 (0-5.0)	5 (2.0-9.0)	6 (2.5-9.0)	6 (2.5-9.5)
Rum Tabanid sp. (W=0.42**)	1 (0-2.5)	9 (5.0-11.0)	4 (2.0-8.0)	6 (2.0-9.5)
Luang Stomoxys sp. (W=0.38*)	5 (3.0-7.0)	7 (4.0-9.0)	7 (4.5-9.0)	2 (0-3.5)
Dhier Mosquitoes (W=0.85***)	0 (0-0.5)	5 (2.0-6.5)	12 (11.0-15.0)	4 (1.0-5.5)
Chom Snails (W=0.83***)	0 (0)	9 (5.0-12.0)	9 (7.0-14.5)	0 (0-2.0)
Mau Tsetse flies (W=0.08)	4 (1.5-7.5)	7 (3.5-12.5)	3 (0-5.5)	5 (2.5-9.0)
Achak Ticks (W=0.79***)	0 (0-2.5)	11 (6.0-14.0)	6 (3.5-9.0)	1 (0-2.5)

Proportional piling

Contents

1. Uses of proportional piling in veterinary epidemiology

Proportional piling methods have various epidemiological uses, but are particularly useful for determining herd age structures, and disease incidence and mortality.

Two important advantages of proportional piling are:

- the method does not require herd sizes to be estimated. Therefore, sensitive questions like 'how many cattle do you own' are not necessary

- when assessing disease incidence and mortality, the method involves comparison of different diseases and therefore, avoids exaggeration of a particular disease situation

2. The method

Example 1 Assessing incidence of cattle diseases in Tana River District, Kenya

Proportional piling was used to determine the incidence of cattle diseases in Orma pastoral communities, Kenya. Previous use of matrix scoring had indicated that Orma disease names could be interpreted as follows:

gandi	chronic trypanosomiasis
hoyale	FMD
buku	acute trypanosomiasis
somba	CBPP
madobesa	rinderpest

Orma pastoralists categorised their cattle by age as follows:

Jabie	Calves up to around weaning age; the 0-2 years age group.
Waela	Weaner group, 2-3 years old.
Goromsa	Young adult stock, including heifers and young bulls; age group 3 to 4 years.
Hawicha	Adult stock, particularly the milking cows kept around the permanent villages; > 4 years of age.

The proportional piling method was repeated with each of the 4 age-groups of cattle and involved the following stages:

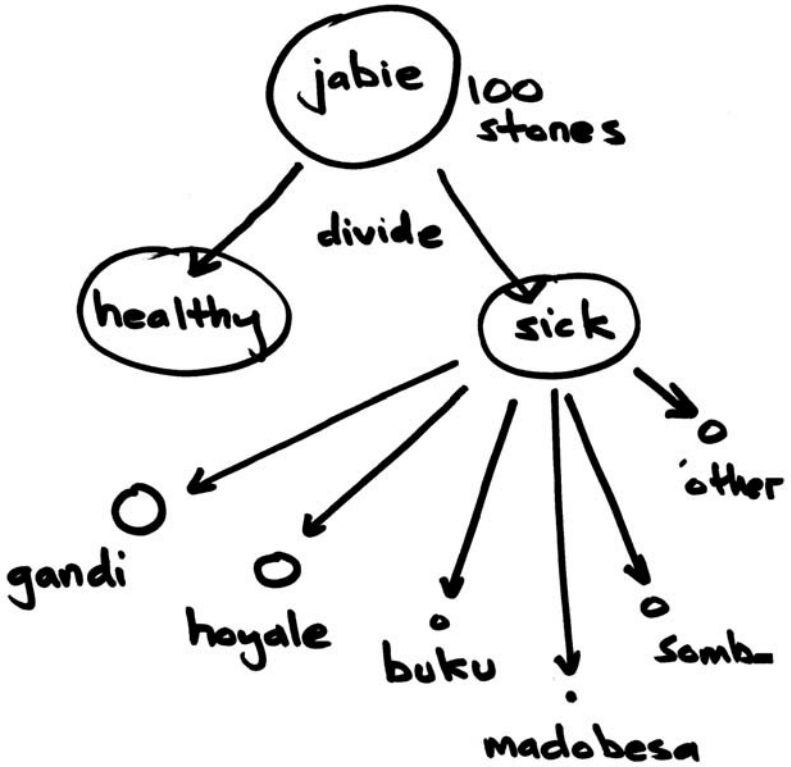
1. Taking the *jabie* age group first, a pile of 100 stones was used to depict this age group. An informant was asked to divide this pile of stones into two piles to show the pattern of 'sick *jabie* cattle during the last year' and 'healthy *jabie* cattle during the last year' in his herd.

