CONTROLLING NEWCASTLE DISEASE in Village Chickens

A Training Manual

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Table of Contents

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Abbreviations

ACIAR	Australian Centre for International Agricultural Research
¢	Cent(s)
°C	Degrees Celsius
FAO	Food and Agriculture Organisation of the United Nations
I-2	Thermostable, live, avirulent ND vaccine available for local production
mL	Millilitre
ND	Newcastle disease
NDV4-HR	Thermostable, live, avirulent, commercial ND vaccine
N°	Number
OHP	Overhead projector
$	Dollar of the United States of America
TM	Trade mark
µL	Microlitre

1.0

General Introduction

1.1 Introduction

Controlling Newcastle disease (ND) in village chickens can make a significant and positive contribution to the lives of people in rural areas. To ensure that ND is controlled in a way that will be least expensive to farmers, it is important that farmers themselves learn how to vaccinate chickens against the disease and how to raise their chickens in a way that is more likely to keep them healthy.

The training of community vaccinators is just one part of a comprehensive ND control program (Figure 1). The vaccination of chickens must be accompanied by appropriate organisational, training, communication and economic practices. Training will often also be required for other key personnel in the control program, such as veterinary and extension supervisors at the national, provincial and district levels. This training may consist of workshops and/or the provision of relevant ND control literature. Training of these key support staff should occur prior to the training of community vaccinators.

In order for the control of ND to make a long-term contribution to the wellbeing of village chicken farmers and their families, the control activities must be well-coordinated and ongoing. It is very important to set well-defined long-term objectives and strategies from the beginning as a single vaccination campaign without follow-up will be of little benefit.

This manual aims to assist trainers to enable farmers to become successful community vaccinators against ND. The manual focuses on the use of freeze-dried vaccine applied via eye drop. Where 'wet' vaccine (i.e. liquid vaccine that has not been freeze-dried) is being used there is no need to discuss how to dilute the vaccine during the course.

Comprehensive Newcastle Disease Control Program

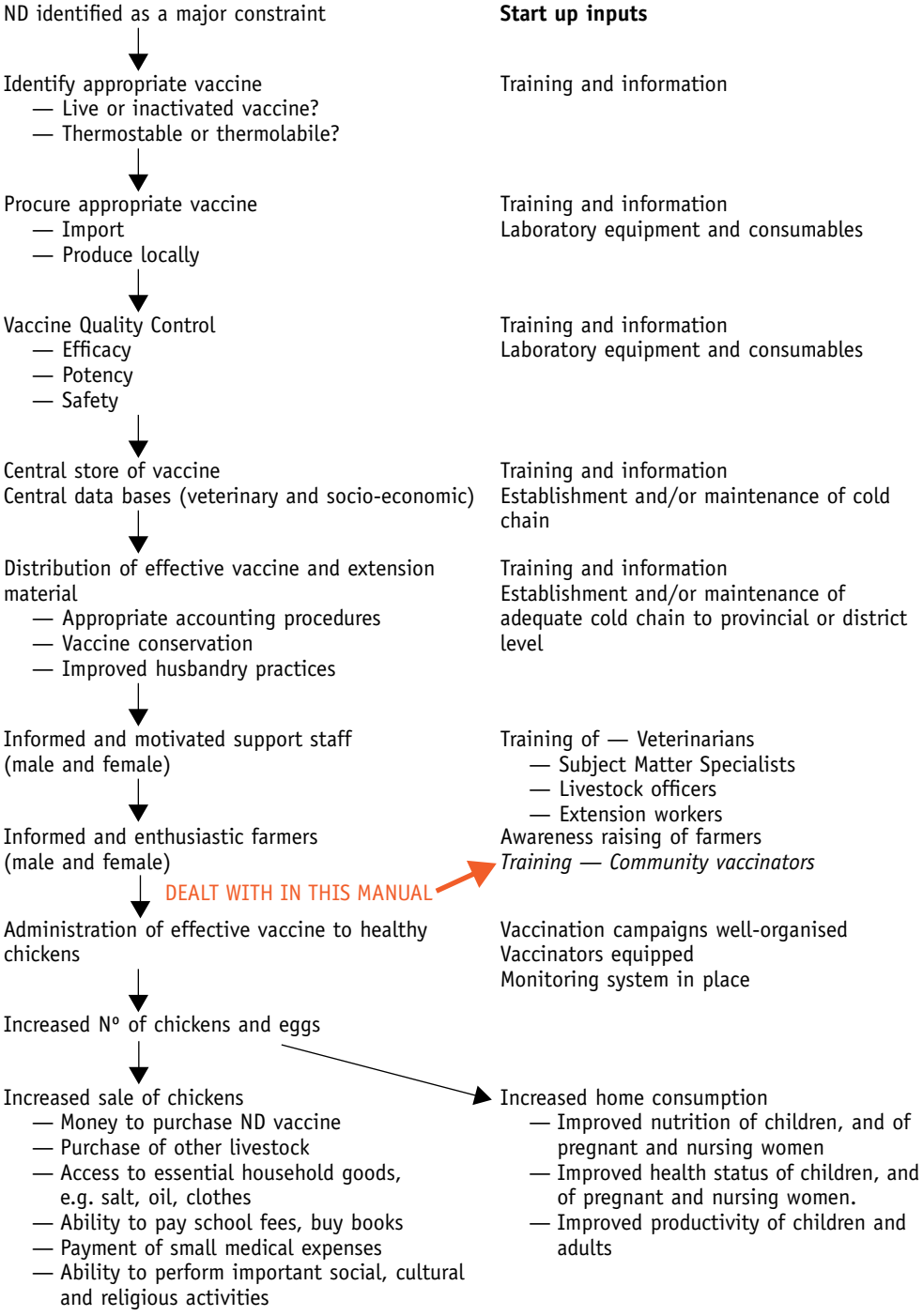


Figure 1: *Components and desired results of a sustainable ND control program in village chickens (adapted from Alders, Spradbrow, Young, Mata, Meers, Lobo, and Copland 2001). The large arrow indicates the component dealt with in this manual, i.e. the training of community vaccinators.*

1.2 How to use this training manual

This manual is divided into six sections:

1. An introduction to the topic;
2. Recommendations for the preparation of the training course;
3. The training course itself;
4. A guide to the monitoring and ongoing education of community vaccinators after the course;
5. A conclusion; and
6. Various appendices associated with the preparation and implementation of the training course, monitoring ND vaccination campaigns and the diagnosis, treatment and control of other common diseases found in village chickens.

The training course is designed to be conducted in a participatory and open fashion. To assist communication, a range of illustrations have been included in this manual. If an overhead projector is available, we suggest that you prepare overheads from the A4 illustrations contained in this manual. Always have a printed copy of your overhead (or PowerPoint®) presentation for use should the electricity supply fail during your training session. If you do not have a copy of the ND flip chart (see Appendix 1.1), prepare A3 photocopies of the illustrations.

For those working outside the Southern African region, it is best if you can prepare illustrations that present people and birds in a manner that will be familiar to your target group. Always pre-test your illustrations before preparing multiple copies (see Zimmerman, Newton, Frumin and Wittet (1996) for a guide to pre-testing visual material).

Please note that in this manual the boxes containing text varying according to whether they contain:

1. Objectives
2. Quotes from others
3. Tips from the authors

1.3 Technical issues

1.3.1 Type of vaccine

This training manual deals with the administration of thermostable live ND vaccine (I-2 or NDV4-HR) via eye drop, that is vaccines that can be kept outside the frigerator for up to two months without losing their activity. Eye drop administration is preferred over other routes by most village chicken farmers because it provides the best level of protection and is less expensive because it does not have to be given as often (Table 1).

The manual also focuses on the use of freeze-dried vaccine. Where “wet” (liquid) vaccine is being used it is usually distributed ready to use and so there is no need to discuss how to dilute the vaccine.

Table 1: *Comparison of routes of administration of thermostable live ND vaccines according to the frequency of administration and the degree of protection.*

Route of administration	N° of applications per year	Degree of protection
Eye drop	3	High (80%)
Drinking water	5	Medium (60%)
Food	8 to 12	Low (50%)

Eye drop administration provides the best protection because after administration, the vaccine passes to the Harderian gland just behind the eye. The Harderian gland in chickens is a key organ in the development of the immune response. With eye drop administration a large amount of the vaccine virus enters the Harderian gland and so a strong immune response is stimulated.

Further technical details may be found in 'Controlling Newcastle disease in village chickens: a field manual' (Alders and Spradbrow 2001) and 'Controlling Newcastle disease in village chickens: a laboratory manual' (Young, Alders, Grimes, Spradbrow, Dias, da Silva and Lobo 2002) published by ACIAR.

1.3.2 Storing the vaccine in the field

Thermostable live ND vaccine can be held for a number of weeks outside the refrigerator prior to use but it must be stored in a cool, dark location where it will not experience wide swings in temperature. As a general guide, if held at 28°C or below,

- freeze-dried vaccine can be stored for two months, and
- "wet" vaccine can be stored for two weeks.

If held at 37°C,

- freeze-dried vaccine can be stored for two weeks, and
- "wet" vaccine can be stored for two days.

Thermostability of the vaccine may change slightly between laboratories producing the vaccine and so you should ask the laboratory concerned to provide you with their recommendations on how the vaccine should be stored in the field and for how long it can be held outside the refrigerator.

1.3.3 Transporting vaccine

If the areas where you are working are sufficiently wealthy, you may decide to issue participants with a cool box to transport the vaccine. To make this decision ask yourself three questions:

1. Is there a local source of ice or a freezer where ice packs may be frozen?
2. Can the vaccinator afford to buy a cool box after the project finishes?
3. Are cool boxes available for purchase locally?

If the answer to any of these questions is "no", then it is recommended that you do NOT provide cool boxes. It is best for vaccinators to learn how to use containers that are locally available to keep the vaccine relatively cool, e.g. wrapping the vaccine in a damp cloth and placing it into a covered open weave basket (see section 3.3.3).

NOTE: The fewer the physical and financial inputs provided by a project, the more likely it is to be sustainable.

1.3.4 Number of doses of vaccine per vial

The number of doses of vaccine per vial is an important issue to consider when using freeze-dried vaccine. Most rural families keep only a small number of chickens and would like to buy the vaccine in small doses. Unfortunately it is not possible to produce vaccine vials containing a small number of doses cheaply. The majority of the costs associated with the production of freeze-dried vaccine are associated with the purchase of the vial, the metal cap, the rubber stopper and the label. The vaccine itself is relatively cheap. Consequently, the price per dose increases as the number of doses per vial decreases (Table 2).

Table 2: *The cost price per vial and per dose of vaccine varies according to the number of doses per vial.*

Number of doses per vial	Cost price per vial ($)	Cost price per dose ($)
100 doses	$1.05	$0.0105
250 doses	$1.25	$0.0050
1000 doses	$1.50	$0.0015

In Mozambique, community vaccinators have managed to vaccinate up to 300 birds in one day. Consequently, a vial containing 250 doses was produced to enable the vaccinators to use one vial per day with a cost price per dose of approximately $0.005.

1.4 Other material on ND control

A range of material that complements this manual is available in English, Portuguese and French. Further details on each item are available in Appendix 1.

2.0

Preparing for the training course

2.1 Qualities of a good trainer

Your training course will be successful if you can —

- **Communicate easily with trainees —** be relaxed and be aware of the social and cultural issues that may impact on field work and training. The trainer should use terms and expressions that are easily understood by the trainees.
- **Be a facilitator not a teacher —** the role of the trainer is to assist the participants to acquire the knowledge they need to successfully implement ND vaccination campaigns. The trainer need not be an expert in ND control to be able to conduct basic training sessions for community vaccinators using the program outlined in this manual. When the trainer is unable to answer a question raised by a participant, it is acceptable to say 'I don't know' and then inquire if anyone else in the group knows the answer. If no one is able to answer the question, the trainer should offer to find out the answer and then pass the information on to the vaccinators as soon as possible after the training session.
- **Keep eye contact with the participants —** do not talk with your back to them while you are writing on a board or flip chart.
- **Be interesting —** show an interest in what you are saying and make it more like a story. Speak clearly and loudly but not too fast. Ask participants if they can understand you clearly and encourage them to ask questions when something is not clear.
- **Respect the knowledge held by participants —** have respect for the skills and experiences of trainees, and the knowledge of village chicken farmers. When checking that your messages are being received clearly, ask your questions in a positive manner. For example, say 'Did I explain that clearly?' rather than 'Did you understand that?'
- **Write clearly —** when you write on a flip chart or white board, form your letters and numbers clearly so that everyone can read what you have written.
- **Be enthusiastic —** have enthusiasm for teaching and for ND control activities. Enthusiasm is contagious!

2.2 How adults learn

The methods used to bring about long lasting learning in adults are quite different from those commonly used to teach children in schools. Adult learners have different experiences, perceptions, problems and needs, and training courses will be more effective if trainers understand how and why adults learn. The points described here are not only relevant to trainers working with extension workers or community vaccinators, but should also be applied by extensionists and vaccinators working with rural families.

The adult learning process incorporates three important principles that should be remembered when running a training session. These are discussed briefly below and suggestions for running effective training programs given.

1. Adults bring a lot of experience with them to training sessions and they therefore have something to contribute and something to lose.

- Adult learning is unique to each individual. Everyone learns at their own pace and in their own way
- Adults value their own experience and do not want to be treated as stupid or ignorant
- You cannot force an adult to change.

Suggested practices:

— Adults want to test what they learn with what they already know. Encourage participants to answer questions from their own experience as village chicken farmers.

— Do not just present information as 'truth'. Use people's different experiences to encourage questioning and discussion so that they can arrive at the truth for themselves.

— Adults do not want to risk looking stupid. Treat everyone equally and respect their input and ideas. If someone makes a mistake treat it as a means to create discussion and so enable learning.

— For learning to occur, material has to be provided in manageable steps. Adults need to understand as they learn and gradually come to master a task.

— Adults want feedback on their progress and how they can improve. However, do not be overly critical, as positive reinforcement is also needed when you are first trying out a new task.

2. Adults prefer to focus on real life, immediate problems rather than on theoretical situations.

- Adults see learning as a means to an end, rather than an end in itself.
- Learning is voluntary. Adults only learn what they want to learn and do what they want to do. What they learn must have personal meaning and be of direct or immediate value.
- In most cases, it will be many years since adults have sat in a classroom. Most will also be unaccustomed to having theoretical material presented in a written form.

Suggested practices:

— Provide useful information that is relevant to their need to control ND in their chickens. Adults would rather focus on current issues, rather than material that may be useful in the distant future.

— Tell participants about the purpose and benefits of the session, and about the process you intend to follow. That way they will know what is in it for them.

— Summarise and review regularly so they can see that progress is being made.

— Keep theoretical sessions as short as possible, certainly under 40 minutes, and alternate with practical sessions.

3. Adults are accustomed to being active and self-directing

- The best learning is based on experience.
- Most adults like to work with others. Aim for a cooperative process that supports sharing of experiences.

Suggested practices:

— Participation needs to be encouraged, supported and expected. Do not embarrass participants, but do not let them hide either.

— For learning to occur, adults have to do things. They must get involved and work at tasks and exercises. They learn by doing and making mistakes and then discovering solutions for themselves.

— Adults want to be consulted and listened to. Although trainers need to give direction at times, this should be the exception rather than the rule.

In summary, treat community vaccinators with respect. Encourage discussion and participation. Rather than being the 'teacher' with all the answers, try and be the facilitator who helps the community vaccinators to learn for themselves. Both you and they will then have a much more rewarding and enjoyable training session.

2.3 Encouraging the participation of women

- Encourage the participation of women as they are important role models and increase women's self-esteem and the awareness that women are competent.
- Encourage the participation of women in discussions that take place during the training sessions.
- Training should be organised in short, regular bursts and not run for the entire day and should be located in the village rather than at provincial training centres;
- Training methodologies must take into account the high levels of illiteracy among rural women. Although participants will need some basic literacy skills to record vaccination details, visual aids and practical sessions should be used as much as possible;
- Information imparted in short training sessions over a longer time period is more easily remembered. Repetition and revision are also important;
- When new information is introduced which relates specifically to women's areas of work, it is particularly important to ensure that women are given control over this information. Veterinary training is one such area, because women are responsible for small livestock. Where this training and information is provided to men, there is a risk that women will not receive the information necessary to help them improve their practices;
- Experience has shown that vaccination campaigns are more successful when women as well as men are involved in all stages of the work.

2.4 Group size and composition

Keep the size of the group small, say around 10 to 12 participants. This way you will be able to pay close attention to the needs of each participant. This is particularly important if only one trainer is running the course.

It is also advisable to include the extension workers or livestock officers who will be supervising the community vaccinators in the course. This will ensure that there is a common understanding between vaccinators and supervisors. It will also enable them to jointly plan their activities for the coming year during the course. Vaccinators, extension workers or livestock officers will get to know each other and can agree on the type of supervision, monitoring and evaluation that should take place after the course.

2.5 Selecting community vaccinators

Community vaccinators may be men or women and should be selected in collaboration with the community. Local associations, e.g. farmers' associations, may also wish to have a representative included in the training course.

It is recommended that the community vaccinator be:

- Respected by the community, dynamic and a good communicator,
- Able to work with both male and female farmers and different groups within the community,
- Able to travel the distances required to purchase vaccine and vaccinate chickens,
- Able to read, write and do basic calculations with numbers,
- A village chicken farmer — protecting his/her own chickens from ND will provide the community vaccinator with a substantial economic incentive.

2.6 Selecting the training venue

The location of the training will depend on who is being trained and the logistics involved in getting the participants together.

If the training cannot be held in the village, then you may need to arrange child care facilities if women with young children are to participate in the course.

Chickens are required for many of the practical sessions. It is best if the training can be done in a village or near to a village so that village chickens can be used in the practical sessions. Using village chickens also provides an opportunity to practise communication with village chicken farmers.

2.7 Selecting the appropriate time of year for the training

The timing of the course is very important. Always allocate sufficient time between the training course and the first vaccination campaign. Participants need around one month to mobilise and make arrangements with the village chicken farmers prior to the first campaign.

Try to hold the course —

- when farmers are less busy with other agricultural and/or off-farm activities;
- when climatic conditions will allow access to the area where the training is to be held
- well before the period when ND outbreaks are most common.

2.8 Preparing for the training course

It is important that you allow sufficient time to prepare the course. Ensure that all relevant authorities and interested parties have been informed about the course and are supportive of initiatives to control ND in village chickens. Local representatives of veterinary and extension services should be invited to attend the course. If they are unable to attend the entire course, try to ensure that they can participate for at least a short time to be introduced to the participants and discuss how the community vaccinators will be monitored and their activities reported. Ensure that key supervisors and decision-makers are well informed about the ND control program and its objectives. In many cases, it may be necessary to provide training and/or background information for them prior to training community vaccinators.

To prepare for this course —

- Use the checklists at the back of the manual to assist with the purchase of training materials (Appendix 2) and components of the community vaccinator's kit (Appendix 3).
- Consult the section on the selection of eye-droppers (Appendix 4) before you purchase eye-droppers for the kit (all being well the distributors of the vaccine will also sell appropriate eye-droppers).
- Prepare a flip chart from the illustrations in the manual for the vaccinators to use when mobilising the community (a suggested order and accompanying text may be found in Appendix 1.1).
- Also prepare a small manual for vaccinators containing: how to tell the difference between sick and healthy chickens (Section 3.2.3), basic instructions on the use of the vaccine (Appendix 5), guidelines on the organisation of vaccination campaigns (Appendix 6) and a description of how to calibrate (Section 3.3.2) and care for eye-droppers (Section 3.3.3).
- Confirm that accommodation, meals, travel and allowances have been arranged for participants and trainer(s). Please note that allowances should be sufficient to cover the costs incurred by participants but not overly generous. If you offer large allowances you may get participants who see an opportunity to make some easy money by attending the course rather than those who are genuinely interested in working in their communities as vaccinators.
- Ensure that participants receive information in advance about their travel arrangements and items that they are requested to provide (e.g. ask them to bring along an example of the container they would like to use to transport the vaccine).
- Practise the material in the manual before you conduct your first training course. Give oral presentations of all the theoretical sections to colleagues and friends and practise the activities to be done in the practical sessions. If you are confident that you are capable of presenting all the material, you will be much more relaxed and comfortable when presenting the course.
- During the course, you may need to illustrate a point that does not have a corresponding illustration in this manual. If you are not a confident artist, practise drawing the things that you think you may need to illustrate. A simple way to draw a chicken is given in Figure 2 to assist those who do not enjoy drawing.
- If you are not using the I-2 ND vaccine, make sure that you get all the necessary information about the vaccine you will be using. Field workers need to know important information such as the storage conditions for a vaccine, how long it can be stored at ambient temperature (i.e. outside the refrigerator), the recommended re-vaccination interval, administration routes, age restrictions and dosages. You will be required to present this information during the course.

How to draw a chicken

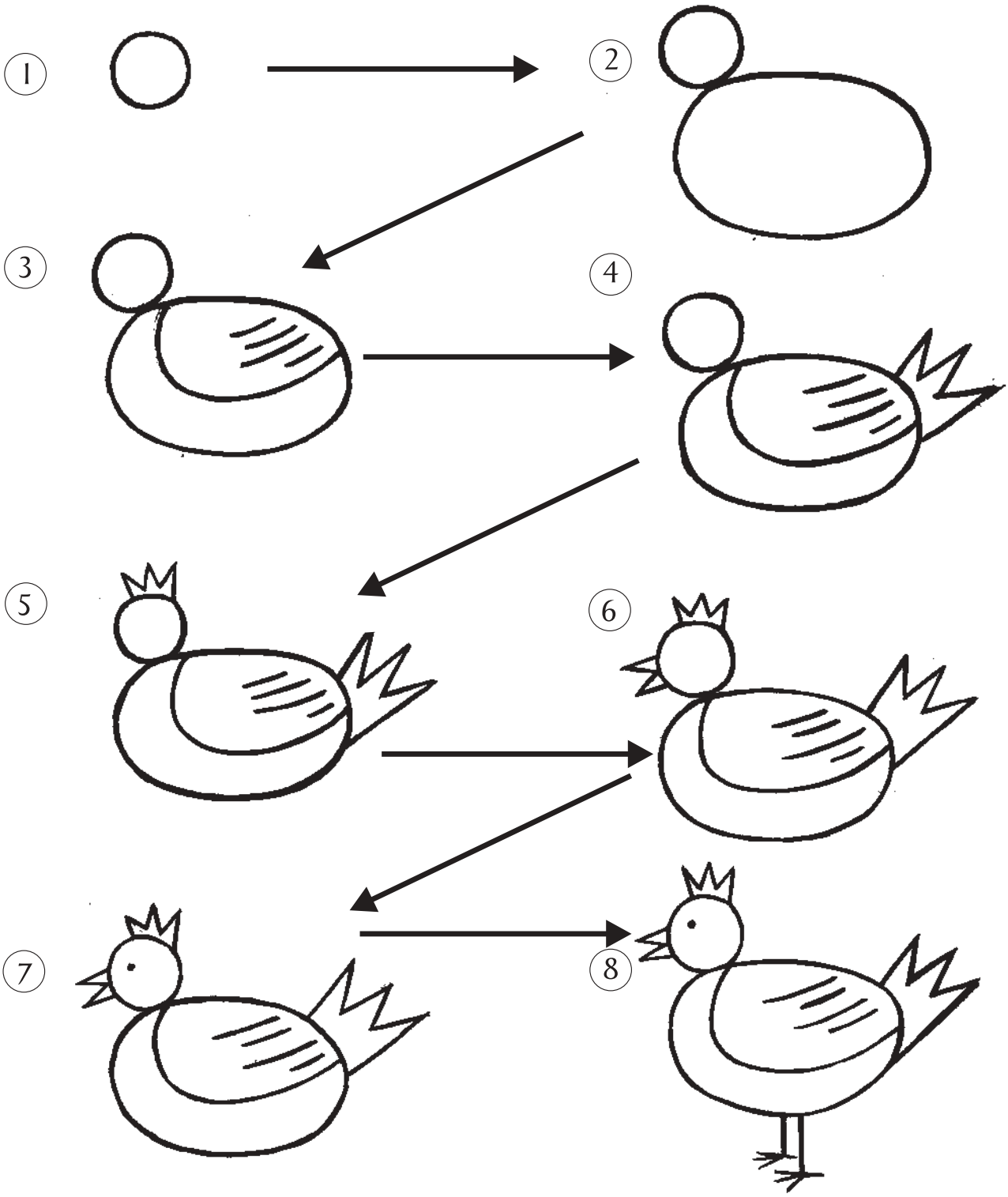


Figure 2: *An easy way to draw a chicken.*

2.9 Selecting the language of communication

It is ideal if the trainer(s) speaks the language commonly used by the participants. If for some reason, the trainer is not able to communicate effectively in the local language, it is best to arrange an interpreter prior to the course.