2. The pile of stones representing sick cattle was then sub-divided by the informant to show the pattern of *jabie* cattle suffering from *gandi, hoyale, buku, somba, madobesa* and 'other diseases' during the last year.

3. When this piling was completed, the stones were gathered and the procedure was repeated with the other age groups.

This method was repeated with 50 informants (i.e. information was obtained from 50 herds).

Diagrammatic representation of the proportional piling method for the *jabie* age group. The method is repeated for each age group.



Presenting the information

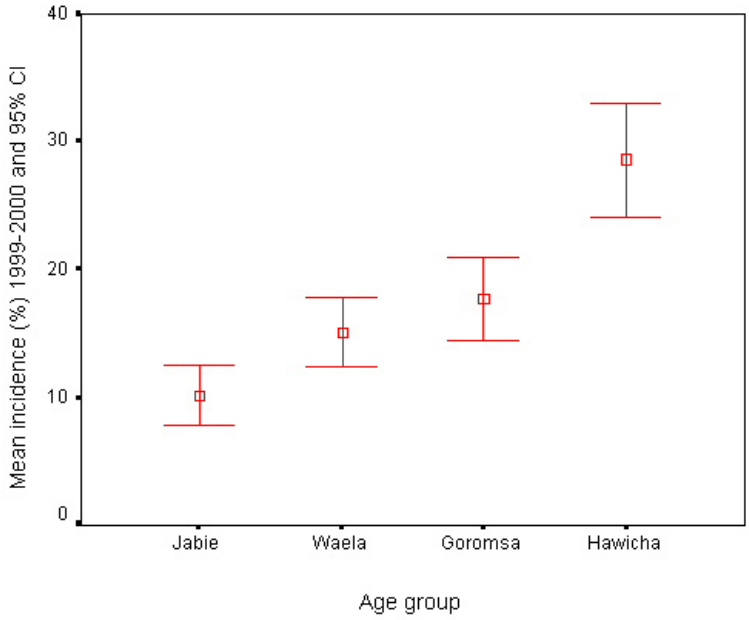
Mean incidence and 95% confidence limits were calculated for each disease by age group. Correlation between age and disease incidence was assessed using Pearson's correlation coefficient.

Results can be presented as disease incidence by age group – an example is shown below.

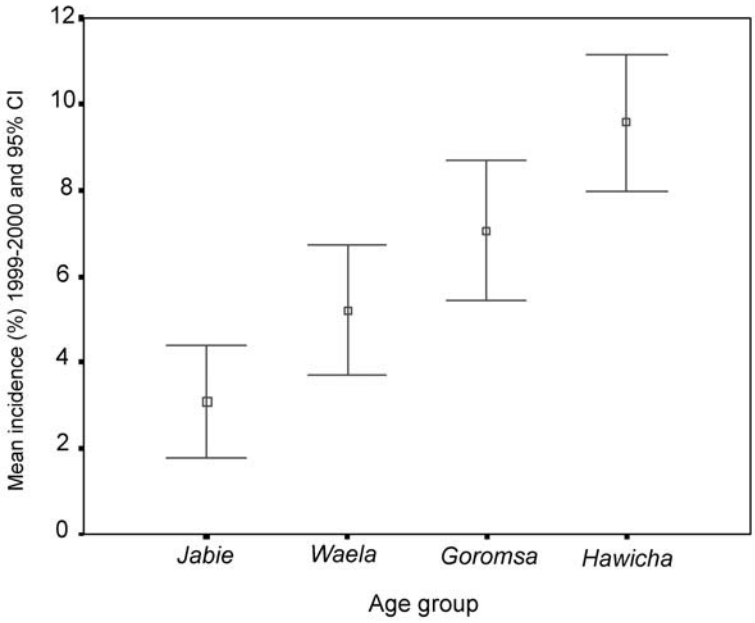
Figure 1
a. Mean incidence of *gandi*/trypanosomiasis in Orma cattle by age group, 1999-2000

Age groups:
Jabie 0-2 years
Waela 2-3 years
Goromsa 3-4 years
Hawicha > 4 years

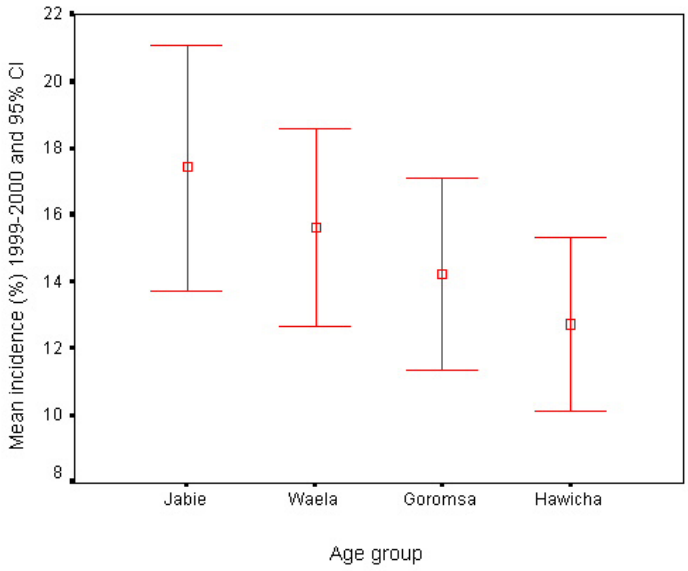
(n=50)



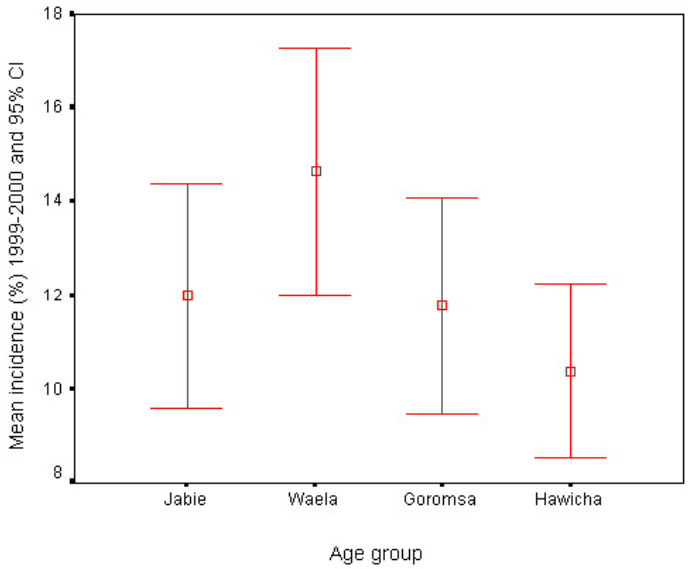
b. Mean incidence of *buku*/acute trypanosomiasis in Orma cattle by age group, 1999-2000