Meet with the interpreter and provide him/her with a copy of this manual and other material on the control of ND to be used in the training course. Local languages may not always have terms that correspond to technical words and it may take time to arrange clear and accurate translations. For example, many local languages do not have a word for vaccine and it is important that the word for drug or remedy not be used as a substitute. As you are aware, a drug is given to an animal when it is sick. A vaccine is given to a healthy animal to prevent it from getting a particular disease. It is very important that farmers understand that a vaccine prevents disease rather than treats it, and so animals must be vaccinated before they get sick.

2.10 The training program

The timetable shown below can be adjusted to indicate the order in which you intend to conduct the training course. The starting time for each session should be completed once you have consulted the participants about the daily program. Allow more time if translation is required. Display the program on the wall of the training venue where it can be easily consulted.

Training timetable

Time	Day 1	Day 2	Day 3	Day 4	Day 5
1st Session Time:.....		1. Getting started Opening ceremony	5. Introduction to vaccines and vaccination	9. Vaccinating chickens	Participants depart
..... minutes		Interval	Interval	Interval	
2nd Session Time:.....		2. Village chickens and community vaccinators	6. Vaccination tools and their use	10. Mobilising farmers and selling your vaccination service	
..... minutes		Lunch	Lunch	Lunch	
3rd Session Time:.....		3. Introduction to Newcastle disease	7. Working with I-2 ND vaccine[1]	11. Signs of success	
..... minutes		Interval	Interval	Interval	
4th Session Time:.....	Participants arrive	4. Working with farmers and handling chickens	8. Extension material for ND control; other disease control measures	12. Looking ahead. Closing ceremony	

[1] Insert the name of the vaccine you will be using.

2.11 Before you start

Remember —

- You are a facilitator not a teacher.
- Encourage all to participate.
- Try not to let any one theme run for more than 40 minutes (a chance to stand up, stretch and relax is important).
- Write clearly.
- Alternate discussion and practical sessions.
- Most importantly, relax and enjoy the learning and training experience.

3.0

The training course

3.1. The Participants Arrive — Day 1

The trainer should arrive before the training course is due to begin to make sure that everything is organised and that no last minute problems or changes have arisen.

If participants need to travel a long distance and there are sufficient funds, organise for the participants to arrive the day before training commences. They will have a chance to rest after their journey, sort out all the administrative issues (such as the payment of allowances, etc.) and get to know their new environment so that they can focus on the training the following day without distraction. Inform all of the starting time the following morning.

3.2. The Course Commences — Day 2

Summary of the day's training and materials required

Topics to be presented	Duration	Support material	Material for distribution
Session 1			
1. Language to be used	5 minutes	None	None
2. Getting to know each other	15 minutes	None	Name tags
3. Expectations of participants	10 minutes	Blank flip chart and felt pens of different colours, adhesive.	None
4. Course objectives	5 minutes	Pre-prepared posters containing course objectives; overhead projector (OHP) or illustrated flip chart.	None
5. Time schedule	5 minutes	Pre-prepared timetable	None
Session 2			
1. Distribute basic training materials	5 minutes		Exercise book, pen or pencil
2. Characteristics of a successful community vaccinator	15 minutes	Blank flip chart and felt pens	None
3. Experiences with village chicken production	25 minutes	Blank flip chart and felt pens	None
Session 3			
1. Characteristics of sick and healthy chickens	10 minutes	OHP or illustrated flip chart	None
2. Clinical signs of ND	20 minutes	OHP or illustrated flip chart	None
3. Traditional remedies for ND	10 minutes	OHP or illustrated flip chart	None
4. How ND spreads	20 minutes	OHP or illustrated flip chart	None
Session 4			
1. Working with farmers	10 minutes	Blank flip chart	None
2. Holding chickens for vaccination	10 minutes	OHP or illustrated flip chart; Chicken	Chickens
3. Clinical examination of chickens	15 minutes	Chicken	Chickens
4. Using a syringe, needle and eye-dropper	15 minutes	Syringe, needle and eye-dropper	Syringe, needle and eye-dropper for each participant
5. Discussion about the day's work	5 minutes	Blank flip chart	None
6. Homework	5 minutes	Blank flip chart	None

3.2.1. Session 1 — Getting started

Session objectives

1. To discuss what language will be used during the training course.
2. To get to know each other.
3. To discuss the expectations of each participant.
4. To outline the objectives of the course.
5. To define starting and finishing times for each day of the course.

Confirm with the participants what language should be used during the course. All being well you will have checked this beforehand and will have an interpreter on hand if necessary.

To help participants to get to know each other, divide the group into pairs and ask them to record the following about their partner

— his/her name

— where he/she lives

— what his/her experience has been with village chickens.

Each participant is then asked to present what they have learned about their partner.

Make sure that you keep a written record of each participant's name, postal and residential addresses, educational level, occupation and supervisor's (extension worker's) name and position.

Ask participants to say what they hope to learn during the course. Write these expectations on sheets of paper on the wall or at least record them in a note book if large sheets of paper are not available. You will refer to this list again on the last day.

Present the objectives of the course (see below) and confirm that participants are in agreement. Modify objectives when necessary in collaboration with the vaccinators. Put the objectives up on the wall of the training venue so that the participants may refer to them during the course. Explain that the course will deal with the control of ND (use the local name for ND) in chickens only and that other issues of importance to the community (e.g. water supply, healthcare, education of children, care of domestic animal species other than chickens) will not be discussed. You may offer to present community concerns other than ND control to the relevant authorities.

NOTE: By laminating the sheets showing the training timetable and objectives, they can be reused in subsequent courses.

General course objectives

1. To share experiences in the control of ND in village chickens.
2. To learn how to successfully implement ND vaccination campaigns in rural areas.

Specific course objectives

At the end of the training course, each participant should be able to:

1. Identify a healthy chicken;
2. Identify a sick chicken;
3. Recognise the signs of ND;
4. Handle a chicken calmly and safely;
5. Read numbers on a syringe;
6. Understand the meaning of the lines and spaces between the numbered lines on a syringe;
7. Read and check the number of doses of ND vaccine per vial and the expiry date of the vaccine;
8. Work out how much diluent to add to freeze-dried vaccine;
9. Use the syringe to put the appropriate volume of water into a vial and draw vaccine out (if using vaccine that requires dilution);
10. Check that the vaccine is properly diluted;
11. Shake vial completely to dissolve all vaccine;
12. Assemble an eye-dropper;
13. Hold the eye-dropper vertically to form a drop of the correct size when vaccinating chickens;
14. Check that the correct number of drops leave the eye-dropper;
15. Clean an eye-dropper and a syringe correctly;
16. Explain to other farmers how ND vaccine can assist with ND control in village chickens;
17. Explain other general husbandry techniques that can assist with disease prevention and control;
18. Organise ND vaccination campaigns in collaboration with participating farmers;
19. Be aware of the information on ND control activities that should be provided to district extension or veterinary supervisors; and
20. Assess the effectiveness of their work as community vaccinators.

Ask participants to indicate at what times they would like to start and finish the sessions each day. This is particularly important when the training is done in a village as some participants may have other activities that they need to attend to each day. Write the agreed times onto the course timetable (see Section 2.10; use a water-based felt pen if the timetable has been laminated) and display it on the wall of the training venue.

Interval — maybe for morning tea.

3.2.2. Session 2 — Village chickens and community vaccinators

Session objectives

1. To distribute basic training materials.
2. To highlight the characteristics of successful community vaccinators.
3. To exchange ideas about raising chickens.

Distribute as appropriate, note books, handouts and pens to the participants.

Discuss the characteristics of a successful community vaccinator. Ask participants to list the characteristics that would help them to be successful. Stress the following key characteristics:

- Respected by the community,
- Able to work with both male and female farmers,
- Able to travel the distances required to purchase vaccine and vaccinate chickens,
- Able to read, write and do basic calculations with numbers,
- Knowledgeable about ND and how it can be controlled,
- A capable village chicken farmer — protecting his/her own chickens from ND will provide the community vaccinator with a substantial economic benefit from his/her work.

Exchange ideas on the production of village chickens. Encourage participants to discuss their experiences with village chicken production, for example:

- What types of chickens do they raise?
- Why do they raise chickens, e.g. for sale, home consumption or traditional use?
- What type of housing is provided for their chickens, if any?
- What type of food, if any, is provided?
- What problems have they encountered?

Interval — maybe for lunch.

3.2.3. Session 3 — Introduction to Newcastle disease

Session objectives

1. To recognise the differences between sick and healthy chickens.
2. To recognise the signs of ND.
3. To discuss traditional remedies used in the control of ND.
4. To discuss how ND spreads between chickens.

It is very important that we know the difference between sick and healthy chickens because we should NEVER vaccinate sick chickens. Chickens need to be strong and healthy so that they can respond well to the vaccine.

Characteristics of a healthy chicken

Ask participants to describe the signs of health in chickens. After making the list together, show them the illustration (Figure 3) of a healthy chicken and use the list below to reinforce the key characteristics of health:

— head raised
— straight neck
— clean and smooth feathers
— clean vent (posterior)
— moves easily
— bright eyes
— strong legs and feet
— crows (sings) well (especially the rooster)

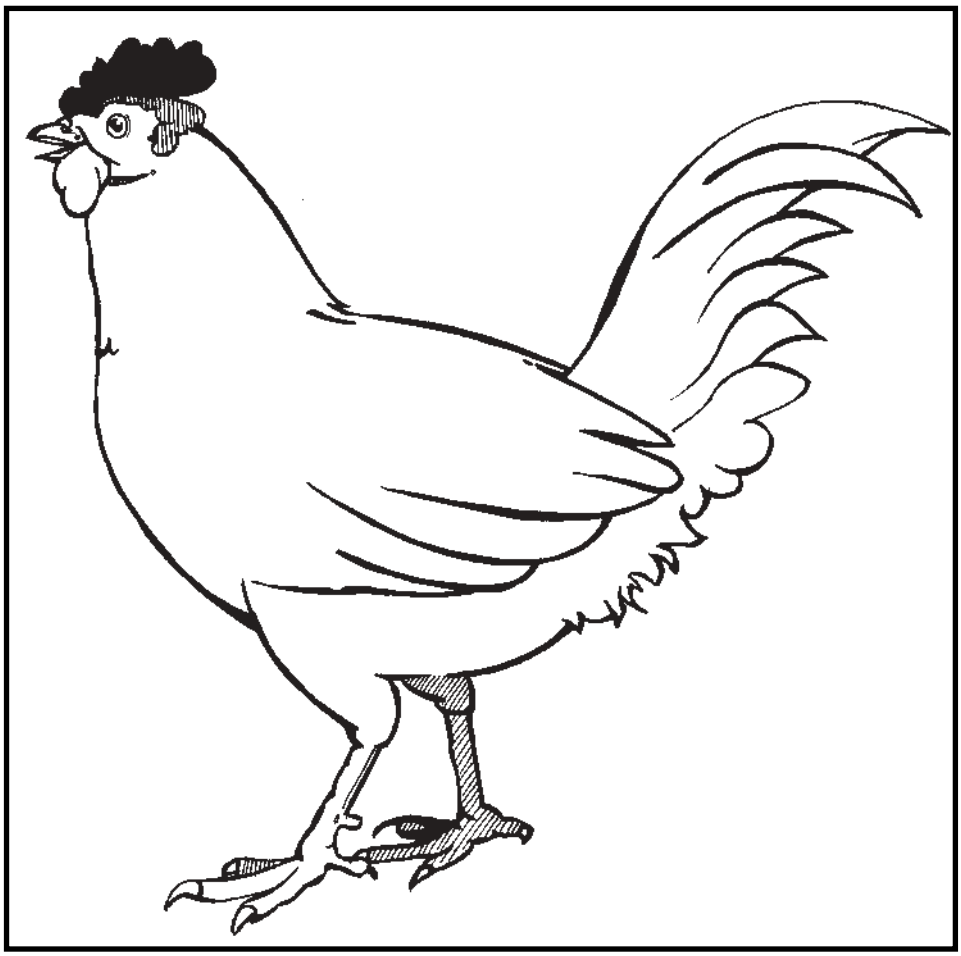


Figure 3: *A healthy chicken.*

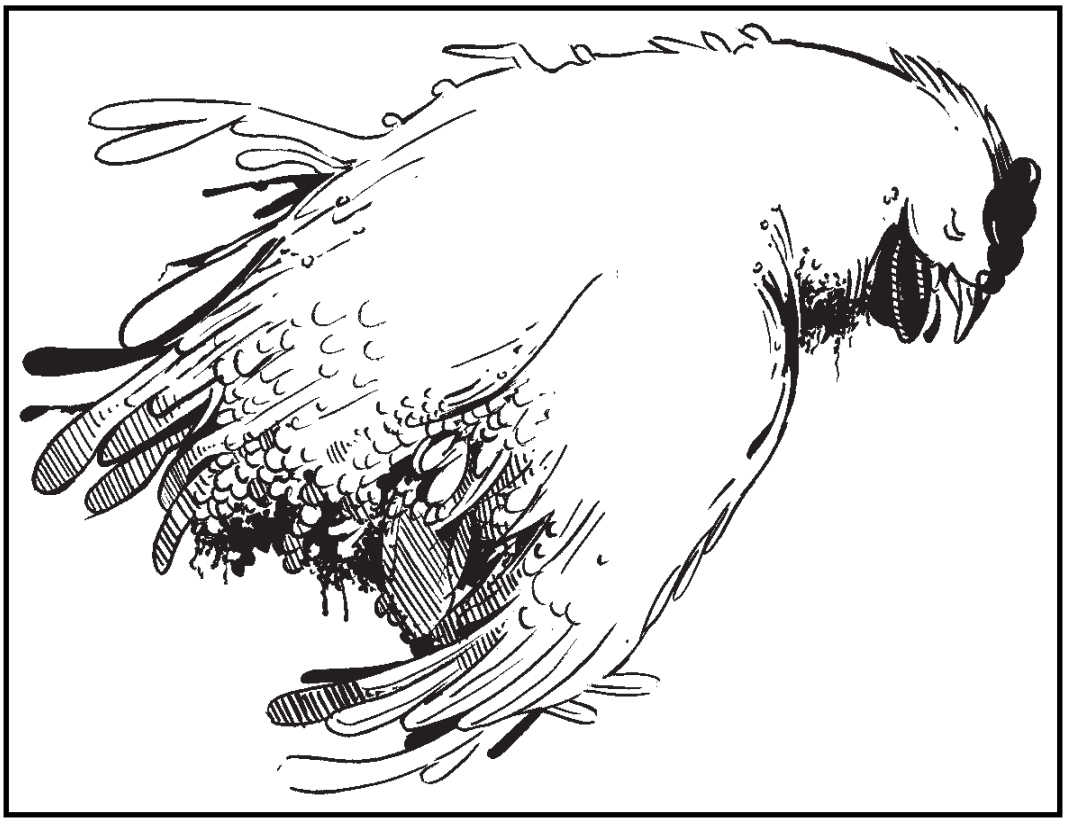


Figure 4: *A sick chicken.*

Characteristics of a sick chicken

Ask participants to describe the signs of illness in chickens. After making a list, use the list below to reinforce the key characteristics of a sick chicken while showing Figure 4:

- drooping head
- closed eyes
- fluffed feathers
- dirty vent (posterior)
- not moving
- legs bent
- stops crowing (singing) (especially the rooster)

We have just talked about sick and healthy chickens.

Apart from ND, what are the other diseases that can cause problems in chickens? Ask participants to name or describe diseases or signs of illness they have encountered in chickens. The vaccine that we are learning to use in this course will control ND only. Chickens might still get sick from:

- external parasites, e.g. fleas, lice, and ticks,
- internal parasites,
- Gumboro disease (Infectious Bursal Disease),
- Fowl pox,
- Fowl cholera,
- any other diseases of importance in the local area.

Use the local names for the above diseases and always record the information provided by the participants. This information will help you with your future plans for improving village chicken production.

An introduction to ND

Newcastle disease is the disease that kills more village chickens than any other disease. Therefore, we need to be able to recognise the characteristics of this disease.

How to recognise ND in a chicken

Ask the participants to look at Figure 6 and to describe what they see. The chicken has fluffed its feathers and is carrying its wings on the ground. Farmers sometimes refer to sick chickens as 'wearing a coat' or 'dragging their coats on the ground.'

What do the vaccinators see in Figure 7? Chickens with ND will often have greenish diarrhoea and the feathers around their vents will be dirty.

In Figure 8, participants should describe a chicken with a twisted neck (torticollis) and fluffed feathers. Chickens with these signs often breathe with difficulty.

Participants should note that Figure 9 shows many dead chickens. Ask them what disease can cause so many deaths? ND is the only chicken disease that can cause all ages of birds, both males and females, to die in such large numbers.

Characteristics of Newcastle Disease

Figure 5: *Characteristics of Newcastle disease.*

Drooping wings

Figure 6: *Drooping wings can be an early sign of Newcastle disease.*

Greenish diarrhoea

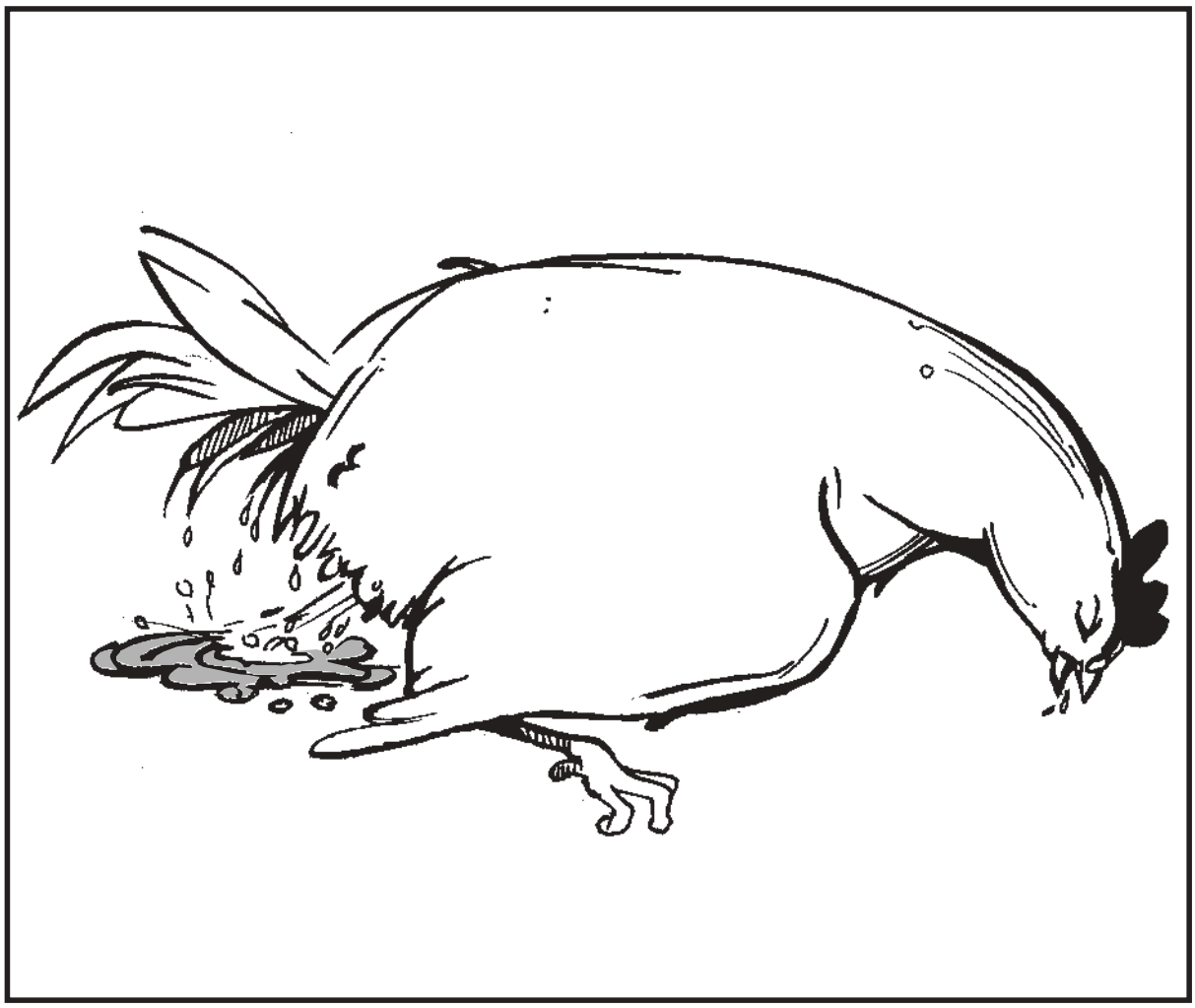


Figure 7: *Greenish diarrhoea can occur with Newcastle disease.*

Twisted neck

Figure 8: *Chickens can get a twisted neck with Newcastle disease.*

Many deaths

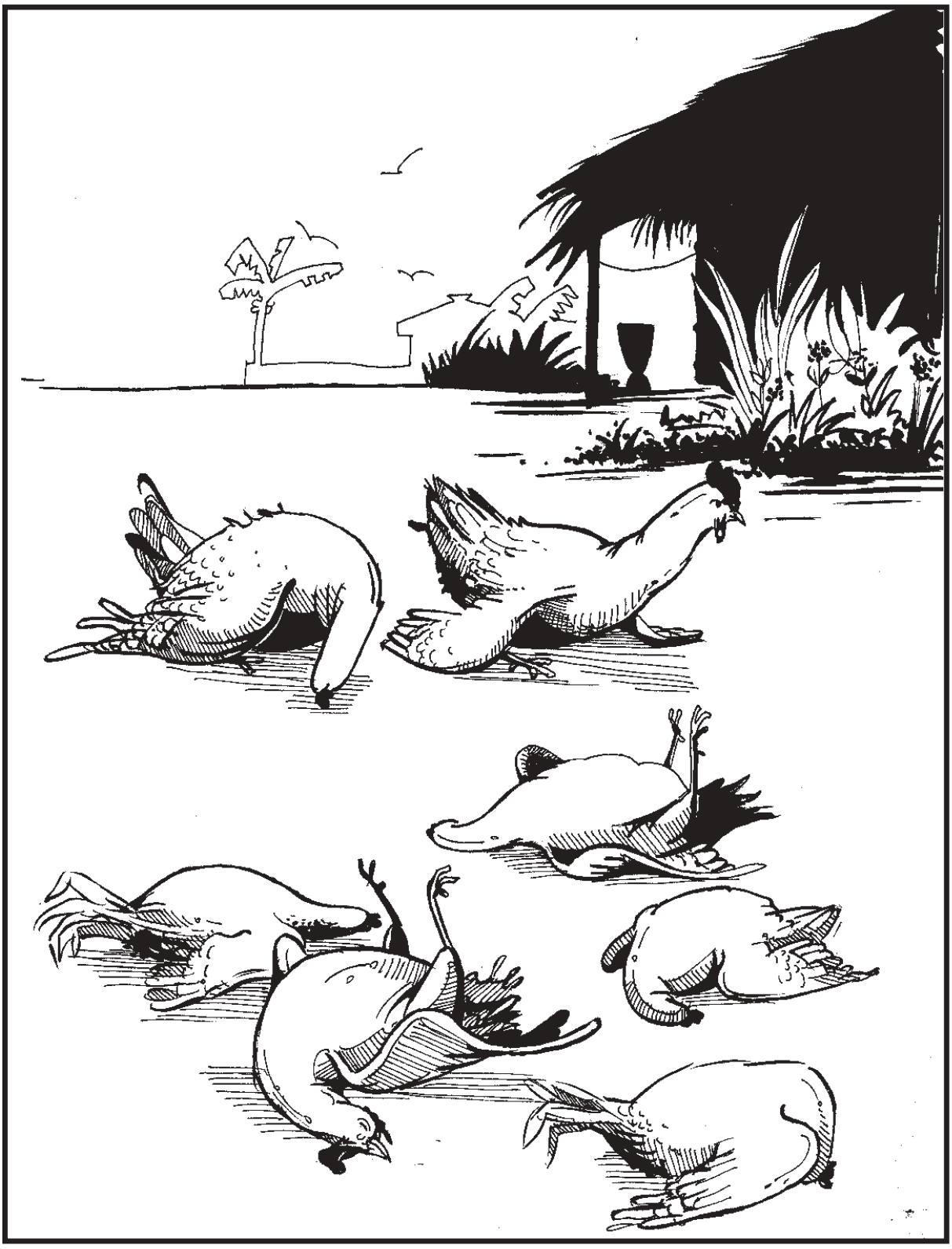


Figure 9: *Many dead chickens are often a sign of Newcastle disease.*

NOTE: When you show illustrations to the participants, ask them to describe what they see in the Figure. This is an important step that will ensure that they are interpreting the images in the intended manner. Encourage the participants to use this technique when they are revising material during the course and afterwards when they are presenting the flip chart to farmers.

Other birds that may get ND

Ask participants if other types of poultry can suffer from ND. What types are shown in this Figure (Nº 10)? Turkeys and pigeons can sometimes get ND. Ducks are normally resistant to ND but ducklings (baby ducks) can sometimes die because of it. If you have noticed that ducks of all ages are dying in large numbers, then this is caused by another disease that attacks ducks, and not by ND.

Explain that sometimes certain diseases only cause illness in particular animals. For example, when we get the flu, the dogs or cats around our house will not get the same illness.

Traditional treatments used to control ND

What can we see here in Figure 11? We can see a woman, a man and a chicken. The man is holding a tray containing a number of different items. What are they? He is carrying some garlic, some chilli peppers and some washing powder. These are some of the traditional remedies used by farmers in an attempt to control ND. Do the participants know of any others? Always keep a record of these responses.

Ask the participants if they have ever used traditional remedies. What were the results? Do farmers give the remedy before the birds get sick or when signs of the disease appear?

How ND spreads from bird to bird

Over the years, societies have developed many theories about what causes sickness in people and animals. Some theories suggest that disease is caused by evil spirits or by witchcraft. In parts of West Africa, some people believe that their chickens die in large numbers just before Christmas because God needs them at this time. Some farmers have observed that a sick bird can make other birds sick, but they do not understand how this happens.

Ask the participants to describe and discuss the ideas of local people about the reasons why people and animals get sick. This is an important issue. We will be better able to help farmers understand the importance of vaccinating their birds against ND if we first understand what farmers believe about why their birds get sick.

Do not discredit local ideas and beliefs. Traditional beliefs have been built up over centuries and generally give an explanation as to why disease appears as it does. Even current scientific theories change with the passage of time as new discoveries are made and certain details better understood.

With the development of new technologies, scientists have learnt that diseases are caused by particles that are too small to be seen without the assistance of special equipment. The small particle that causes ND is called the ND virus. When the virus enters a bird, the bird does not get sick immediately. It takes some days, usually 3 to 5 days (but sometimes 2 to 15 days) for the bird to show signs of illness. During these first few days when the bird does not look sick, the number of virus particles inside it increases rapidly and some particles can leave the bird when it breathes or drinks or passes manure (Figure 12). If other birds come in contact with these particles, then they too will get sick.

Other birds that spread the disease

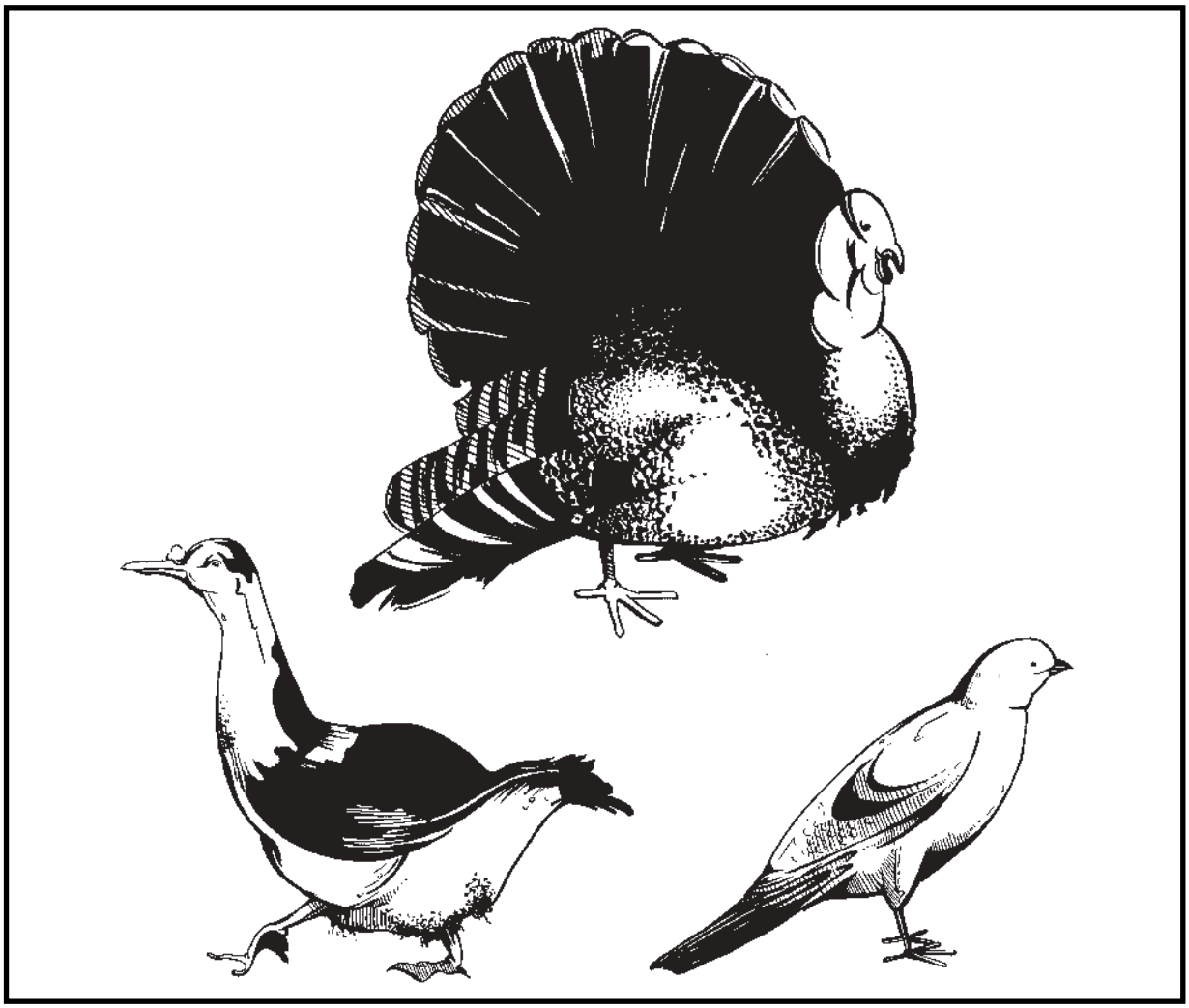


Figure 10: *Other birds can also be involved in the spread of Newcastle disease.*

There is no cure

Figure 11: *Many farmers use traditional remedies to treat Newcastle disease but most farmers admit that the treatment is not very effective.*

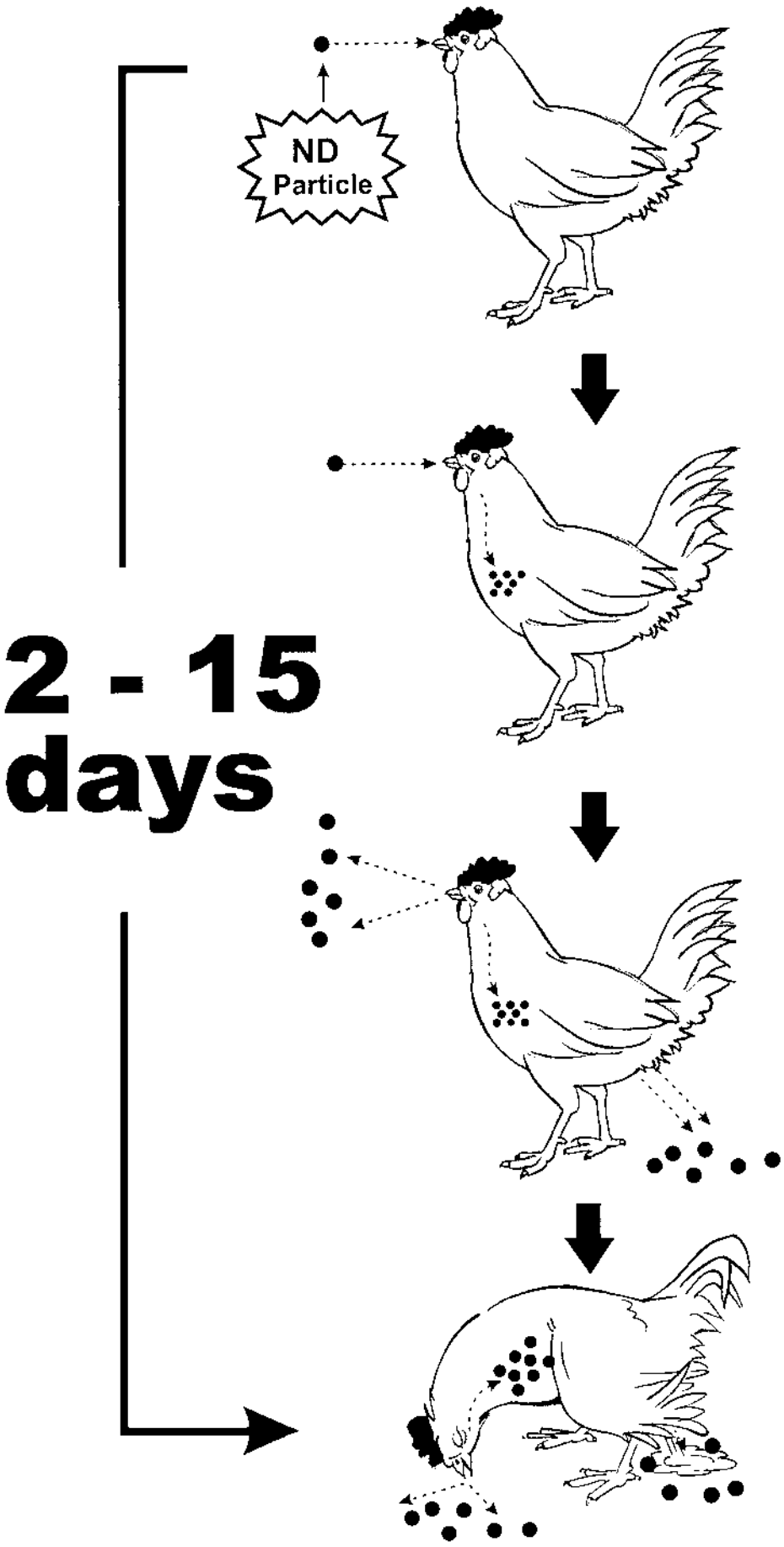


Figure 12: *After contact with the Newcastle disease virus, birds take 2 to 15 days to show signs of illness.*

The virus that causes ND can vary in strength. Sometimes, the type of virus will cause very few deaths in chickens, sometimes the virus involved may cause many deaths. For example, if a farmer has ten chickens, then —

- Infection with a weak ND virus may cause ⇒ 1 out 10 chickens to die.
- Infection with a moderately strong ND virus ⇒ 5 out of chickens die.
- Infection with a very strong ND virus ⇒ all 10 chickens die.

NOTE: When the community vaccinators have a basic level of education, it may be best to refer to the ND 'particle' rather than the ND 'virus.'

Figure 13 is slightly complicated and so you will need to explain it part by part. It shows how the ND virus can move from bird to bird.

- In the middle of the Figure we have a healthy chicken with various pictures around it.
- On top there is a chicken with diarrhoea. If ND caused this diarrhoea, then the manure produced by this bird can spread the ND virus.
- Next we have a dog eating a chicken. If this chicken had ND, then the dog can spread the virus around by carrying the body to a different location and distributing the uneaten parts (e.g. feathers).
- There are some eggs. If the egg has contact with a chicken sick with ND, then the ND virus can sit on its surface and be carried along with the egg. It has not been shown that the ND virus can be transmitted through the inside of the egg.
- A car that passes through an area where an ND outbreak is occurring could carry the ND virus.
- Chicken organs, feathers, bones, intestines and feet that have not been cooked can all carry the ND virus if they come from a sick chicken.
- The man in the figure could also transport ND virus on his shoes.

Because the ND virus is so small, it could contaminate all of the above items and we would not know until chickens in a new area start to die.

Ask participants to name other items that might carry the ND virus from an infected area? They may mention chicken baskets, ordinary baskets, car and bicycle tyres, etc.

The role of humans in the spread of Newcastle disease

In areas where the movement of birds is not controlled, farmers often sell some of their birds before or during ND outbreaks. Birds that have come in contact with the ND particle can spread it to other birds in the market. So it is possible to buy birds that look healthy in the market, only to take them home where they will develop ND. People working in villages (e.g. farmers, vaccinators, traders, extension workers, etc.) may also spread the disease by carrying ND particles from households with sick birds to other households.

Ask the participants to describe what they see in Figure 14. It shows a woman thinking about how she might raise healthy chickens.

How the disease spreads

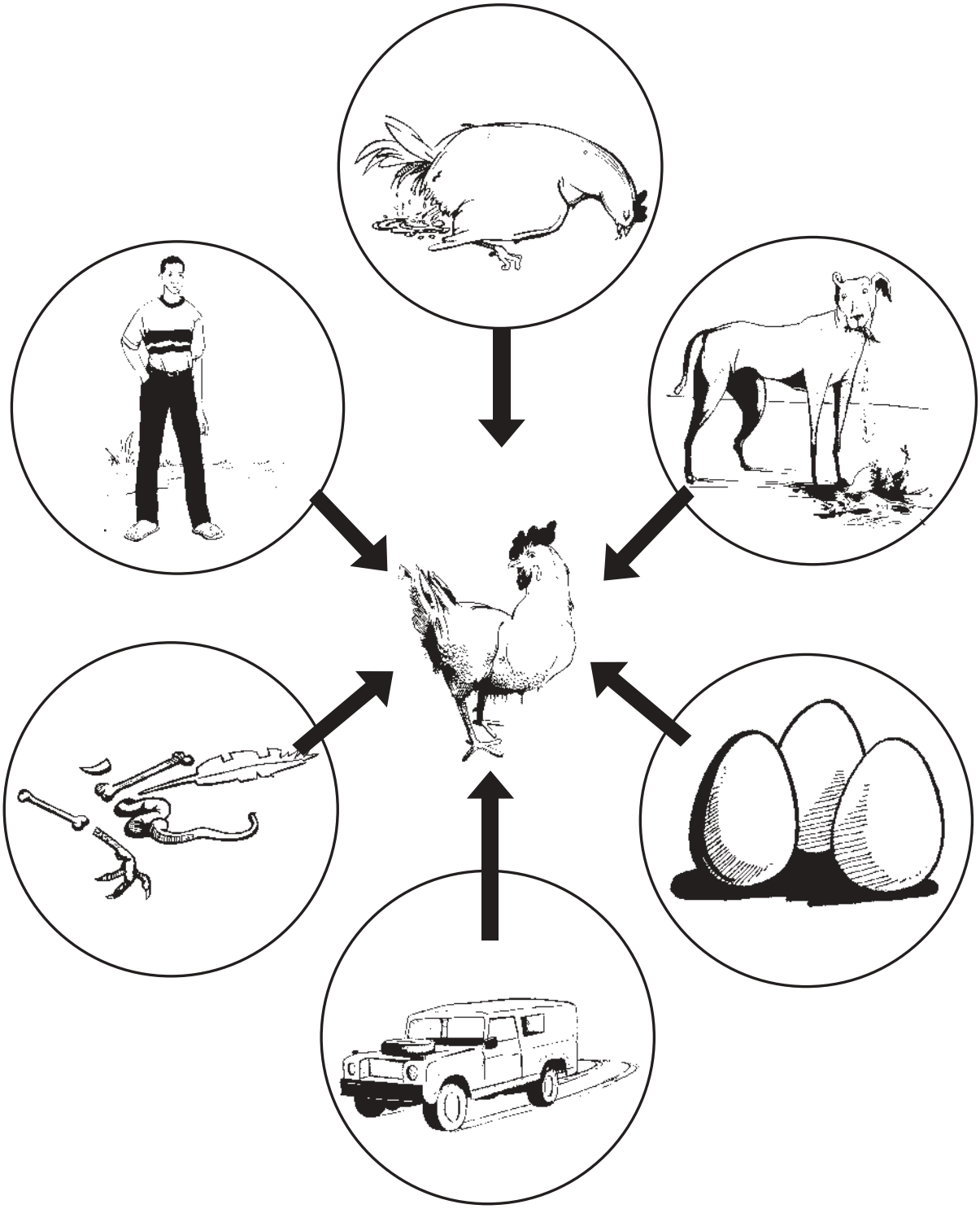


Figure 13: *The Newcastle disease virus can spread by many different ways.*

How can I have healthy chickens?

Figure 14: *Village chicken farmers are keen to know how they can keep their chickens healthy.*

Assessing reading and writing skills

During the first sessions it is necessary for the trainer to discover the extent of the trainees' reading and writing skills. It can be the case that attendance at school may not necessarily have resulted in the development of these skills. Proof of these skills will be needed and the trainer will need to incorporate into the first sessions a means of testing individuals for these skills. The trainer may decide on a straight test for these skills, but it is also possible to judge the trainee's ability by participation in joint sessions.

FAO 1994

3.2.4 Session 4 — Working with farmers and handling chickens

Session objectives

1. To discuss how to talk and work with village chicken farmers.
2. To learn how to best hold a chicken for vaccination.
3. To observe a healthy chicken.
4. To learn how to use syringes, needles and eye-droppers.
5. To discuss any comments or questions that participants may have about any of the topics discussed during the day.
6. To present the homework to be done by participants overnight.

How to work successfully with farmers

Many or all of the participants will be farmers. However, it is useful to outline the important aspects of the relationship between a service provider (the community vaccinator) and the client (the farmer).

The service provider must ensure that the clients have sufficient information to help them understand the importance and reliability of the service being provided. Farmers will be asked to pay for this vaccine and so they must be convinced that it is a worthwhile activity. It is the farmers who decide whether or not their chickens are to be vaccinated against ND. The job of the community vaccinator (and extension staff) is to provide appropriate information to farmers to help them to decide to vaccinate their chickens and then to provide the vaccination service.

Farmers are busy people and so the community vaccinator must plan activities to fit into the times that farmers indicate are the best for them. Remember that village chickens are often owned and managed by women. Vaccinators should have ways of ensuring that they are able to talk to the women who look after the chickens without causing problems with husbands! It may be best to have a general meeting first and ensure that the community is supportive of the program and understands the importance of working with female farmers. On your first visit to a house, try to make sure that all family members are present.

Always be on time. When you arrange a time to meet with farmers, do NOT keep them waiting. If you are late, apologise to those farmers who waited for you.

Practical Work

How to hold a chicken for clinical examination and vaccination

Holding a chicken in a way that minimises the stress it experiences will help it respond better to the vaccination.

What are the ways of holding chickens that make them distressed?

Possible examples may be:

- Holding them upside down by the feet (ask participants how they would like to be held upside down?)
- Holding them by the wing base — (how would we like to have someone hold us up by our arms?)

What are the ways of holding chickens calmly and safely for examination and vaccination?

- Keep the chicken upright or horizontal.
- Hold the legs together with one hand and hold the wings down with the other hand or you can hold the bird against your body to keep one wing down.
- Use an assistant to hold the bird. You will need someone to help you examine a bird thoroughly and vaccinate it in a calm and safe manner.
- When vaccinating a bird, have your assistant hold the body of the bird (by holding the legs and the wings) on its side. You will then hold the head while applying the vaccine by eye drop. By holding the head yourself, you will be better able to coordinate the application of the drop into the bird's eye (Figure 15).

Ask the participants to divide into pairs if there are sufficient birds. They should practise examining the bird to make sure that it is healthy and practise holding the bird as if they were going to vaccinate it.

The role of a syringe and how to use it

- Give each participant a syringe. Explain that the syringe will be used to measure the amount of water (diluent) used to mix with (dilute) the vaccine.
- What do the markings on the syringe mean? Explain that the divisions on the syringe are equal to a set volume. If you are using a 10 mL syringe, each mark on the syringe will be equal to 1 mL. Being able to measure particular volumes accurately is important when we have to administer a set number of doses of vaccine by eye drop.