c. Mean incidence of *hoyale*/FMD in Orma cattle by age group, 1999-2000

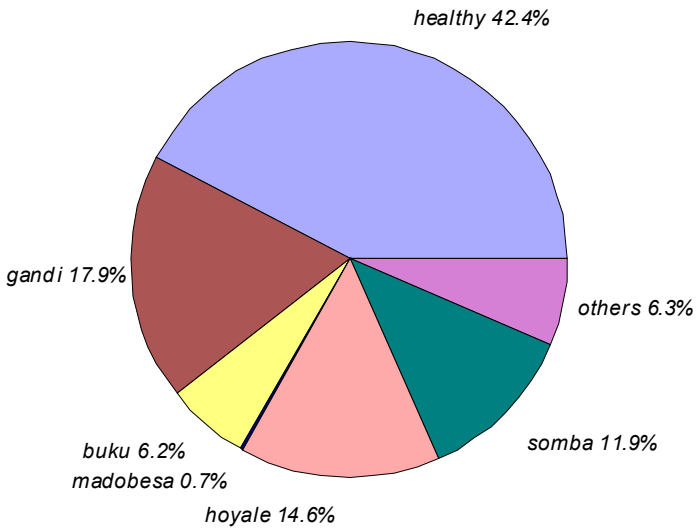


d. Mean incidence of *somba*/CBPP in Orma cattle by age group, 1999-2000



Results from this kind of proportional piling can also be presented in pie charts.

Figure 2
Mean incidence of important cattle diseases relative to healthy cattle (all age groups) 1999-2000.

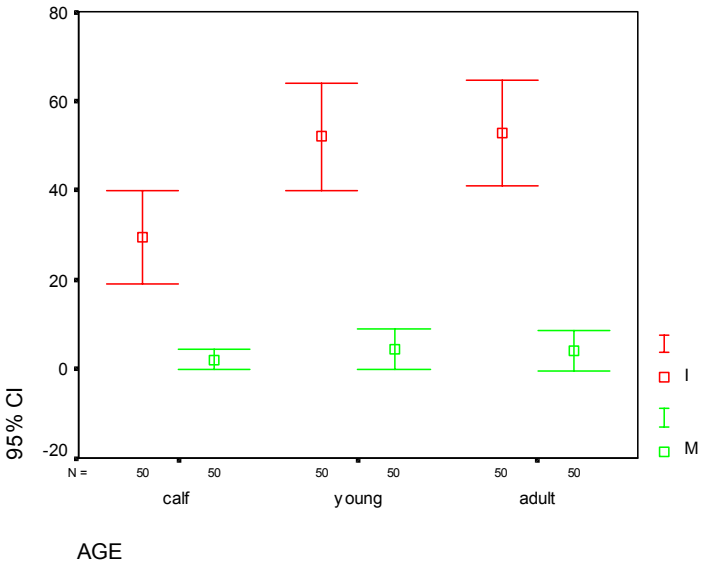


Example 2 Assessing cattle disease incidence and mortality in Maasai herds, Morogoro, Tanzania

A similar proportional piling method to that described above was also used to estimate disease incidence in Maasai herds in Tanzania. However, the method was taken a step further by also including mortality. With this method, the 'incidence' piles for each disease are further sub-divided into animals dying and animals surviving. The piles of stones for the dead animals represent the mortality for each disease.

Like the method used in Example 1, this proportional piling was repeated for each age group of cattle and with 50 informants.