Eye drop

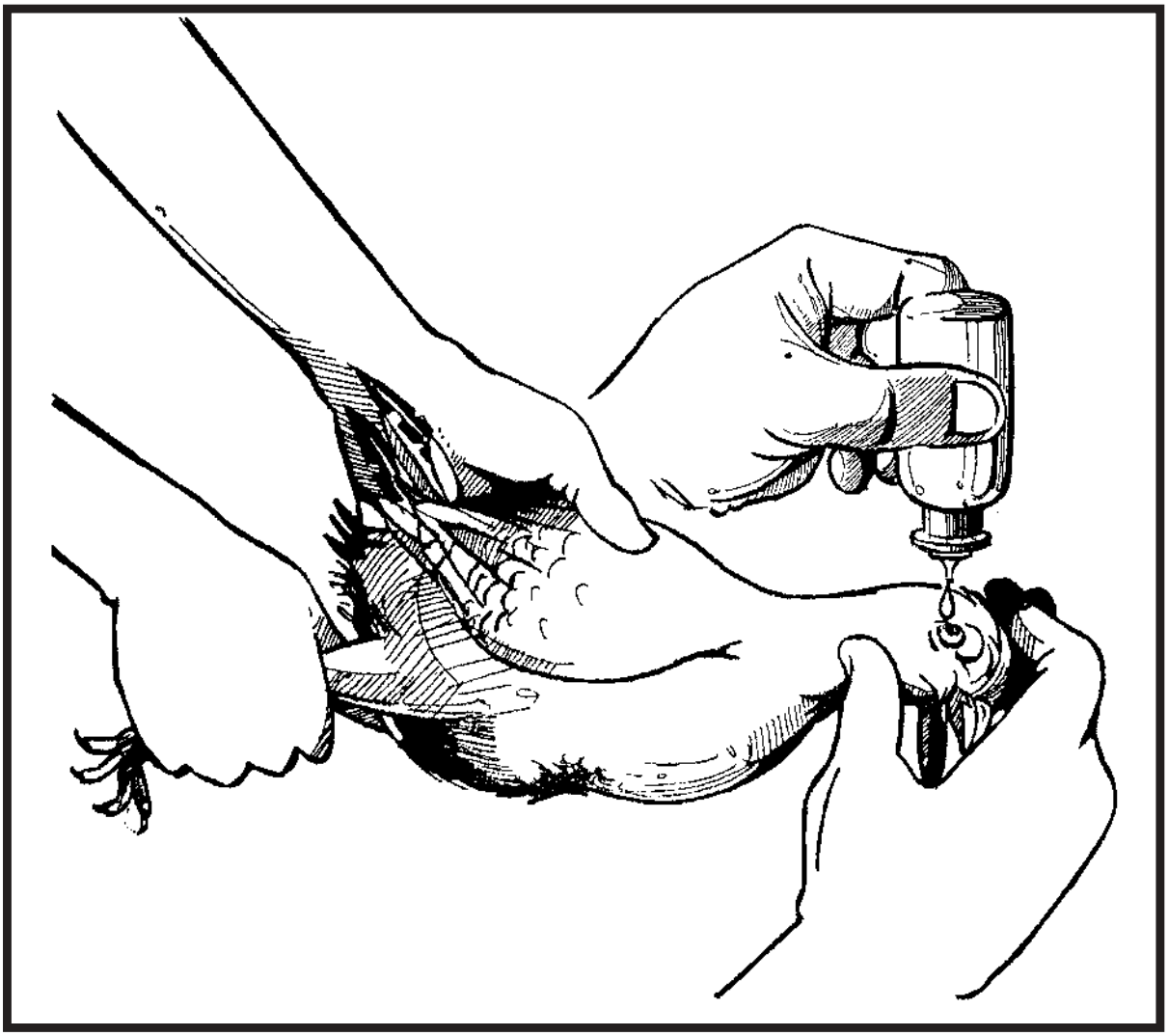


Figure 15: *Eye drop administration. When using an eye-dropper, hold it in a vertical position.*

— Ask participants to pull the plunger up to 5 mL and confirm that each participant has moved the plunger to the correct position (Figure 16A). Then, if you are using syringes with 0.2 mL divisions, ask participants to move the plunger to 5.6 mL (Figure 16B).

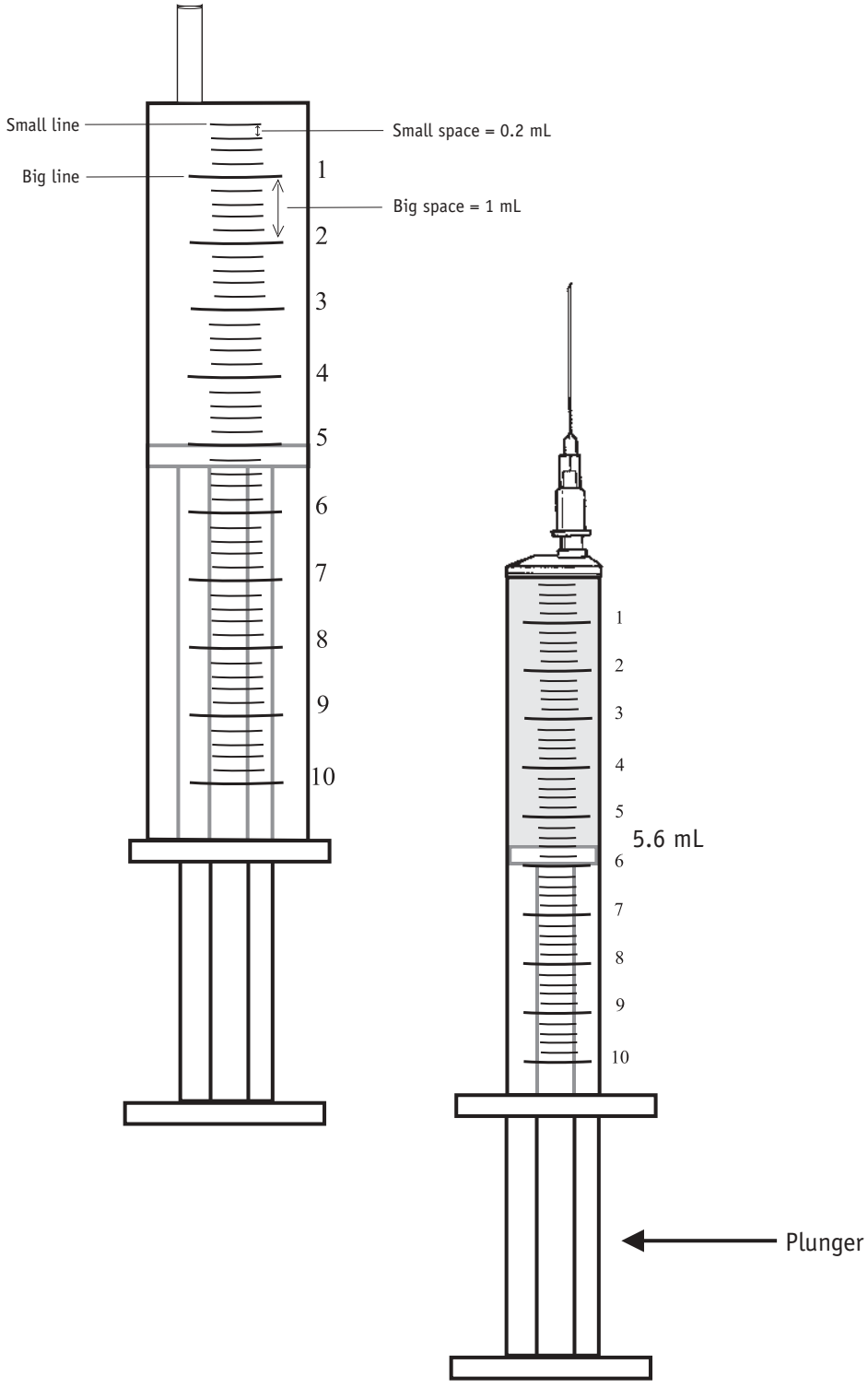


Figure 16: *Ten millilitre syringes, one with the plunger at the 5 mL mark (A) and the other at the 5.6 mL mark (B).*

The role of a needle and how to use it

NOTE: Needles are sharp and can hurt you and your family. It is possible to get the vaccine out of a vial without using a needle. If the participants have not worked with needles previously (e.g. if they are not trained as community livestock workers) it is best NOT to include needles in their kits.

- Give each participant a needle enclosed in its plastic cover.
- What shape is the needle? The plastic part of the needle is to attach the needle to the syringe. Practise this.
- The metal part of the needle is long and thin. The end of the needle is sharp and the tip has a slope on it to help the needle enter skin or other materials more easily. Can you see the slope at the end of the needle? (Figure 17)
- The plastic cover keeps the sharp end of the needle covered when the needle is not in use.
- Practise attaching the needle to the syringe and pulling water up into the syringe via the needle.

Figure 17: *A needle with a plastic part to attach it to a syringe and a long, thin metal part with a slope at the end.*

The role of an eye-dropper and how to use it

- Distribute an eye-dropper to each participant.
- Ask participants how many parts make up the eye-dropper?
- What does each part do?
- The base of the dropper holds liquid and the tip allows liquid to leave, drop by drop (Figure 18).

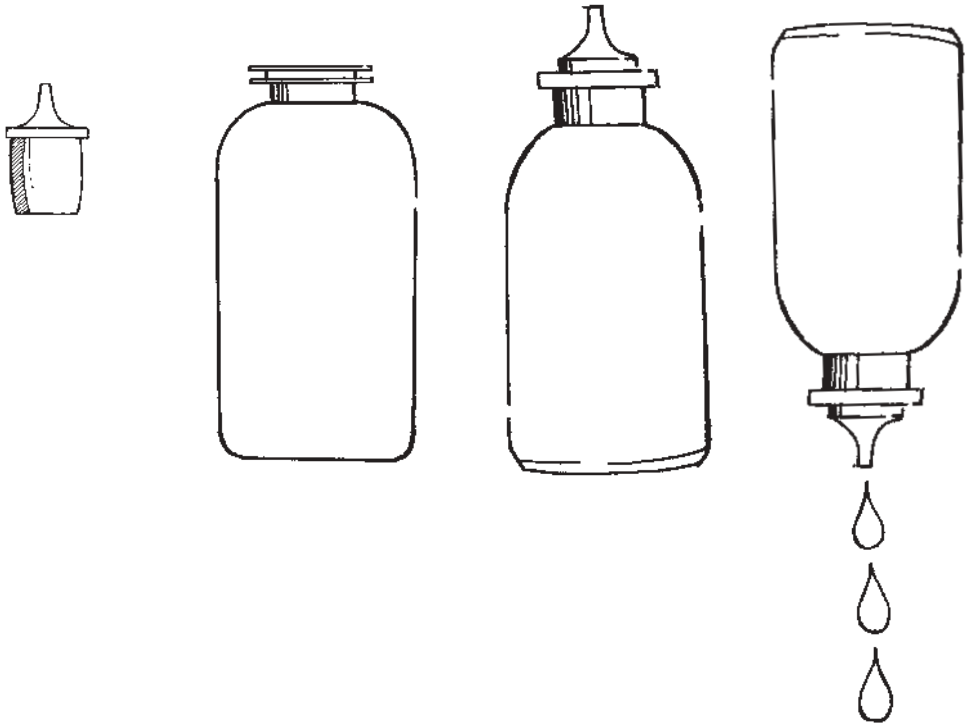


Figure 18: *A plastic eye-dropper consists of a part that holds the liquid and a tip that forms single drops.*

Eye-droppers produce drops of the same size when the droppers are held with the tip pointing straight down. The idea is to prepare the ND vaccine in such a way that every drop that leaves the dropper contains one dose of the vaccine. Freeze-dried vaccine will be mixed with water that has been especially prepared. 'Wet' vaccine usually arrives ready to use and does not require dilution.

Eye-droppers are made of flexible plastic, preferably with a removable tip, protected by a screw top cap (Appendix 4). A suitable eye-dropper should:

- hold a suitable volume of vaccine;
- not destroy the vaccine (use eye-droppers provided with the vaccine as these will have been tested to confirm that they do not harm the vaccine); and
- deliver drops of an appropriate size (as the eye of a chicken is small, the drop produced by the eye-dropper should also be small).

Human eye-droppers are not convenient for use in chickens. These often produce drops that are large compared to the size of a chicken's eye and splashing of the drop and wastage of the vaccine can occur.

This exercise is best done outside so that water does not make the floor wet.

— Ask participants to remove the tip of the eye-dropper, place a small amount of water into the dropper and then replace the tip.

— Turn the dropper upside down (so that the tip is pointing towards the ground) and squeeze the base gently between the thumb and forefinger.

— Participants should keep practising until they are able to make the drops come out one by one.

NOTE: Learning to use the eye-dropper is a very important part of the training. Vaccinators who are skilled at forming individual drops with their eye-droppers will waste less vaccine during the vaccination campaigns.

Discussion session

The first day is coming to a close. Ask the participants if they have any comments or questions about any of the topics discussed during the day.

Homework

1. Ask participants to prepare a presentation on the things they have learnt during the first day of training. Identify volunteers who are willing to present a summary of the first day's work at the start of the following day. Inform the group that each participant will be requested to make at least one presentation during the course.

   Presentations may include —

   — The characteristics of healthy and sick chickens.

   — The signs of Newcastle disease (present using the relevant pages of the ND flip chart.

   — How the ND virus causes disease.

   — How to work with farmers.

   — How to hold a chicken.

   — What is the role of a syringe?

   — What is the role of a needle?

   — What is the role of an eye-dropper?

2. Practise using the syringe, and assembling the eye-dropper and forming single drops of water with it.

3.3 — The Course Continues — Day 3

Summary of the day's training and materials required

Topics to be presented	Duration	Support material	Material for distribution
Session 5			
1. Revision of previous day's work	20 minutes	OHP or illustrated flip chart	None
2. Introduction to vaccines and how the chicken fights disease	20 minutes	OHP or illustrated flip chart	None
3. Controlling ND with vaccination	15 minutes	OHP or illustrated flip chart	None
4. Discussion about vaccine vial label	15 minutes	OHP or illustrated flip chart	None
Session 6			
1. Revise the use of syringes, needles, eye-droppers and vaccine labels	5 minutes	Syringe, needle and eye-dropper	None
2. How to hold an eye-dropper correctly	5 minutes	Eye-dropper	None
3. Calibration of an eye-dropper	25 minutes	OHP or illustrated flip chart	None
4. Opening and diluting freeze-dried vaccine	15 minutes	Syringe, needle and vaccine vial	One vaccine vial per participant
Session 7			
1. Preparing diluent	10 minutes	Blank flip chart	None
2. Storage and transport of vaccine	10 minutes	OHP or illustrated flip chart	None
3. Cost of ND vaccination	25 minutes	OHP or illustrated flip chart and blank flip chart	None
4. Payment options	10 minutes	OHP or illustrated flip chart and blank flip chart	None
5. Care of eye-droppers	5 minutes	OHP or illustrated flip chart	None
6. Dilution of vaccine and calibration of eye-droppers	15 minutes	None	None

Topics to be presented	Duration	Support material	Material for distribution
Session 8			
1. Control of an ND outbreak	15 minutes	OHP or illustrated flip chart	None
2. Housing and feeding of village chickens	10 minutes	OHP or illustrated flip chart	None
3. Presentation of extension package	20 minutes	Extension material, OHP	Extension material (e.g. illustrated ND control flip chart, calendar, etc.)
4. Discussion of the day's work	15 minutes	Blank flip chart	None
5. Homework	5 minutes	Blank flip chart	Basic instruction sheets on using the vaccine and organising a vaccination campaign

3.3.1 Session 5 — An introduction to vaccines and vaccination

Session objectives

1. To revise the work done the day before (participants).
2. To introduce vaccines and how the chicken fights disease.
3. To learn about the control of ND using vaccines.
4. To present a ND vaccine vial and identify the information contained on the vial label.

Revision by participants of work done the day before

Inquire if anyone has a question about the topics discussed the previous day.

Ask for three volunteers to present a summary of the topics covered in sessions 2, 3 and 4 of the previous day with each volunteer covering a different session. Encourage the volunteers to present the work as they would to farmers in their own village and ask the participants to ask questions or assist the volunteer where appropriate. These presentations should be fun so make sure that you put the volunteers at ease. These presentations help the trainer to learn whether the information presented in the sessions is being understood by participants. Such presentations may also help the trainer to gain a range of examples and stories that assist with the communication of particular topics.

An introduction to vaccines and how the chicken fights disease

Vaccines protect animals and people from getting diseases. They are for preventing diseases, not for treating or curing them. Ask the participants if they or their children have been vaccinated. What were the vaccines for?

Vaccines are different to drugs such as antibiotics that treat infections. A vaccine protects only against the particular disease that the vaccine is for. This means that the vaccine that we are using this week will prevent ND only and not other diseases.

NOTE: Ask participants to define the local word or phrase for 'vaccine' and the local term for 'drug' or 'treatment.' It is very important that the vaccinators and farmers have a clear understanding that a vaccine will prevent a particular disease, whereas a drug is used to cure an animal that is already sick.

When we talked about how ND is spread between birds, we mentioned that the disease is caused by a very small particle that we cannot see, called a virus. The vaccine that we are learning to use during this course is made of these same small particles but the particles in the vaccine are weak and not strong like the particles that cause the disease.

NOTE: The example given below to explain how a vaccine works should be understood in most areas and by people who have limited scientific knowledge about how disease occurs. If you think that the story below may not be well received in a certain area, then please prepare an alternative explanation before the training session.

Giving a vaccine to a bird is like training soldiers to defend an area. The chicken can be thought of as the land to be protected, the vaccine contains the soldiers and the ND particle (virus) is the enemy. The soldiers first have to practise how to fight and to learn about the enemy so that they can win the battle. When soldiers arrive in a new area that needs to be protected, they must establish their lines of defence and collect information about the enemy that is causing problems.

When we give the vaccine to the bird, the bird's defence system is trained to recognise the ND particle as the enemy and establishes lines of defence against it (Figure 19). It takes around 7 to 14 days for the chicken to develop these lines of defence. The next time that the bird encounters the strong virus, the defence lines are already in place and so the strong virus cannot take over the bird's body. The headquarters for the soldiers lies just behind the chicken's eye and so when the vaccine is given by eye-drop, most of it goes straight to this centre. This is the main reason why eye-drop administration causes such a strong protective response.

When soldiers stay in one place without seeing the enemy for a long time they may get lazy and think that the enemy is not going to attack. If the soldiers forget to maintain their lines of defence, then the enemy could attack and defeat the soldiers. It is the same with vaccine. If we do not re-vaccinate birds every 4 months (NOTE: some countries may prefer to re-vaccinate every 3 months), the birds' lines of defence against ND will get lazy and will be unable to fight the strong virus successfully.

This illustration (Figure 20) promotes the vaccination of chickens every 4 months.[2] Because chicks are always hatching, it is usual to vaccinate regularly to ensure that the young birds are protected as well as refreshing the level of protection in older birds. Confirm that the participants understand the calendar:

- It highlights the need to estimate the number of birds to be vaccinated and order the vaccine in advance,
- It stresses the importance of making sure that the vaccine is available for purchase in the areas where farmers live, and
- It highlights the months of March, July and November as the months when vaccination campaigns should occur. You may wish to alter these months to better fit the agricultural calendar in the area where the training is being conducted.

[2] Insert the interval appropriate to local recommendations.

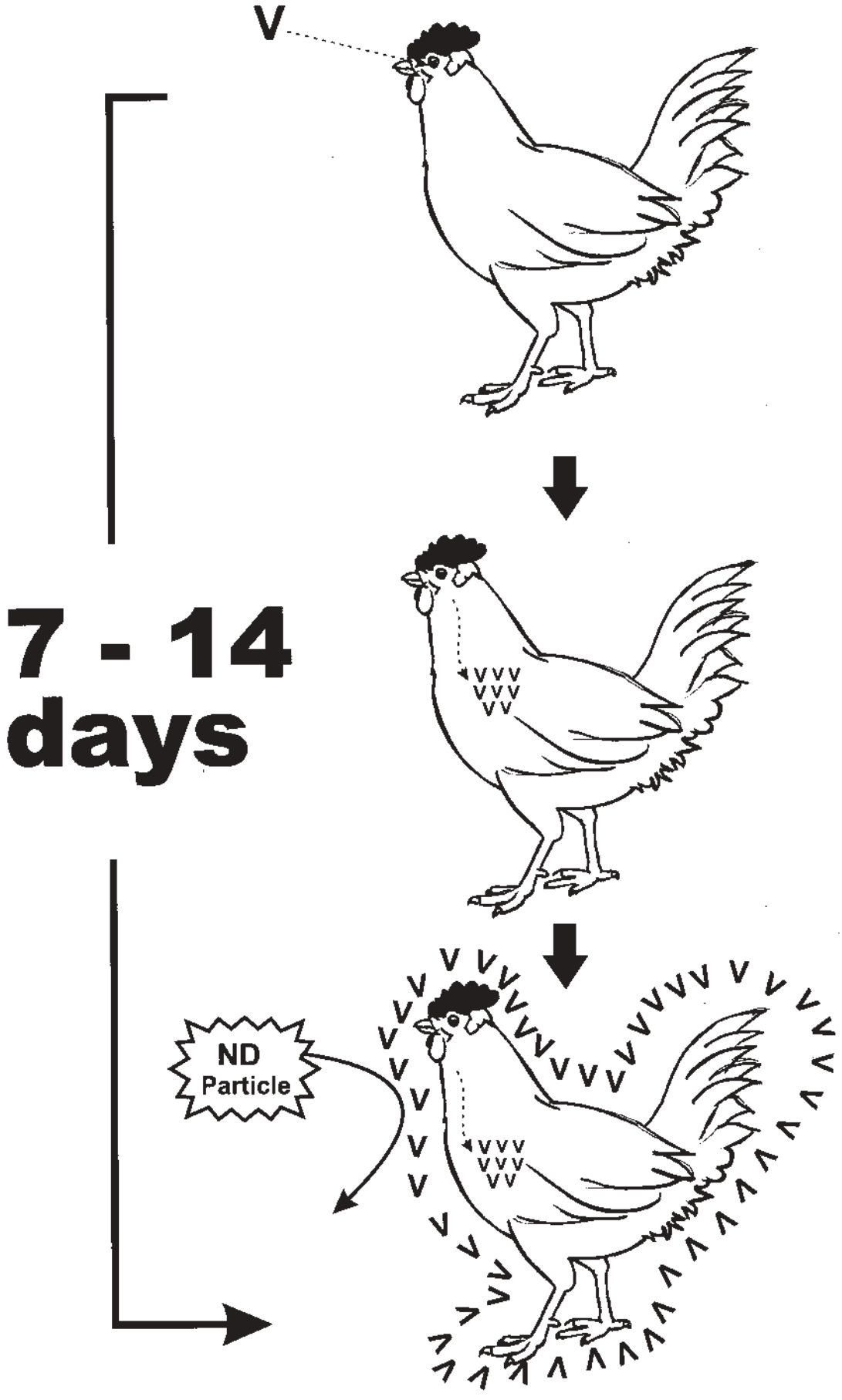


Figure 19: *After vaccination, it takes 7 to 14 days for a chicken to develop adequate protection against Newcastle disease.*

Revaccination

Calendar 2002

Count chickens
Order vaccine

January

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

May

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Vaccine available locally

February

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

June

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Vaccinate chickens

March

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

July

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

November

S	M	T	W	T	F	S
					1	2
3	4	6	5	7	8	9
10	11	13	12	14	15	16
17	18	20	19	21	22	23
24	25	27	26	28	29	30

April

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

August

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

December

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Figure 20: *For chickens to be constantly protected against Newcastle disease, they must be revaccinated.*