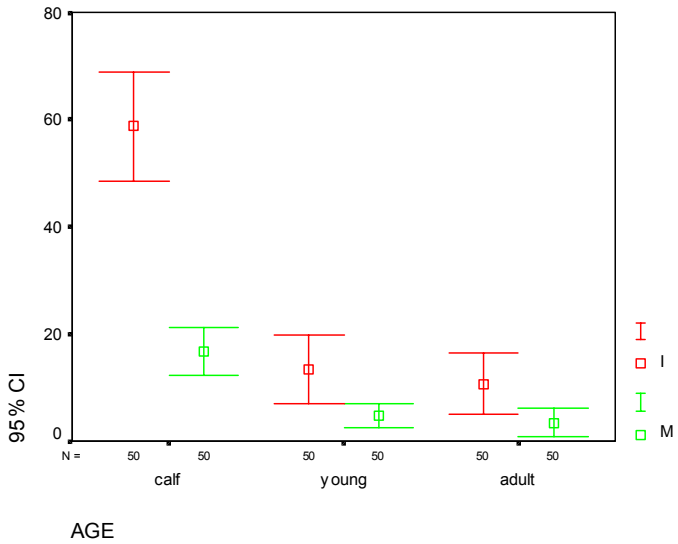
<u>Presenting the data</u>



Again, results for each disease and age group were summarised as mean incidence and mortality and 95% confidence intervals.
Results can be presented, for example, as shown in Figure 3.

Figure 3. Estimated incidence and mortality of some cattle diseases in Maasai herds (I = incidence; M= mortality)

a. *Endorobo*/trypanosomiasis



b. *Oltikana*/ECF

3. Assessing validity

Proportional piling methods to assess disease incidence or mortality should only be used after informal interviews, matrix scoring and other methods have been used to understand local disease characterisations and names.

The validity of data derived from these types of proportional piling methods can be assessed in various ways.

- Seroprevalence (e.g. FMD, CBPP) and parasitological diagnosis (e.g. trypanosomiasis) by age group can be used to cross check the data. However, in the case of serological surveys, remember that we're usually assessing antibody prevalence not disease incidence. Also be aware that tests with low sensitivity will underestimate antibody or parasite prevalence.

- When disease incidence and mortality patterns by age are well described in textbooks, a judgement can be made by veterinarians by comparing the age trends with conventional thinking. For example, Figures 1a and 2a describe the expected age trend for trypanosomiasis, with increasing incidence with age. In comparison, Figure 2a also fits conventional thinking with higher incidence and mortality of calves due to ECF relative to adults.

4. Recent uses – disease modelling

Proportional piling has recently been used to generate herd structure and age-specific mortality data to estimate the basic reproductive number R_o for rinderpest and build disease models.

This approach enables models to benefit from indigenous knowledge on disease behaviour and is described in Jeffrey Mariner's work on rinderpest modelling in southern Sudan.

Handling the data

In veterinary epidemiology there are few examples of statistical analyses of data derived from participatory methods. Therefore, much work remains to be done to determine which tests are most appropriate for PE methods. These notes are drawn from published papers and therefore, the statistical tests suggested here have been subject to peer review. This is not to say that the tests are necessarily correct.

1. Matrix scoring

Assume that a standardised matrix scoring method is developed for a particular research objective and that method is repeated with different informants. If the method is repeated 10 times, the results will comprise 10 matrices.

What kind of data do we have?

The numbers in each cell of a matrix are **discrete** data. This means that the numbers can only be whole numbers e.g. 1, 2, 5, 10. This situation arises because the counters used in the exercise (the stones or seeds) are not divisible. An informant cannot allocate 4.25 stones to a particular disease but only 4 stones or 5 stones. The data in a matrix can also be described as **ordinal** or **ranked**.

What kind of statistical tests can we use?

If data derived from matrix scoring is ordinal, **non-parametric** statistical tests must be used. Compared with parametric tests, non-parametric tests do not require data to be normally distributed.

How do we measure the average of the data?

The **median** is the most commonly-used average measure for ordinal data. Note that this compares with the mean, which is used for continuous, normally distributed data.

Which measures of spread can we use?

Measures of spread for ordinal data include the minimum and maximum values (the 'range') and the 95% confidence interval. Although a non-parametric test to calculate 95% CI for ordinal data exists (e.g. Gardner et al., 1992), epidemiologists and statisticians have varying opinions concerning the value of this calculation.

<u>Example</u>

Refer to Figure 2, Handout 12. This shows a summarised matrix scoring derived from 12 informant groups. The top left hand cell of this matrix relates to the disease-sign 'chronic weight loss' and the disease called 'liei'. The cell shows that median score allocated to this cell from the 12 informant groups was 10 and the 95% CI were 6.0-16.0. Median scores and 95% CI are presented in each cell of the matrix i.e. for each disease-sign and each disease.