Vaccination of chickens

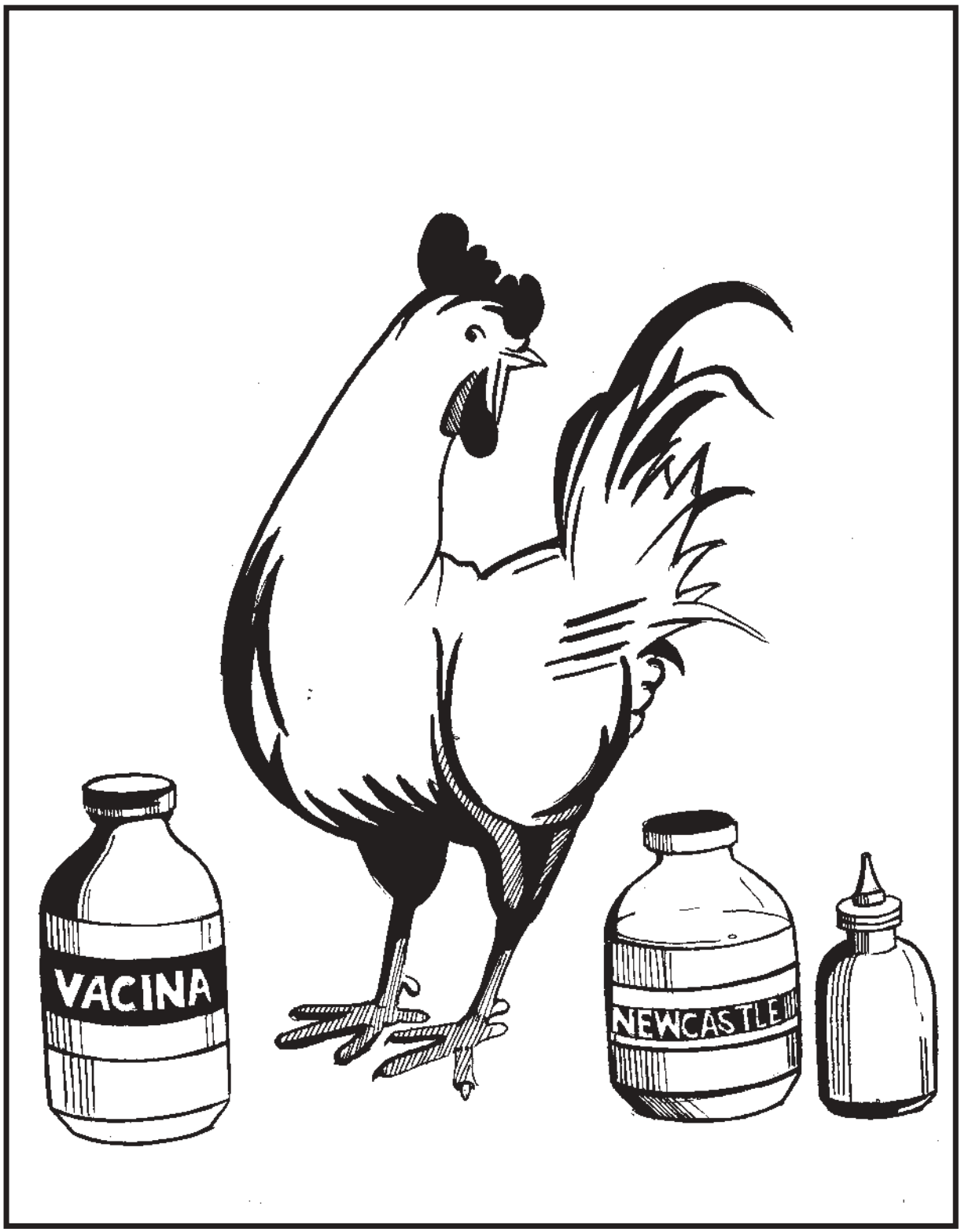


Figure 21: *Vaccination is the best way to control Newcastle disease in village chickens.*

Newcastle disease vaccines

ND occurs in many countries throughout the world. Over the years a number of different vaccines have been developed to prevent the disease. Some vaccines can be given by placing a drop in the eye of the bird, some via drinking water and some by injection. Most of these vaccines must be kept cold and will lose their effectiveness if left out of the refrigerator for more than a few hours.

When you get a vial of vaccine, always check that it is the one that you have been trained to use. This training session deals with a vaccine called I-2 (or NDV4-HR, or whatever the local name is for the vaccine you are using) and it is especially designed to cope with situations where it is difficult to keep vaccines cold. The I-2 vaccine in powder form (freeze-dried) can remain active for 2 months after being taken out of the refrigerator if kept in a cool, dark place. Once diluted, the freeze-dried vaccine should be used within two days. The 'wet' I-2 vaccine (i.e. vaccine that was not freeze-dried) can remain active for 2 weeks after leaving refrigeration.

NOTE: If you are using a vaccine other than the I-2 ND vaccine, make sure that you obtain all the necessary information from the manufacturer before the training session. People in the field need accurate information about the storage requirements and shelf life of the vaccine.

We recommend that you give the I-2 vaccine by eye drop as the bird makes a stronger defensive response when the vaccine enters via the eye. You could give the vaccine via drinking water but it generates a smaller defensive response. You also have to give the vaccine more often if you use drinking water and this makes it more expensive. There is also the problem that the more aggressive birds may drink more water resulting in the weaker birds receiving an inadequate dose of vaccine.

Farmers who have tried both eye drop and drinking water, prefer the eye drop method because —

- they know that the bird gets the vaccine,
- more birds survive an outbreak (8 out of 10 birds survive an outbreak when eye drop vaccination is used and only 6 out of 10 will survive after giving the vaccine via drinking water), and
- it is cheaper because birds are vaccinated 3 times a year and not the 5 times a year that is necessary with drinking water administration.

When working with freeze-dried I-2 or NDV4-HR vaccine the following dosage regime is recommended:

- **After diluting the vaccine,** use within two days according to the following guide:
  - — Day 1 ⇒ 1 eye drop per chicken (i.e. first day of vaccination campaign)
  - — Day 2 ⇒ 2 eye drops per chicken
  - — Day 3 ⇒ Throw away.

The ND vaccine vial and its label

The vaccine vial and label are very important. The label contains important information that will help you with your work (Figure 22). Each vaccine label should tell you —

- Who made the vaccine
- The name of the disease that the vaccine will prevent
- The type (strain) of vaccine
- How many doses are contained in each vial
- How the vaccine should be conserved
- That the vaccine is for use in animals only and not humans
- What batch number the vial comes from
- The date (month and year) after which the vaccine should no longer be used (expiry date)
- And sometimes, how the vaccine should be administered

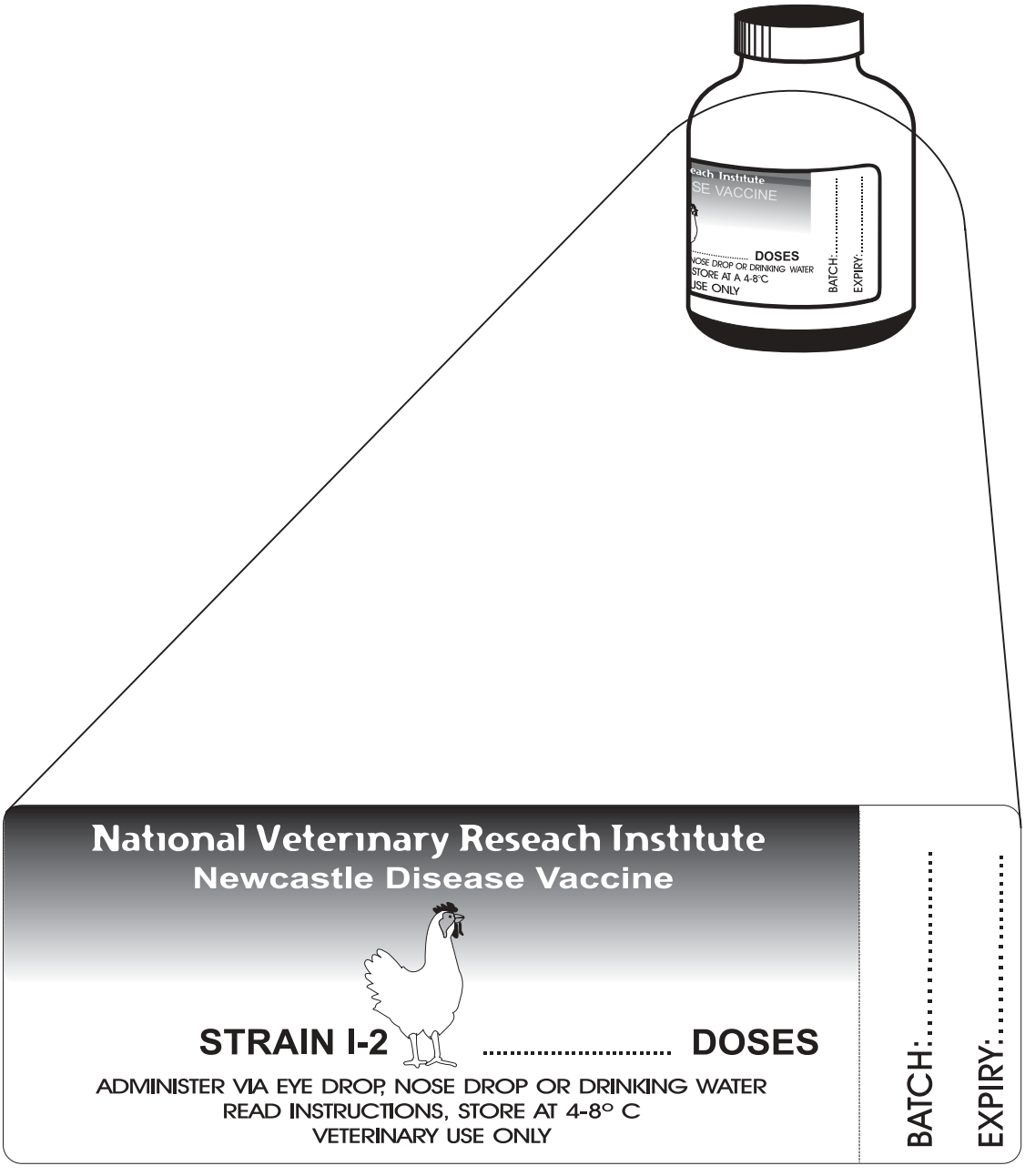


Figure 22: *The label on the vaccine vial contains very important information.*

3.3.2 Session 6 — Vaccination tools and their use

Session objectives

1. To revise the characteristics of a syringe, needle and eye-dropper.
2. To learn how to hold an eye-dropper correctly.
3. To learn how to confirm that your eye-dropper will deliver the correct number of drops.
4. To learn how to open and dilute a vial of freeze-dried vaccine.

Distribute one vial of the vaccine to each participant. Ask each participant to check that they can locate all of the information presented in the previous session on the label.

Ask for three volunteers to assist with the revision of the characteristics of a syringe, needle and eye-dropper. Ask each volunteer to explain to the group the characteristics and function of each of the items. The group should assist the volunteers when necessary and ask questions if something is not clear.

How to hold an eye-dropper correctly

Remind participants once again that eye-droppers will produce drops of a uniform size only when held vertically (i.e. held straight with the tip of the eye-dropper pointing to the ground, Figure 15).

Encourage them to experiment holding the eye-dropper at different angles while noting the form and size of the drop that leaves the dropper.

How to confirm that your eye-dropper will deliver the correct number of drops

The volume of liquid used to mix with the freeze-dried vaccine, or to dilute liquid vaccine, will depend on the size of the drop that is formed by the eye-dropper. It is best to use an eye-dropper that produces more than 40 drops per mL.

Each new batch of eye-droppers should be checked (calibrated) to ensure that chickens receive the correct dose of vaccine.

This method is ideal for people less familiar with syringes and mathematical calculations. It is better if two people work together.

1. Check the vaccine label to determine the number of doses per vial.
2. Remove the tip of the eye-dropper (Figure 23, step 1), fill the eye-dropper with water (step 2) and replace the tip (step 3).
3. Remove the plunger from a 10 mL or 20 mL syringe (step 4) and hold the syringe vertically with the tip down. The tip should be closed with a finger or a thumb (step 5).
4. Hold the eye-dropper vertically, squeeze the eye-dropper very gently and count the drops as they fall into the syringe (step 6). Continue counting until the number of drops equals the number of doses contained in the vaccine vial. Many people find it easier to count the drops in groups of ten and record the number of groups. For instance, for a 250 dose vial, count 25 groups of 10 drops to give a total of 250 drops. Working in pairs, people count to 10 and then make a mark on the ground (Figure 24A). Or each pair can prepare a list of numbers from 1 to 25, and cross out a number each time they count a group of 10 drops (Figure 24B).

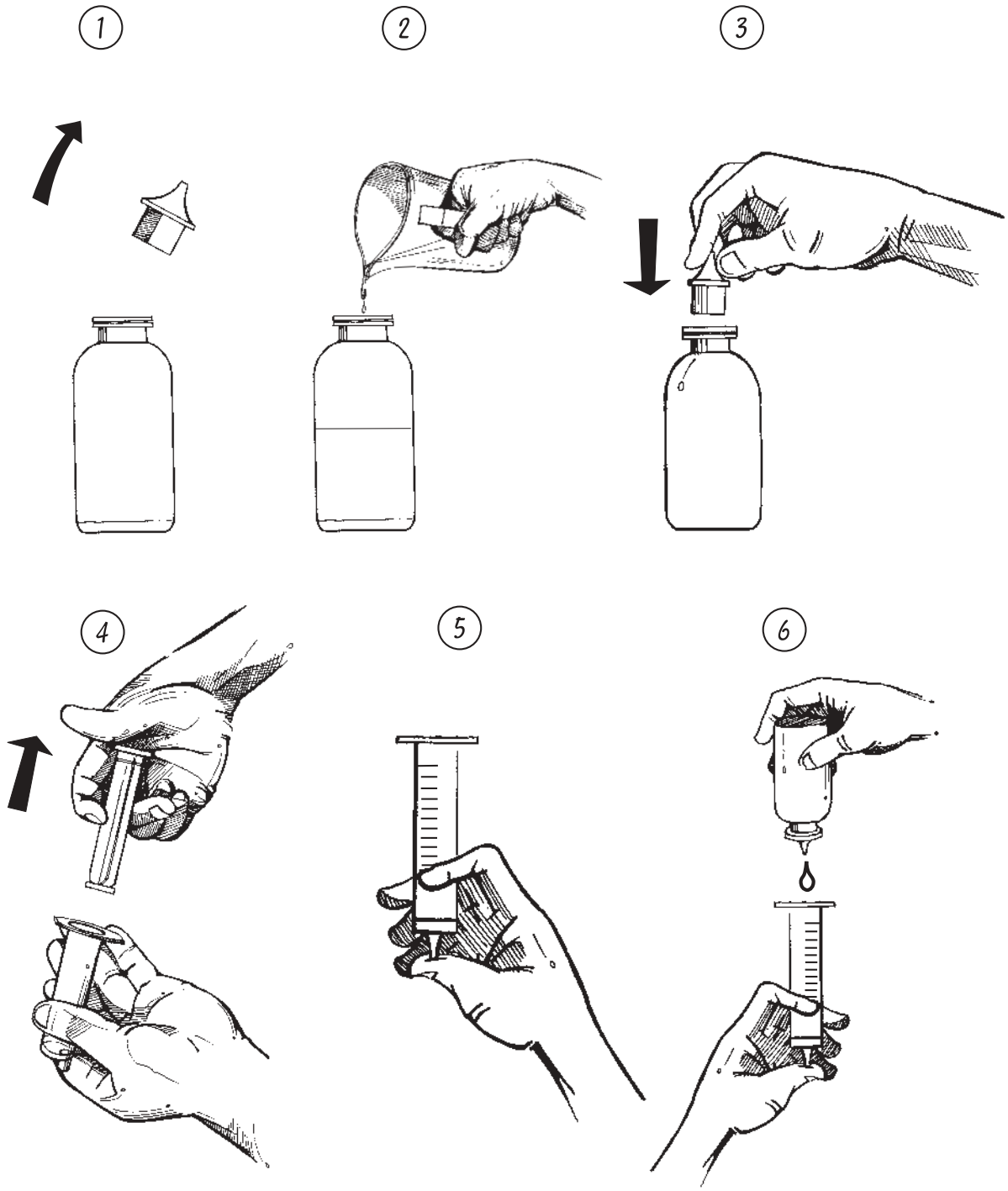
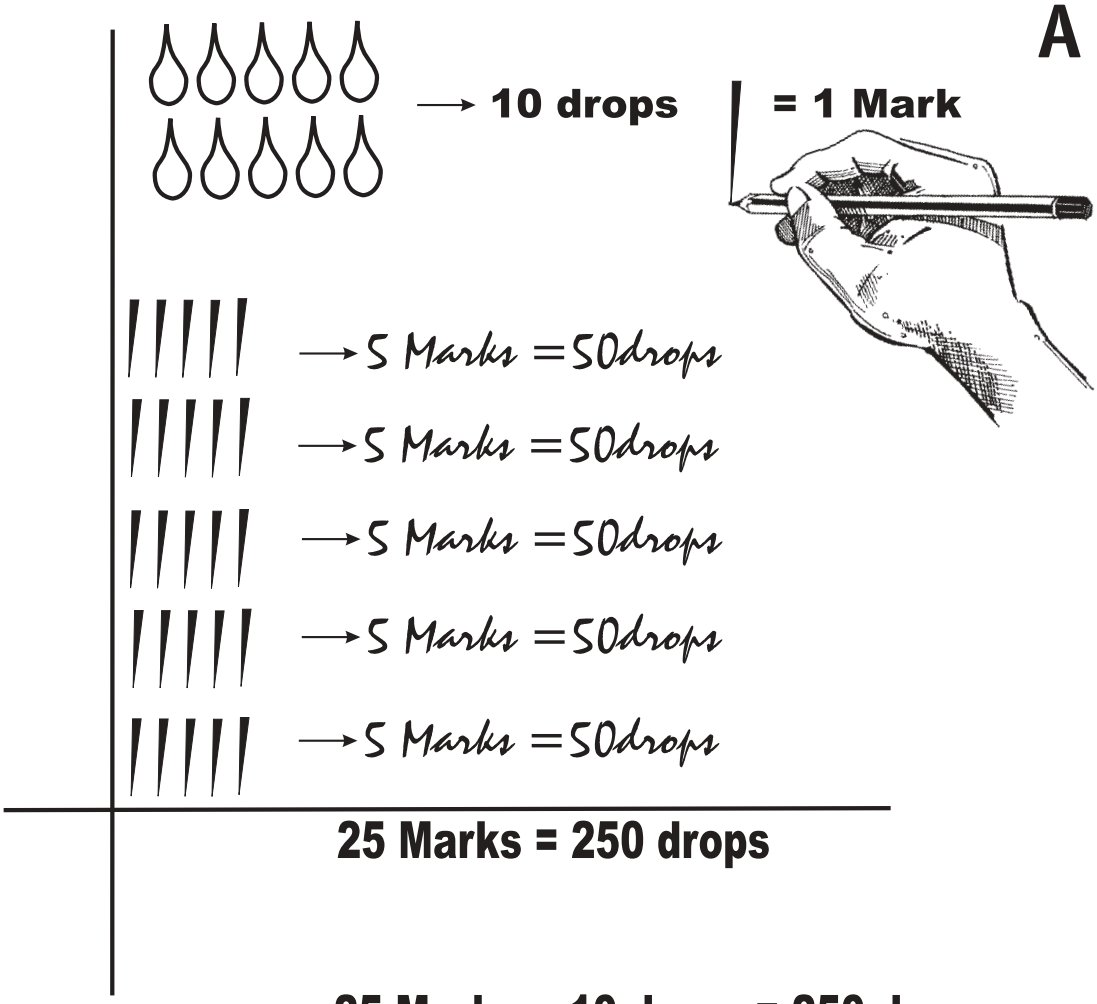


Figure 23: *Illustration of a method used to confirm that an eye-dropper will deliver the correct number of drops after diluting the vaccine.*

5. Hold the syringe vertically and check the level of the water against the marks on the syringe. This is the volume required to dilute the vaccine.
6. Once everyone has agreed on the volume of water required to dilute the vaccine, ask the participants to make a small scratch in the plastic of the syringe that runs parallel to the line that corresponds to that volume. This scratch will indicate the volume required to dilute the vaccine once the black lines have worn off the syringe.

If it is necessary to use glass eye-droppers with a rubber bulb, this method of calibration can be used. However, glass eye-droppers produce very big drops and for this reason, are not recommended.

A



B

Each number represents 10 drops, e.g.
1 = 10 drops
2 = 20 drops
Cross out one number each time you count 10 drops until all 25 numbers have been crossed out.

~~1~~ ~~2~~ ~~3~~ ~~4~~ ~~5~~ 6 7 8 9 10 11 12 13 14 15
16 17 18 19 20 21 22 23 24 25

50 drops counted

Figure 24A + B: *Different ways of confirming that you have counted 250 drops.*

How to care for plastic eye-droppers

To ensure a long life for eye-droppers, they must be cleaned and stored correctly after use. Do not allow vaccine to dry out in the eye-dropper.

1. Wash in cool, clean water only. Do NOT use hot water.
2. Do not use treated tap water. If you only have access to treated tap water, it is advisable to let it stand overnight to allow the chlorine to evaporate.
3. Do not use soap or disinfectants as they will kill (inactivate) the vaccine virus.
4. Do not clean the tip of the eye-dropper with anything hard that will cause damage.
5. Do not force anything into the tip of the eye-dropper that will enlarge the opening.
6. Allow the eye-dropper to dry thoroughly and then wrap in a dry clean cloth.
7. Store away from direct sunlight and sources of heat, and rats and mice!

How to open and dilute a vial of freeze-dried vaccine

NOTE: Before you open a vial of vaccine which has been prepared under vacuum, check that the stopper on top has a slight depression in it (Figure 25). This means that the vaccine vial still has a vacuum inside (i.e. no air inside) and that the vaccine powder is still in good condition (if air gets inside it can reduce the effectiveness of the vaccine).

Some commercial vaccines are stored under dry nitrogen and not vacuum. In this case, as the pressure is the same on both sides, there is no depression in the stopper. Ask your vaccine supplier whether the vaccine is stored under vacuum or with nitrogen.

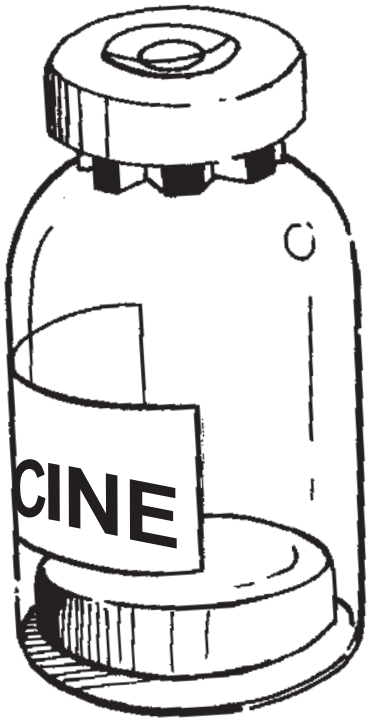


Figure 25: *When the stopper on the top of the vaccine vial is slightly depressed, it shows that the vial has no air (a vacuum) inside.*

There are two ways to get the vaccine out of the vaccine vial.

1. Using a needle and a syringe

1. Firmly attach the needle to the syringe and take the cap off the needle.
2. Draw some or all of the water to be used to dilute the vaccine into the syringe via the needle.
3. Remove the metal circle at the top of the vaccine cap and push the needle, with the syringe still attached, through the middle of the ring on the top of the rubber stopper.
4. If the vaccine vial has been correctly stored, then the vacuum in the vial should pull some of the liquid in the syringe into the vial without any pressure from the operator (Figure 26).

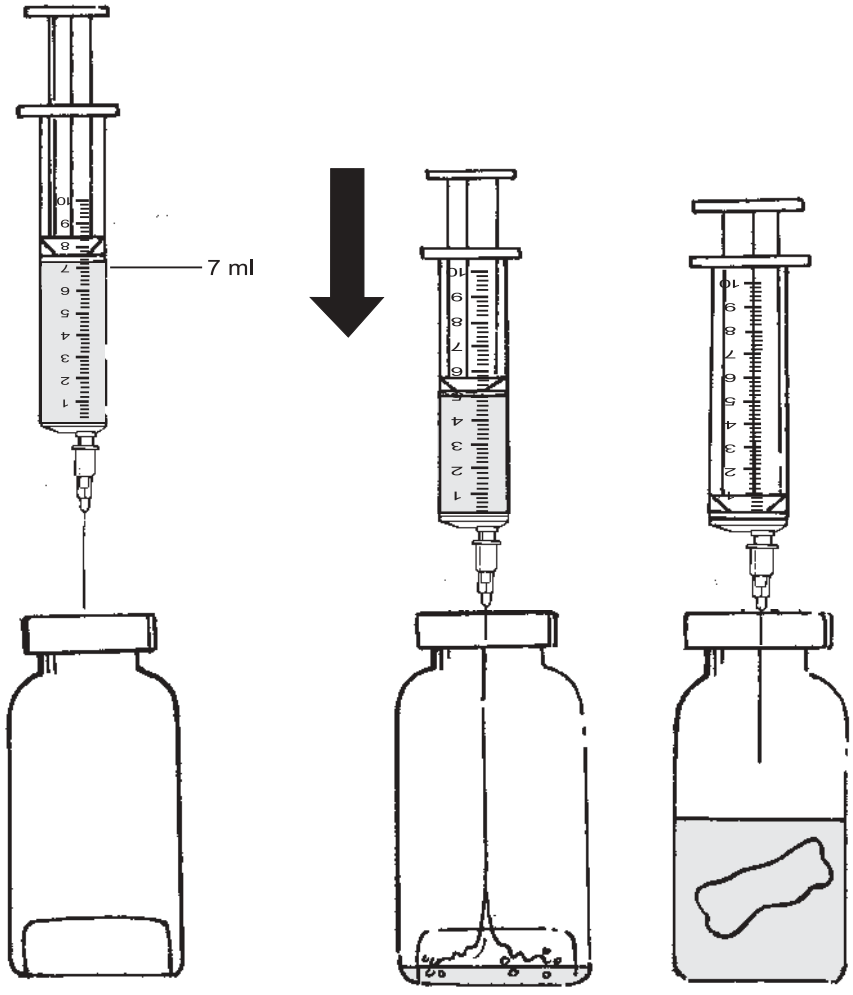


Figure 26: *When diluting vaccine, a vial with a vacuum inside will appear to pull some of the liquid in the syringe into the vial.*

5. Once part of the liquid has gone into the vial, pull on the plunger on the syringe a little and then push all of the liquid into the vial.
6. Take the needle and syringe out of the vial and gently mix the vaccine and water together by moving the vial from side to side. Do NOT shake the vaccine with a lot of force. You should mix the vaccine gently without creating many bubbles in the liquid.

7. Add a small amount of air to the syringe by withdrawing the plunger, push the needle and syringe into the vial again and push the air into the vial.
8. Turn the vial upside down. Gently withdraw the diluted vaccine into the syringe by pulling on the plunger of the syringe. The tip of the needle should be inserted only a small distance beyond the stopper to ensure that most of the liquid can be withdrawn.
9. Remove the needle from the syringe and gently push the diluted vaccine into the eye-dropper.

2. Using a knife and a syringe

1. Confirm that the vaccine powder is on the bottom of the vial.
2. Holding the vial upright, use the knife to cut the metal band holding the rubber stopper in place. Take the metal band off. Do not throw it on the ground. Carry it with you until you can dispose of the band safely.
3. You should now be able to remove the rubber stopper easily from the top of the vial.
4. Always keep the stopper in a safe, clean place as you will need to put it back into the vial once you have added the water to dilute the vaccine.
5. Use the syringe to add the correct amount of water to the vial.
6. Put the rubber stopper back into the vial, place your thumb on the rubber stopper to hold it in place, your big finger on the bottom of the vial and gently move the vial from side to side until the vaccine is completely dissolved in the water. Do NOT shake the vaccine with a lot of force. You should mix the vaccine gently without creating many bubbles in the liquid.
7. The diluted vaccine can then be poured directly into the eye-dropper.

NOTE: Remind the participants that the vaccine should be diluted in the shade, i.e. away from direct sunlight.

NOTE: If you are using vials containing out-of-date vaccine for the training course, inform the participants that the vaccine being used in the practical sessions is not real, i.e. they should not be tempted to save the vials for use on their own chickens at home.

3.3.3 Session 7 — Working with I-2 ND vaccine[3]

Session objectives

1. To learn how to prepare water to dilute freeze-dried vaccine.
2. To learn how to store and transport the ND vaccine.
3. To discuss the costs involved in the purchase and use of ND vaccine.
4. To discuss ways of receiving payment for the vaccination of chickens.
5. To practise for a second time diluting the ND vaccine and the calibration of the eye-dropper.

[3] Insert the name of the vaccine you will be using.

Preparing water to dilute freeze-dried vaccine

1. Boil local drinking water and leave it to cool in a covered container. Ask participants to discuss where they obtain their drinking water from at home.
2. Do NOT use metal containers to store water. What containers can be used? It is best to use clean plastic or glass containers.
3. Wash the container and its lid with clean water first. Do NOT add detergent to the washing water.
4. Make sure that the container is covered or sealed once the water that was boiled previously has been added to it.
5. Do NOT use treated tap water because the chemicals (chlorine) will destroy the vaccine (if no other water is available, let the tap water stand overnight to allow the chlorine to go away).

Storing and transporting the freeze-dried vaccine

1. This vaccine can keep its activity even if it stays outside the refrigerator for some weeks but you must not let it be exposed to sunlight or get hot!
2. The vaccine also does not like to get very cold. So, do NOT freeze the vaccine. Do NOT put it into areas where ice forms.
3. If you can place the vaccine in a refrigerator (4 °C), the vaccine will last until the expiry date on its label, if it has not been diluted.
4. Outside the refrigerator, the undiluted vaccine will last for two months if stored in a cool (28°C or less), dark place. At 37°C, the vaccine remains active for two weeks only. In villages, consider placing the vaccine vial near the base of a clay water pot that is kept in a clean, dark place (Figure 28). The vaccine should also be stored in a way that prevents children from playing with it.
5. Always transport the vaccine in the field using a cool box and ice pack if they are available.
6. If you do not have a cool box, wrap the vial in a damp cloth and carry it in a covered open-weave basket (to keep it cool and away from sunlight; Figure 27).

Figure 27: *A covered, open-weave basket with a damp cloth inside is a good way to transport thermostable vaccine in the field.*

Conservation of vaccine

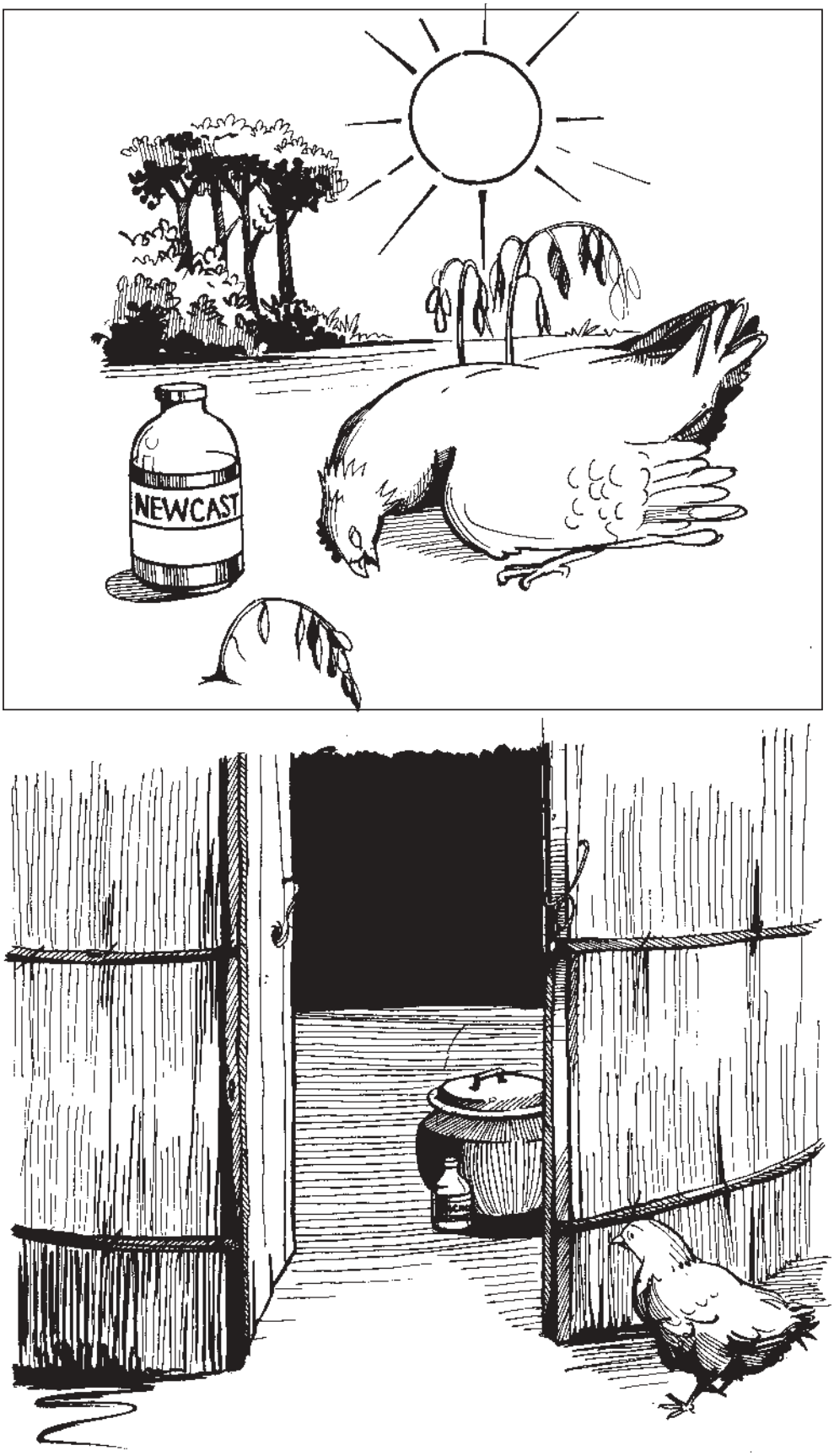


Figure 28: *Vaccine must be stored away from direct sunlight, in a cool, dark place.*

Determining the field vaccination price

The price of vaccinating a chicken against ND in the field is equal to the cost of:

- the production or importation of the vaccine,
- its distribution (i.e. transport and storage costs) and
- charges involved with administration of the vaccine.

It is useful for community vaccinators to have a basic understanding of the costs associated with an ND control program based on vaccination. Two sets of calculations are given below. The first set of calculations is detailed and may be of more use to those supervising the ND control program. The second set of calculations is very simple and will help vaccinators to see how vaccinating more chickens will increase their profits.

Set 1: Detailed cost calculations

The calculation is performed as follows.

Price of vaccinating 1 chicken = **Price of one dose of vaccine against ND** + **Charges for administration**

The price of one dose of vaccine is calculated in the following way:

$$\textbf{Price of one dose of vaccine against ND} = \frac{\textbf{Price of one vial of ND vaccine}}{\textbf{N° of chickens to be vaccinated}}$$

Labour charges for administration of the vaccine may vary depending on the time and effort required and the level of expertise or seniority of people involved. For instance, a vaccinator may charge more per bird if he/she has to travel to individual houses rather than meeting farmers at a central vaccination point.

Ask the participants to make a list of all the costs involved in vaccinating birds against ND. Once you have the list, work out the cost of vaccination.

The price of vaccination can be reduced if the vaccinator combines his/her trip to collect the vaccine from the distribution point with other activities. For instance, the vaccine will usually be available in towns and so the vaccinator could deal with other business during the same trip. This way the transport costs involved in the trip will not all have to be added on to the price of vaccination.

For example:

Item	Cost per item ($)	Cost per year ($) for 3 campaigns	Cost per campaign ($)
One vial of vaccine containing 250 doses	1.30	3.90	1.30
One 10 mL syringe	0.10	0.10	0.03
One eye-dropper	0.65	0.65	0.22
Woven basket and cloth for transporting the vaccine	1.00	1.00	0.33
Record book and pen	0.50	0.50	0.17
Transport to buy the vaccine and bring it back to the village*	1.30	3.90	1.30
Labour charge to vaccinate 250 birds (Labour charge per bird)	1.25 (0.005)	3.75 (0.015)	1.25 (0.005)
Total	6.10	13.80	4.60

* Full price of trip is $2.60 but only half the price is shown because the assumption is that other business activities will also be done on the same trip.

NOTE: Only the vaccine and the transport require more money for each new campaign. If the other items are cared for well, they will last for more than one year. Remember that the vaccinator's own birds should also be included in the calculations.

Price of 250 doses of vaccine = $1.30

Labour charges per bird = $0.005

Other costs = $2.05 (syringe, eye-dropper, basket and cloth, book, pen and transport)

Question:

What price should a farmer pay per chicken when a vial of 250 doses of ND vaccine costs $1.30 and the vaccinator plans to vaccinate 130 birds travelling from house to house.

Price of one dose of vaccine against ND = $\frac{\text{Price of one vial of ND vaccine}}{\text{N° of chickens to be vaccinated}} = \frac{\$1.30}{130}$

= **$0.01 (1 cent)**

Administration costs per bird = $\frac{\text{Other costs + labour*}}{\text{N° of chickens to be vaccinated}} = \frac{\$2.05 + 0.65^*}{130}$

= **$0.02**

(*Labour costs = Charge per bird x N° of birds to be vaccinated
$0.005 x 130 birds = $0.65)

Price of vaccinating 1 chicken = **Price of one dose of vaccine against ND** + **Charges for administration**

= **$0.01** + **$0.02 = $0.03 (3¢) per chicken**

Set 2: Simple cost calculations

If vaccinators use all the doses in a vial containing 250 doses, they should receive the following payment —

250 birds vaccinated x $0.03 per chicken = $7.50

After paying for the vaccine, vaccinators should have the following amount —

$7.50–$1.30 = $6.20

This amount covers the vaccination administration fee and will also cover the cost of a new eye-dropper or basket whenever it is necessary to replace these items.

NOTE: If you think that these calculations are too difficult to perform in the field, it may be best to recommend that all chickens in the same area be vaccinated for one uniform and well-publicised price.

Emphasise once again to the participants that the amount of money that the vaccinator will make from vaccinating other people's birds is not a lot. The main benefit to the vaccinator comes from vaccinating his/her own birds and then using the remaining doses in the vial to vaccinate birds belonging to others nearby. The amount charged for administration per bird should cover all additional expenses so that the vaccinator can buy a new eye-dropper, etc. when necessary.

Using the above calculations the vaccinator will cover costs by using only half the doses in the vaccine vial. If the above vaccination charges are used and the vaccinator manages to vaccinate more birds, then the small profit stays with the vaccinator.

Method of payment

There are many different ways of receiving payment for vaccination. Discuss and list the various options suggested by participants that may be acceptable in the area where the vaccinators will be working.

NOTE: Some payment possibilities may be:

Farmers to pay in cash on the day of vaccination. With this option, the vaccinators will need to arrange some coins to facilitate the giving of change to farmers or they will need to record the change owing to farmers. The change owing may be written down as credit for the farmers so that the amount is deducted from the amount to be paid during the next vaccination campaign.

Farmers to pay in-kind. Instead of paying cash, farmers may provide the vaccinator with a chicken or some eggs or some other product. The monetary value of the product should be determined so that all agree that the exchange is fair. If the value of the product is greater than the amount owing for the vaccination, it can be recorded as a credit to the farmer so that he or she pays less during the next vaccination campaign. In the end this option will make more work for vaccinators as the product received will need to be sold or bartered by the vaccinators to get money or a desired product.

Farmers to pay a deposit. In some areas it may be possible to encourage farmers to provide an indication of their willingness to participate in ND vaccination campaigns throughout the year by paying a deposit to the vaccinator at the start of each year. The amount paid to the vaccinator should be recorded and the amount of the deposit remaining would be calculated after each vaccination campaign. This would decrease the need to provide change on the day of vaccination and would also help the vaccinators plan ahead because they would know which farmers wanted to have their birds vaccinated in advance.

Vouchers. Vouchers can be used to encourage the participation of poor farmers in certain circumstances. Farmers who participate in a group meeting on ND vaccination are given a voucher. The voucher is given to the community vaccinator after vaccinating the farmer's birds and the vaccinator gets paid on presentation of the voucher to the organising agency.

Practical session

Diluting freeze-dried vaccine

The dilution of the freeze-dried vaccine is a critical step in the vaccination procedure. To ensure that the participants have a sound understanding of this procedure, ask them to practise diluting the vaccine again (see session 6).

Determining the volume of water needed to dilute the vaccine

It is also very important that the vaccinators understand how to determine the volume of water required to dilute the vaccine correctly. Repeating this exercise not only helps the vaccinators to understand the procedure better, it also gives them a chance to practise using these new instruments (see session 6).

Interval

3.3.4 Session 8 — Extension materials for ND control and other disease control measures

Session objectives

1. To discuss the ways to control an outbreak of ND.
2. To present general advice concerning village chicken production such as the provision of good housing and supplementary feed.
3. To demonstrate the range of extension material available to assist vaccinators.
4. To discuss any comments or questions that participants may have about any of the topics discussed during the day.
5. To present the homework to be done by participants overnight.

General husbandry advice

What to do during and after an outbreak of ND?

As well as administering ND vaccine to control ND, we can use some general disease control practices to reduce the spread of the disease. It is best not to buy chickens from the markets or neighbouring villages at the times of the year when ND outbreaks are more common (Figure 29).

When chickens show signs of illness, they should be separated from other healthy birds (Figure 30). Emphasise once again that once chickens become sick, they should not be vaccinated. Ask the participants if many village chicken farmers in their areas will have two chicken houses? If they do not, ask the participants to come up with other ways of separating sick chickens. Always ensure that the sick chickens have water and food available nearby should they wish to drink or eat.

When a chicken dies from ND, ask the participants what they normally do? Advise them that when a chicken is very sick, it is best to slaughter it. Do not carry the chicken into another area that is free of the disease. The slaughtered bird should be burned or buried. If for any reason, the whole bird cannot be burnt or buried, then the parts of the bird (e.g. bones, feathers, etc) that have not been used should be burnt or buried (Figure 31).

NOTE: Do not recommend that farmers eat sick (or dead) birds, but remember that in some areas, animal protein is in such short supply that families will feel forced to slaughter and cook sick birds. In these cases, it is important that the families know how to reduce the spread of the disease by the parts of the bird that were not used.

After birds have died from ND, farmers should wait 30 days after the last bird died before introducing new birds. The Newcastle disease particle should be destroyed after 30 days. You can assist this process by ensuring that all manure from the sick birds is removed and the chicken houses cleaned thoroughly. The disease particle can survive for several months inside clumps of bird manure.

The importance of good housing for chickens

Providing good housing for chickens can reduce the risk that diseases, including ND, will spread from bird to bird. At the top of Figure 32, a small chicken house built on the ground is shown. This type of housing is used for hens with young chicks.

Do not introduce new birds during outbreaks

Figure 29: *Do not bring new birds to farms during outbreaks of Newcastle disease.*

Separate sick chickens from healthy chickens

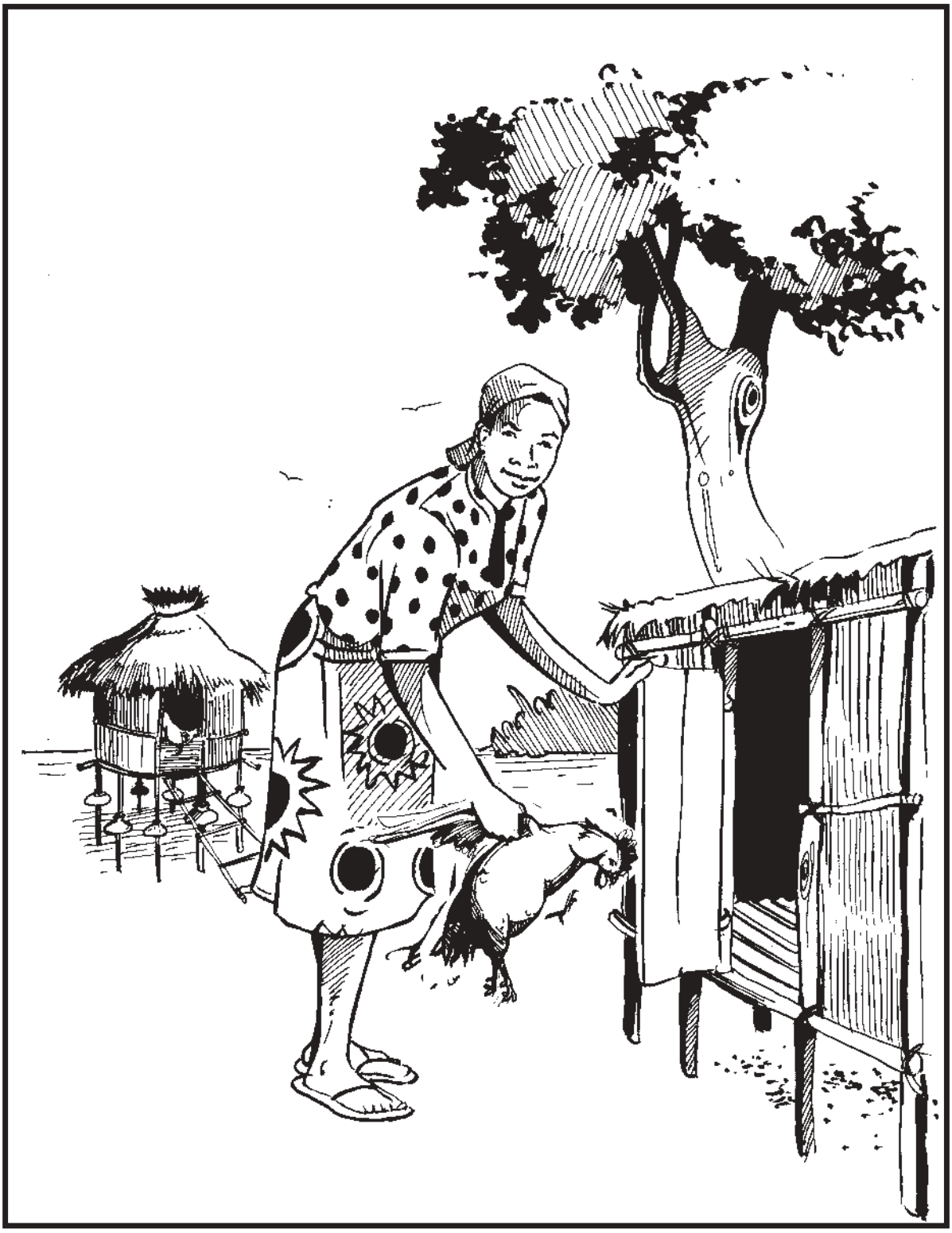


Figure 30: *Sick chickens should be separated from healthy chickens.*

Discard infected material carefully

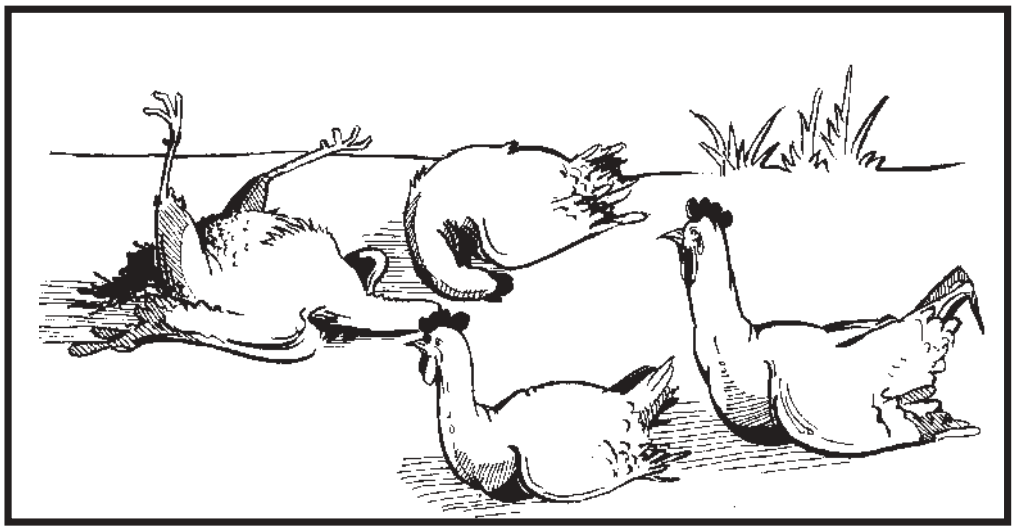


Figure 31: *Dead birds must be disposed of carefully to stop the disease spreading to new areas.*