Assessing levels of agreement between informant groups

In addition to summarising matrix scoring data using medians, 95% CI and ranges, we can also ask the question *'To what extent did different informant groups agree with each other?'*

To do this, a non-parametric test called the Kendal coefficient of concordance (W) can be used. For a full description of this test and some methods for calculating W see Siegal and Castellan (1994).

In summary, the test is a measure of the association between sets of ranks assigned to objects by judges (or groups of judges) and computes a W value between 0 and 1. A high or significant W value means that the judges are ranking the objects using a similar standard. The test is particularly useful for determining inter-judge reliability (Siegel and Castellan, 1994). Also bear in mind that a test that is reliable is more likely to be valid than a test which is unreliable.

Example

Again, refer to Figure 2, Handout 12. A W value has been calculated for each disease-sign. In other words, taking each sign in turn the researcher has tried to assess the level agreement between the 12 informant groups. For 'chronic weight loss', W=0.51. According to statistical tables for W, $p < 0.001$if N=12. This result indicates very good agreement between the 12 informant groups.

2. Seasonal calendars

For the purpose of data analysis, seasonal calendars are comparable to matrix scoring. If a standardised seasonal calendar is used, the data is ordinal and rules for non-parametric tests apply. The median, range (or 95% CI) and W can all be used with seasonal calendar data.

Example

Refer to Figure 2, Handout 14. This summarised seasonal calendar was derived from 10 informant groups and in each cell, shows median scores and 95% CI. In addition, levels of agreement between the 10 informant groups have been calculated. Compare the agreement for the indicator 'rainfall' with that for 'cual' to see how levels of agreement can vary for different indicators.

3. Proportional piling

In proportional piling, it is usual to begin with 100 stones and divide these stones against various items or diseases. Compared with matrix scoring or seasonal calendars, a larger number of stones is used and typically, informants do not count the stones when assigning them to particular items. Instead, they simply group the stones into piles which show visually the varying amounts of the items being scored. For this reason, it has been argued that data derived from proportional piling can be described as continuous data and therefore, parametric statistical tests can be used. However, the issue of whether data produced by proportional piling should be summarised and analysed using parametric or non-parametric tests remains to be explored further. It may also depend on the type of sampling used to identify the informants i.e. random or non-random sampling.

Example

Refer to Handout 15. Under example 1, a standardised proportional piling method was developed and repeated with 50 individual informants. Data was collected on 5 cattle diseases plus a disease category called 'other', for 3 age groups of cattle. The data was summarised using the mean and 95% CI for each disease and age group, and then presented graphically in Figure 1.

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Annex 2

Resource materials for participatory epidemiology

TRAINING MANUALS AND BACKGROUND INFORMATION ON PARTICIPATORY APPROACHES AND METHODS

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Annex 3

Example of an evaluation form

Please circle the appropriate number to record your views

Were the training objectives relevant to your work?	Highly relevant 5 4 3 2 1 Not relevant
Were the training objectives achieved?	Achieved 5 4 3 2 1 Failed to achieve
Relevance and value of handouts	Highly relevant 5 4 3 2 1 Not relevant
Training approach/methods	Very good 5 4 3 2 1 Very poor
Time allocated to practical work[1]	Too much 1 2 3 Just right 4 5 4 Too little 3 2 1
Time allocated for working groups and discussion	Too much 1 2 3 Just right 4 5 4 Too little 3 2 1
General organisation and logistics for workshop	Very good 5 4 3 2 1 Very poor
Value and relevance of field work	Very good 5 4 3 2 1 Very poor
Time allocated to field work	Too much 1 2 3 Just right 4 5 4 Too little 3 2 1
What is the likelihood of you using PE methods in your future work, or helping others to do so?	Very high 5 4 3 2 1 Very low
Accommodation and food in training venue	Very good 5 4 3 2 1 Very poor

If you would like to make any comments, please write them overleaf.

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