Good housing

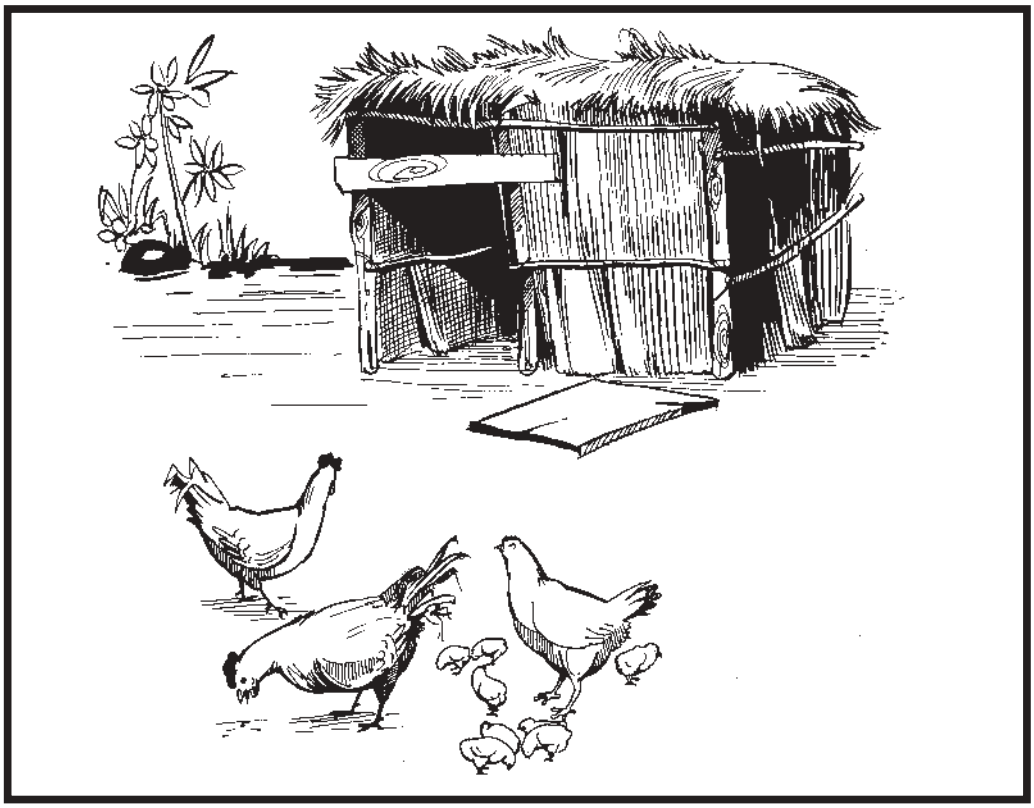


Figure 32: *Appropriate housing for young and adult birds can reduce the risk that disease will spread from bird to bird and also protect birds from predation.*

The door to the house is big enough so that the floor can be regularly cleaned (on a daily or at least a weekly basis). The house is built from local materials and should be burnt and rebuilt whenever birds show signs of ill health or external parasites appear.

The elevated chicken house shown at the bottom is suitable for adult birds. The floor slats allow manure to fall through and so prevent birds from coming in contact with it. The house should have good ventilation and inverted metal cones on the legs that will prevent the entry of predators such as rats, snakes, etc.

Always remove the bark from timber used to construct the houses so that external parasites such as ticks and mites will have nowhere to hide. Place ash on the floor and walls of the houses after cleaning as this will also discourage external parasites.

The importance of good nutrition (especially for chicks)

The health of chickens can be improved if they eat well. This means that birds need adequate quantities of good quality feed. This is very important for young chicks that sometimes have to walk a long way to find something to eat. By placing small pieces of food, such as leftover food, maize meal, worms, green leaves, ants and termites under a cover (creep feeder) that only the chicks can enter, they can have a good meal without the hen eating too much (Figure 33). This reduces the amount of food that needs to be provided by poor families.

Always make sure that the chickens have access to water. When possible, offer the birds clean fresh water.

Healthy well-fed birds will also respond better to vaccination.

The last image in the flip chart (Figure 34) is to remind farmers and community vaccinators that they should always consult the veterinary or extension services when they have a question about raising village chickens.

Presentation of extension material

Vaccination campaigns against ND will be more successful if farmers understand that a ND vaccine exists and that it WILL protect most birds that have been vaccinated with it. In many areas, the idea of vaccinating chickens will be very new and farmers may be reluctant to believe that such technology exists. It is very important that vaccinators and extension workers take time to inform farmers about ND and how it can be controlled well before of vaccination campaigns begin.

To help vaccinators and extension workers raise the awareness of farmers, a range of extension materials about the control of ND has been developed. Some of the material is for use by the vaccinators themselves, while other material can be used to prepare newspaper articles and/or radio programs, etc. If information about controlling ND reaches farmers from a range of sources (e.g. radio, newspapers), they will be more likely to accept the information provided in their local area by the vaccinator or the extension worker.

Good nutrition

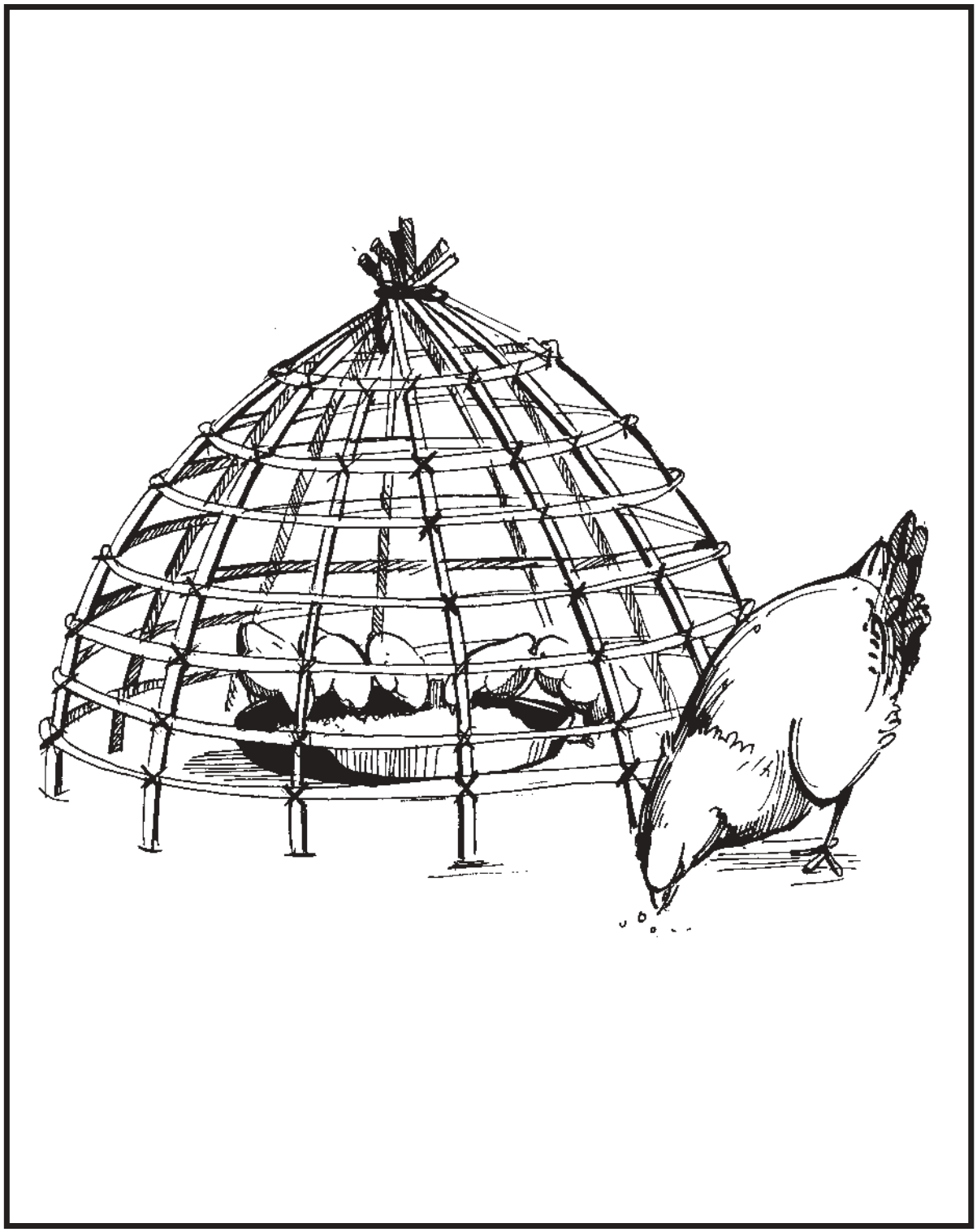


Figure 33: *A creep feeder for chicks.*

Any questions? Ask the Veterinary or Extension Services

Figure 34: *It is important for farmers to know from whom they can obtain more information.*

Material available includes:

A flip chart — an illustrated A3 booklet, with clear, largely self-explanatory line drawings and an accompanying narrative can be prepared using the illustrations included in this manual (Appendix 1.1). It can be used for training and in the field, with farmers, to explain the characteristics of the vaccine and its application. Prepare the flip chart using the local language if at all possible.

Radio programs — radio dramas and question and answer sessions recorded in Portuguese and four Mozambican languages. Radio programs are very useful because they are broadcast in local languages and reach many people no matter what their literacy skills.

A poster — a large black and white line drawing of a rooster, ND vaccine vials and an eyedropper is included in this manual (Appendix 1.3). The poster provides space for the local vaccinator to write the venue, date, time and contact person for the next ND vaccination campaign.

A pamphlet — prepared to provide an introduction to ND and its control. It is printed on both sides of an A4 sheet and is easily reproduced. It is useful for front line extension staff, literate farmers, farmers' associations and school children. (Appendix 1.4)

A drama piece — was developed by a local theatre group with experience in community development after visiting one of the vaccine field trial sites in Mozambique. This piece runs for 20 minutes and covers most aspects of ND control including the need to vaccinate before chickens get sick and to pay for the vaccine. As the drama's text is included in the Portuguese version of the ND field manual it can be used, in the form of role-plays, during the training of extension workers and community vaccinators. Role plays developed and performed by participants are encouraged during training sessions.

A vaccination calendar — this 2002 calendar (Appendix 1.5) highlights the months in which vaccination campaigns should be implemented, prompts vaccinators to get their orders for vaccine in well before the campaign begins and reminds distributors when they should have the vaccine in stock. Your vaccination calendar should be prepared after studying the pattern of ND outbreaks in the local area. More details concerning how to determine ND outbreak patterns may be found in 'Controlling Newcastle disease in village chickens: a field manual' (Alders and Spradbrow 2001).

Distribute copies of the available extension materials to all participants.

Discussion session

The second day is coming to a close. Ask the participants if they have any comments or questions about any of the topics discussed during the first two days.

Homework

1. Ask participants to read the information contained in the sheets dealing with the use of the I-2 vaccine (Appendix 5) and the organization of vaccination campaigns (Appendix 6) as well as the extension material that was just distributed to them. This information will be discussed tomorrow in more detail and participants will design a vaccination campaign to be used in their own areas.
2. Tomorrow participants will practise vaccinating chickens. At the same time, they will compare different ways of transporting the vaccine to the vaccination site. Ask participants to bring along the containers in which they would like to carry the vaccine. Also make sure that the farmers who have agreed allow the vaccinators to practise vaccinating their birds are reminded not to let their birds out before the group arrives.
3. Practise three times how to determine the volume needed to dilute the vaccine. Ask the participants to write down each volume that they get.
4. You may wish to set some questions for them to work on overnight, particularly if you are concerned that some participants are not keeping up with the course. Review the answers to the questions the next morning. For example:

Questions	Section in this manual where answers can be found
What are the signs of a healthy chicken?	Section 3.2.3
What are the signs of a sick chicken?	Section 3.2.3
What is a syringe and what do you use it for?	Section 3.2.4
What is an eye-dropper and what do you use it for?	Section 3.2.4
How should you care for your eye-dropper?	Section 3.3.2
How do you check that your eye-dropper will deliver the correct number of drops?	Section 3.3.2
How should you store and transport the vaccine?	Section 3.3.3
How will you tell farmers about the ND vaccine and the vaccination campaign?	Section 3.4.2
Should you vaccinate a sick chicken?	Section 3.2.3
What type of chicken housing would you recommend?	Section 3.3.4
What type of additional feed would you recommend for village chickens?	Section 3.3.4
What would you do once a ND outbreak has started on your farm?	Section 3.3.4
What is the price to vaccinate one chicken?	Section 3.3.3

3.4 — Bringing it all together — Day 4

Summary of the day's training and materials required

Topics to be presented	Duration	Support material	Material for distribution
Session 9			
1. Revision of the previous day's work	20 minutes	OHP or illustrated flip chart	None
2. Compare containers for transporting vaccine	10 minutes	Various vaccine transport containers, cotton cloth, 0–50°C thermometers	None
3. Practise speaking with farmers	5 minutes	None	None
4. Practise diluting vaccine	10 minutes	Vaccine vial, syringe, needle and eye-dropper	None
5. Practise vaccinating chickens	15 minutes	Vaccine and eye-dropper	None
Session 10			
1. Record keeping	10 minutes	OHP or illustrated flip chart	One vaccination registration sheet to each participant (Figure 36)
2. Price list preparation	10 minutes	OHP or illustrated flip chart; or blank flip chart and felt pens	None
3. Raising the awareness of farmers	15 minutes	OHP or illustrated flip chart; blank flip chart and felt pens	None
4. Planning a vaccination campaign	30 minutes	Blank flip chart and felt pens	None
5. Prepare role plays	5 minutes	None	None
Session 11			
1. Present role plays	30 minutes	None	None
2. Self-monitoring by vaccinators	20 minutes	Blank flip chart and felt pens	None
3. Practise diluting vaccine and using eye-droppers	20 minutes	None	None
Session 12			
1. Discussion of all aspects of course	15 minutes	None	None
2. Prepare annual work plan	25 minutes	Blank flip chart and felt pens	None
3. Evaluation of course by participants	15 minutes	OHP or illustrated flip chart; or blank flip chart and felt pens	None.
4. Recommendations by facilitator	5 minutes	Blank flip chart and felt pens	None
5. Presentation of certificates	5 minutes	None	Certificates of participation
6. Closing ceremony	10 minutes	Material needed will depend on the seniority of the person performing the closing ceremony	None

3.4.1 Session 9 — Vaccinating chickens

Session objectives

1. Participants to revise work done the day before.
2. To compare the temperatures inside containers brought by participants to transport the vaccine in the field.
3. To practise speaking with village chicken farmers about ND control.
4. To practise opening and diluting a vial of freeze-dried vaccine.
5. To practise vaccinating chickens.

NOTE: You may want to change the order of activities in this session depending on how the participants are to practise vaccinating birds. If you are in a village, it may be best to arrange to vaccinate the birds early in the morning and then come back to the classroom afterwards to revise the work done on the previous day.

Revision by participants of work done the day before

Inquire if anyone has a question about the topics discussed the previous day.

Ask for four volunteers to present a summary of the topics covered in sessions 5, 6, 7 and 8 of the previous day with each volunteer covering a different session.

Practical session — vaccinating chickens

During this session, we will practise speaking with village chicken owners, vaccinating chickens and compare the effectiveness of the vaccine transport containers presented by participants.

Comparing vaccine transport containers

The number of containers to be compared will depend on the number of thermometers that you have. For instance, if you have three 0 to 50°C thermometers, ask participants to choose the three containers that they would like to test. Provide each of the owners of the containers with a vial of vaccine and ask them to wrap the vaccine vial together with the thermometer in a damp cloth and place them in the containers. If it takes you about 20 to 30 minutes to reach the vaccination site, then you can check the temperature on arrival. Otherwise, you can leave the containers in the sun near to your classroom and check the temperature in each container on your return from vaccinating the birds.

The best container is one that protects the vaccine vial from sunlight and keeps the vaccine as cool as possible (Figure 35).

Table 3 below demonstrates the result of an experiment conducted in Gurué District in the Zambezia Province of Mozambique. The suitability of three potential vaccine transport containers was compared. The containers tested were an open weave grass basket with a lid, a cotton carry bag and a small backpack made from synthetic material. A vial of vaccine and a thermometer wrapped together inside a damp cotton cloth (the cloth is called a *capalana* and is the traditional wraparound skirt worn by women in Mozambique) were placed inside each container. The containers were then placed in the sun and the internal temperatures read at hourly intervals.

Table 3: *A comparison of internal temperatures in three vaccine transport containers over three hours.*

Time	Grass basket	Cotton bag	Backpack
0 hours	25°C	25°C	25°C
1 hour	23°C	28°C	31°C
2 hours	23°C	28°C	35°C
3 hours	24°C	29°C	39°C

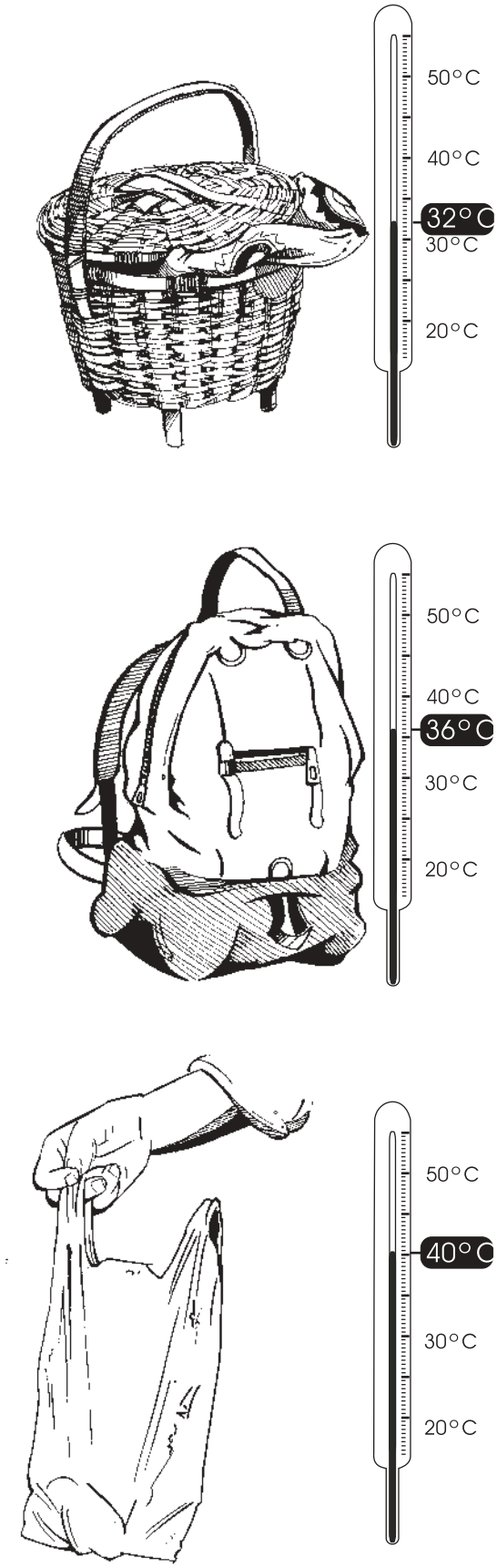


Figure 35: *Thermometers can be used to check internal temperatures of possible vaccine transport containers to assist with selection in areas where cool boxes and ice packs are not an option. Covered open-weave baskets (A) with the vaccine wrapped in a damp cloth inside usually provide the coolest environment. Closed synthetic backpacks (B) and plastic bags (C) are not suitable. The temperatures shown were recorded after carrying the containers in the field for 20 minutes on a sunny 35°C day (Alders and Spradbrow 2001).*

Speaking with farmers

- Always be polite.
- Ask the farmer if all of his/her birds are in good health.
- Ask the farmer to help hold the birds for vaccination if necessary and show him/her how to hold the bird with the head to one side so that you can easily administer the eye drop.
- Check that the farmer understands that the vaccine will protect against ND only.
- Mention that birds in poor condition or infested by parasites may not respond well to the vaccine.
- Remind the farmer that birds should be revaccinated every 4 months.[4]
- Let the farmer know that you will pass by again after the vaccination to check that everything is going well and to plan for the next campaign.
- Birds may be eaten immediately after vaccination if necessary.
- Ask the farmer if he/she has any questions.
- Record the farmer's name, the number of birds raised and number vaccinated.

Vaccinating chickens

- Dilute the vaccine and place it in the eye-droppers.
- Examine each bird to make sure that it is healthy before you vaccinate it.
- Vaccinate the birds away from direct sunlight, e.g. in the shade of a tree.
- Try to have as many birds available as possible so that participants can practise administering the eye-drop many times.
- Rinse the eye-droppers and syringes after use and allow them to dry.

NOTE: The I-2 and NDV4-HR vaccines are harmless to chickens and so birds can receive a dose many times above the recommended dose without risk. If you are not using the I-2 or NDV4-HR vaccines, then it may be best to administer water rather than diluted vaccine if there are only a few birds available for this session

3.4.2 Session 10 — Mobilising farmers and selling your vaccination service

Session objectives

1. To learn how to record vaccination details including the owner's name, number of birds vaccinated and payment received.
2. To learn how to prepare a price list that indicates the payment required to vaccinate from 1 to 40 chickens.
3. To present ways of raising the awareness of farmers about ND control prior to running a vaccination campaign.
4. To discuss how a vaccination campaign is planned in collaboration with the community.
5. To divide participants into groups that will prepare short role plays about different situations that may be encountered by vaccinators in the field.

[4] Insert the interval appropriate to local recommendations.

Keeping records

By keeping good records, participants will be able to see if they are working effectively.

Distribute a copy of the vaccination registration sheet and ask participants to comment on its contents (Figure 36).

This sheet contains the information that the vaccinator should record in his/her own exercise book. The sheet is to be filled in by the person supervising the vaccinators and the information it contains will help local authorities to monitor the progress being made in the area.

To help reduce the amount of work that vaccinators have to do on the day of vaccination, it is suggested that the vaccinators write a vaccination price list into the front of their exercise books. Use the local currency when doing this exercise with participants. An example is given in Table 4.

Table 4: *An example of a list of prices for vaccinating 1 to 10 and then 20, 30 and 40 birds.*

No. of chickens	Price of Vaccination
1 bird	$0.03
2 birds	$0.06
3 birds	$0.09
4 birds	$0.12
5 birds	$0.15
6 birds	$0.18
7 birds	$0.21
8 birds	$0.24
9 birds	$0.27
10 birds	$0.30
20 birds	$0.60
30 birds	$0.90
40 birds	$1.20

If you are unable to provide correct change to farmers, arrange a way to repay the money owning at a later date or give them credit for the following campaign. The amount of credit owing to particular farmers can be recorded in the 'Comments' column of the registration sheet.

NOTE: It may be useful if the local veterinary authority prepares vaccination price list on letterhead paper for the vaccinators to carry in the field. This official list can be used by the vaccinators to prove to farmers that the prices being charged are the official prices.

Insert name of agency responsible for supervision of ND control activities —
Newcastle disease control in village chickens
Registration of farmers and chicken numbers

Block: _____ District: _____ Type of vaccine and method of administration:_____

Vaccination campaign: ___1 ___ 2___3 ___ Vaccinator: _____

Date	Name of farmer	Sex	Village	Total N° of chickens owned	N° of chickens vaccinated	Payment	Comments

Figure 36: *An example of a form used to register farmers' names and the number of birds vaccinated.*

Planning an extension campaign to raise awareness about ND and its control through vaccination

This is a very important part of the training course. The trainer must work as a facilitator to help the participants develop an extension strategy that is cost-effective, based on available resources, socially acceptable and promotes communication with village chicken farmers.

Try to ensure that the vaccinators and their supervisor use a range of methods. For example,

- The extension workers and vaccinators might like to develop their own role play that they perform during community meetings to facilitate discussions.
- The vaccinator or the extension worker might present the ND flip chart and have an open discussion afterwards.
- Farmers may join together with vaccinators or extension workers to listen to the radio at times when messages dealing with ND control are broadcast.
- Mobile loud hailers may be used to alert farmers that the vaccination campaign will take place the following day or that it has already started.
- The extension worker might talk about ND control at the local primary school or other locations where people meet.
- Vaccinators might like to visit farmers house by house after a general community meeting has been held to assess the level of interest and to answer specific questions that farmers might have.

Planning a vaccination campaign with community participation

Ask the participants to list the activities necessary to implement a vaccination campaign. Write the suggestions down and divide them up according to when they are done: one month before, one week before, one day before, and the day of vaccination. Make sure that the activities listed below appear on the plan.

How many doses of vaccine?

Estimate village chicken numbers and if farmers are expected to pay for the vaccine, estimate the number of farmers who may be willing to pay. This will enable vaccinators to order an appropriate quantity of vaccine.

When to vaccinate

- Decide in consultation with farmers. Consider weather conditions, the farmers' weekly and annual work plan and the pattern of ND outbreaks.
- Begin campaigns at least one month before the season when ND outbreaks are more common. Remember that birds need one to two weeks to develop a strong defensive response to the vaccine.
- Campaigns are frequently best held during the weekends or school holidays. The skill and energy of children to help with catching and holding chickens is invaluable.
- Postpone the vaccination campaign if it is suspected that an outbreak of ND is in progress. As we learnt yesterday, chickens do not look sick until a few days after the ND virus has entered their bodies. Therefore, you cannot always tell which birds have already come into contact with the ND virus. If you vaccinate birds that already have the ND virus inside, the bird will die and farmers may think that it was your vaccine that killed them.

Where to vaccinate

- Decide, in consultation with farmers, where their birds should be vaccinated:
  - — at home with the vaccinator doing house-to-house visits, or
  - — at central vaccination points, for example at village meeting centres.

Visiting the homes of individual farmers is more work for vaccinators but it decreases the risk of transmission of diseases between birds owned by different farmers and also decreases the likelihood that birds will escape into an unknown area. Farmers may be willing to pay a little more for the vaccination of their birds if the vaccinator agrees to visit their home. This possibility should be discussed before vaccination day.

What will vaccinators need?

- Make sure that they know where to get
  - — the vaccine, of appropriate quality and quantity,
  - — an eye-dropper,
  - — a registration book and pen or pencil to record farmers' names, number of birds vaccinated and payment received,
  - — an appropriate container to transport the vaccine in,
- Make sure that they always check ahead of time that the materials are available.

NOTE: Easy access to the vaccine is critical to the success of ND vaccination campaigns. It is pointless having trained community vaccinators who are unable to obtain the vaccine. Distribution of the vaccine by local structures — such as the Government Veterinary Services or private pharmacies — must commence in the early phases of the project. While it is tempting for project staff to deliver the vaccine to community vaccinators, this approach will prevent the development of sustainable distribution systems.

Activities for the day before the vaccination campaign starts

- Check the volume required to dilute the vaccine (see section 3.3.2)
- Practise forming single drops with the eye-dropper using clean water and not vaccine.
- Prepare water for diluting the vaccine and leave to cool overnight in a plastic or glass container with a lid.
- Arrange small coins to provide change to farmers if payment is to be made by farmers on the day of vaccination.

What support should be provided by supervisors?

Make sure that extension workers and livestock officers are aware of the part that they should play in this process. The supervisor may not always be present on vaccination day, but they should be sure that the vaccinators have everything they need to do the vaccinations. Supervisors should arrange to meet with vaccinators after each campaign to discuss the successes and problems they encountered.

Role play

Role plays can help participants to prepare for situations that they may encounter during the vaccination campaigns.

Role playing

Role playing involves asking participants to act out some scene or situation. Role playing allows participants to think about issues that are likely to be raised during field work, and to develop appropriate ways of dealing with them while still in a safe, non-threatening environment. It is also a good way to get people participating and break down inhibitions.

A role play is like a very short play, acted by the participants. Each of the players is given clear instructions as to who their character is, and what position or attitude they have. The players then act out the play, making up the dialogue as they go along. Usually, a role play involves some sort of conflict or disagreement, that the actors need to resolve.

Cameron (1999)

Ask the participants to divide into three or more groups (either they can form their own groups or the trainer can ask the participants to number off from 1 to 3, with all participants who were number one joining the same group, etc). Ask each group to prepare a play during the next interval. The play should last for 5 to 10 minutes and present one or more of the following topics:

- A farmer presenting a sick chicken for vaccination.
- A farmer that wants his/her chickens vaccinated but does not want to pay.
- A vaccine distributor or extension worker or livestock officer informing the vaccinator that the vaccine has not arrived in time to start the vaccination campaign.

Interval — participants should use this time to prepare their various drama pieces.

3.4.3 Session 11 — Signs of success

Session objectives

1. To present the role plays prepared during the interval by the participants.
2. To discuss how a vaccinator can be sure that his/her work controlling ND is going well.
3. To practise again the dilution of the ND vaccine and use of an eye-dropper.

Presentation of role plays

After each presentation, encourage everyone to discuss the play and to come to a group decision as to the best way to solve the problem presented.

How community vaccinators can be sure that their work is going well

Ask participants to contribute to a list of the ways they will know that their work as community vaccinators is going well. The list should include:

- no complaints from farmers whose chickens were vaccinated;
- an increase in the number of chickens per family/household that vaccinated their chickens;
- farmers continue to participate in subsequent vaccination campaigns;
- new farmers present their chickens for vaccination at each campaign;
- most of the doses in the vaccine vial are used; and

- payment received from farmers for the vaccination of their chickens is sufficient to buy vaccine for the following campaign and to cover any transport, equipment or labour costs involved.

How extension workers and supervisors can be sure that their work is going well

It is important that extension workers and their supervisors also evaluate the ND control program. Ask extension workers to make a list that will help them evaluate their work. Once the program has been underway for at least one year, the following should be evaluated.

- All of the above criteria for community vaccinators; and
- Percentage of community vaccinators continuing to vaccinate chickens;
- Number of new community vaccinators trained or number of farmers requesting training as community vaccinators;
- Change in the numbers of vaccine vials being distributed;
- Change in the frequency of ND outbreaks;
- Degree of confidence that farmers have in the extension workers;
- Village chicken production should be evaluated at the household level to confirm that the number of chickens has increased, home consumption of chickens and eggs has increased and the sale of chickens and eggs has increased.

Practical session

Repeat one last time the dilution of the vaccine and use of the eye-dropper. Participants may like to work in pairs and to pretend that one is the farmer and one the vaccinator so that they can also practise conversing with farmers.

3.4.4 Session 12 — Looking ahead

Session objectives

1. To discuss any comments or questions that participants may have about any of the topics discussed during the course.
2. To prepare a work plan for the vaccinators and their supervisors.
3. To evaluate the course (participants).
4. To make final recommendations to vaccinators (trainers).
5. To present the certificates of participation.
6. To thank all those involved with the training and officially close the course.

This is the final session of the training course. Ask the participants if they have any questions or comments about any of the topics discussed during the course.

Go back to the list of training objectives discussed at the start of the course. Go through the list and confirm that each objective has been successfully achieved.

Annual work plan

Assist the vaccinators and their supervisors to construct a program of activities over the coming year. The first month in this plan need not be January, it will be selected according to local conditions and the time of the year when the training course is held. Ensure that the list includes coordination meetings between vaccinators and their supervisors as well as field work (Figure 37).

Monthly activities	1	2	3	4	5	6	7	8	9	10	11	12	
Month (write name)	A*	S	O	N	D	J	F	M	A	M	J	J	
Training	X												Everyone
Raise awareness of farmers		X	X										Vaccinators, Extensionists
Count the number of chickens to be vaccinated		X				X				X			Vaccinators, Extensionists
Order vaccine		X				X				X			Vaccinators, Extensionists, District and Provincial Livestock distributors, Central distributor
Distribute vaccine			X				X				X		Central distributor, Provincial and District distributors
Vaccination campaign				X				X				X	Vaccinators, Extensionists.
Campaign report	X				X				X				Vaccinators, Extensionists, District and Provincial Supervisors
Send left over vaccine to central laboratory for testing	X				X				X				District and Provincial distributors, central distributor/laboratory
Monitor vaccinated chickens	X				X				X				Vaccinators, Extensionists

* In this example the training session occurred in August and activities were to start in the same month.

Figure 37: *An example of an annual work plan.*

Evaluation session

1. **Evaluation of the course by the participants**. You will have worked with the participants all week and should know by this stage the best way to conduct this session. You may wish to open the session up for comments from the vaccinators or you may wish to start by asking a series of questions. For example,
   - — Was the way I spoke easy to understand?
   - — Was the information presented in a way that was easy to understand?
   - — Were the written and illustrated materials easy to understand?
   - — What was the most difficult part of the training course?
   - — Do you have any suggestions as to how this part might be improved?
   - — What was the best part of the training course? Why?
   - — Was the training course well organised? Why?
2. **Evaluation of the participants by the trainer**. If you are training a small number of participants and these participants meet the selection criteria (see Section 2.5), then you may not need to do a formal evaluation of each participant. If you feel the need to formally assess each participant, then you may wish to ask them to do a written test or interview each participant individually. A suggested list of questions may be found in Appendix 7.

Ask participants to outline the problems that they expect to encounter while implementing ND vaccination campaigns.

Closing ceremony with presentation of certificates of participation to the vaccinators (an example is given in Appendix 8). Try to organise for the District Director of Agriculture to present the certificates and perform the closing ceremony.

3.5 The Departure of Participants and Trainers — Day 5

Ensure that
- each vaccinator leaves with a complete kit.
- transport is arranged for all.
- each vaccinator is aware of who their direct supervisor is and how that person may be contacted.
- the managers of the training venue are satisfied.
- each participant has a clear idea of what they must do between the end of the training course and the first vaccination campaign.

4.0

Monitoring, evaluation and ongoing education of community vaccinators

4.1 Monitoring and Evaluation

This is an essential part of a ND control program (Alders and Spradbrow 2001).

- **Timing and frequency.** Monitoring of activities should occur at regular intervals to enable timely adjustments to be made.
  - — One week to one month after vaccination, the community vaccinator should confirm that birds are healthy following vaccination; and
  - — Three months after vaccination is an ideal time to monitor chicken numbers, farmer attitudes and to prepare for the following campaign if vaccination is being done every four months via eye drop.
  - — Supervisors should meet with community vaccinators on a regular basis. During these meetings the community vaccinators may wish to ask questions as well as report on their work.
- **Participatory process.** Make sure that all those involved with the control of ND are involved in the evaluation process, for example community representatives (male and female), chicken traders, livestock officers, extension workers, veterinarians, government officials, and project staff.
- **Indicators.** All those involved should have a say in defining the indicators of success. Possible indicators may be:

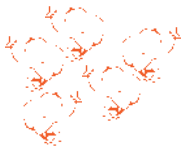
  Short-term changes in:
  - — household chicken numbers;
  - — the number and type (e.g. gender and/or wealth status) of people participating in vaccination campaigns;
  - — the level of community involvement in campaigns;
  - — the economics of households;
  - — the number of chickens sold or traded; and
  - — home consumption of chickens and eggs.

  Long term changes in:
  - — the number and diversity of livestock species raised;
  - — the demography of households; and
  - — primary school enrolment statistics

  Ultimately, the question which needs to be answered is whether the control of ND has assisted in poverty alleviation and improved food security.

4.1.1 Compilation of vaccination records

These records are required to monitor the impact of ND control activities. Provide examples of sheets to record vaccination details at the district and provincial levels (Appendix 9).



4.1.2 Feedback from community vaccinators

Learning from vaccinators about their experiences provides valuable information that will assist you to improve your training of other vaccinators in future training sessions. Community vaccinators may go on to become community livestock workers if there is support within the community for a person who can treat and control a range of livestock diseases and production problems.

4.1.3 Economic sustainability of ND control activities

For ND control activities to be sustainable in the long term, all costs associated with the production (or importation), distribution and use of the vaccine must be covered (Figure 38). In some instances, village chicken farmers may be expected to pay all of the costs. In many cases, government or development agencies may subsidise some aspects of the control activities with the remainder being paid for by farmers (Alders 2001).

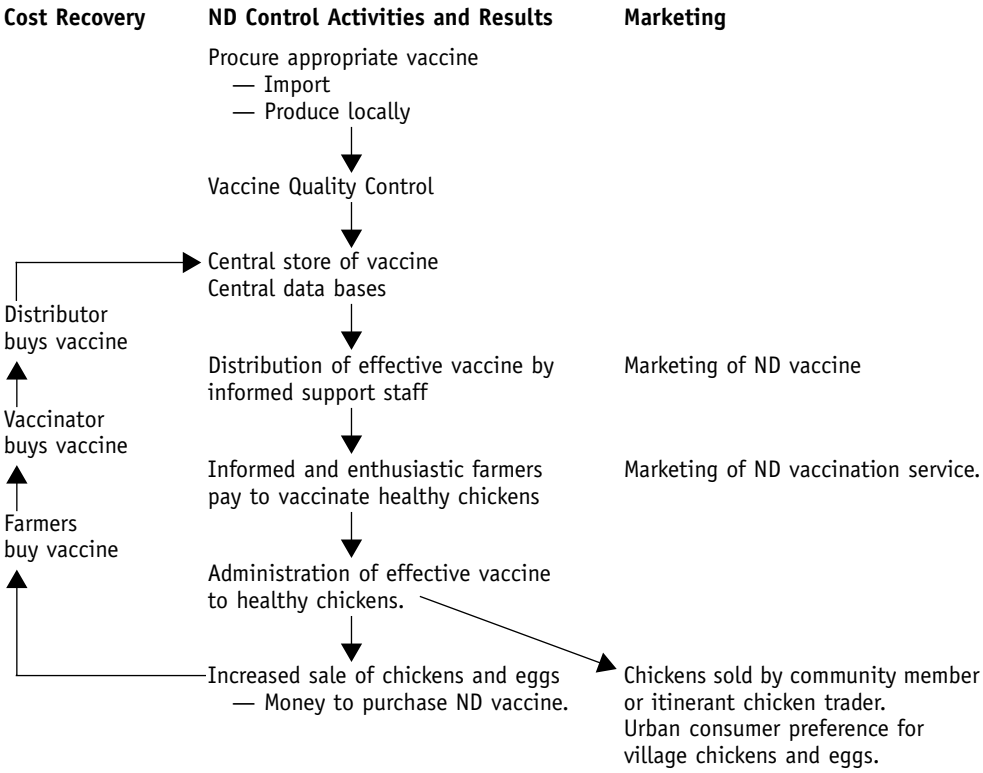


Figure 38: *Cost-recovery and marketing activities linked to the sustainable control of ND in village chickens (Alders, Spradbrow, Young, Mata, Meers, Lobo, and Copland 2001).*

4.1.4 Program monitoring

This manual focusses on field activities but it is important to remember that every aspect of the ND control program must be monitored to ensure that the program is working efficiently (Table 5).

Table 5: *General inputs and activities required to mount a ND control program and indicators that can be used to evaluate the efficiency of the program (Alders, et al. 2001).*

Input/Activity	Indicators
Procure appropriate vaccine — Import — Produce locally	Quantity of vaccine produced or imported. Value of vaccine sales in comparison to actual costs of importation or production.
Vaccine Quality Control — Efficacy — Potency — Safety	Quality Control test results.
Central store of vaccine Central data bases (veterinary and socio-economic)	Maintenance of central cold store. N° of doses & vials of vaccine distributed nationally. Value of vaccine sales nationally. N° of chickens vaccinated nationally. N° per year and timing of vaccination campaigns. Incidence of ND outbreaks. National village chicken population. Socio-economic indicators.
Distribution of effective vaccine and extension material — Appropriate accounting procedures — Vaccine conservation — Information package	Maintenance of provincial cold stores. Appropriate extension material available for farmers, field staff and decision makers. N° of doses & vials of vaccine distributed in each province. Value of vaccine sales per province. N° of chickens vaccinated in each province. N° per year and timing of vaccination campaigns. Incidence of ND outbreaks per province. Provincial village chicken population.
Informed and motivated support staff	N° of staff (male and female) involved in ND control activities. N° of staff with acceptable knowledge of ND control. N° of meetings between supervisors and extension workers and community vaccinators. Quantity and type of refresher courses. Value of vaccine sales per district. Identification of other diseases and production constraints.
Informed and enthusiastic farmers	N° of farmers (male and female) participating in and paying for vaccination. N° of community vaccinators (male and female) working one year after initial training. N° of community vaccinators working one or two years after the end of the project.
Ongoing and systematic administration of effective vaccine to healthy chickens.	N° of chickens vaccinated per household. N° of chickens vaccinated per locality and district. N° of doses and vials of vaccine used by vaccinators. N° per year and timing of vaccination campaigns in each locality. Vaccination costs (price of one dose and administration fee per chicken).
Increased N° of chickens and eggs	Village chicken population per locality and per district. Incidence of ND outbreaks per locality and per district. N° of chickens and eggs sold. N° of chickens and eggs consumed. N° and type of livestock owned by male and female staff. N° of children attending school. Malnutrition rate in villages.

4.2 Dealing with surplus chickens and eggs once your ND control campaigns are an ongoing success

Once a ND control program is functioning well, the problem may well be what to do with the surplus chickens and eggs! In many areas, large markets may be some distance from the areas where chickens are produced and/or cultural taboos may prevent certain members of the family from eating eggs or chickens.

For many farmers, village chickens are a living bank account. The sale of chickens or eggs can resolve many problems that rural families face, such as the payment of school fees, purchase of clothes or medicines or essential food items like oil or salt. The sale (or barter) of chickens can also enable farmers to acquire other domestic animals such as pigs, sheep, goats and cattle.

4.2.1 Tips for marketing surplus chickens and eggs

- Let chicken traders in central markets know about areas where farmers are vaccinating against ND. Tell them that they will always find chickens to buy if they make the effort to visit these areas. ND also causes problems for chicken traders because it can be difficult for them to buy birds at a reasonable price after an outbreak. Traders can also lose money if birds purchased from many different houses and areas become infected with ND and die before reaching the market.
- Encourage the local communities to select their own chicken traders. Just as the community has chosen community vaccinators, they can also choose people to take their surplus birds and eggs to central markets for sale. This way the farmers are more likely to get a fair price for their birds and the profits involved in chicken trading are more likely to stay within the community. Training may be required to ensure that sales are fairly distributed and that trips to central markets are made when buyers are more likely to have money (i.e. the first week after government salaries are paid) and when major festivals are about to take place (e.g. religious or secular holidays).
- Organise market days, maybe on a monthly basis, and invite chicken traders, restaurant owners, etc. to attend.

4.2.2 Encouraging families to eat more chickens and eggs

In many areas, farmers are reluctant to eat surplus chickens or eggs and in some regions, the consumption of eggs is prohibited for children and women by tradition. The conservation of eggs and the hatching of chickens are important in situations of high chicken mortality, where replacement birds are essential. If sustainable ND control programs can be implemented and chicken numbers increase, then the consumption of eggs becomes an option and a very good use of resources. The egg provides a range of nutrients apart from protein and could make a substantial contribution to the nutrition of children, and pregnant and nursing women.

In many parts of the developing world, child malnutrition remains a serious problem. Malnutrition in children under the age of five years can affect their whole life. But if young children eat well, they will grow well, be healthier, do well at school and be strong physically.

Collaborate with colleagues working with human nutrition within the Ministries of Health and Education to raise the awareness of families about good eating practices and the contribution that chickens and eggs can make to good health.

4.3 Collecting information concerning other constraints to village chicken production

In collaboration with farmers and vaccinators, prepare further training sessions dealing with other issues associated with village chicken production.

Once ND control activities are underway, it is useful if the cause(s) of mortality among vaccinated birds can be diagnosed. Vaccination against ND cannot provide protection in 100% of birds and this message must be clearly understood by all those involved. Also, it is important to diagnose other diseases that will become more apparent (and consequently, more important) once chicken numbers increase as a result of the control of ND.

Guidelines for the diagnosis of ND in the field and the collection of samples for laboratory diagnosis have been included in Appendix 10.

A suggested poultry curriculum for a community livestock worker training course is given in Appendix 11. An introduction to the treatment and control of external parasites, internal parasites, Fowl cholera and Fowl pox may be found in Appendix 12. Information on other diseases of importance to village chicken production may be found via the internet at: http://www.vsap.uq.edu.au/ruralpoultry

5.0

Conclusion

A successful training session results in vaccinators who understand their work, have the necessary practical skills and a willingness to get the job done. It also provides the trainer with a better knowledge of village chicken production in the area. Effective training requires commitment, good planning and ongoing communication with trainees. Ongoing education is part of effective training and is an important way of increasing efficiency in work practices. This fits perfectly with a long-term strategy to control ND as refining control procedures is a continuous process and farmers will also encounter other problems in their chickens and other domestic animal species, the control of which may require that the vaccinator receive further training to become a community livestock worker.

6.0

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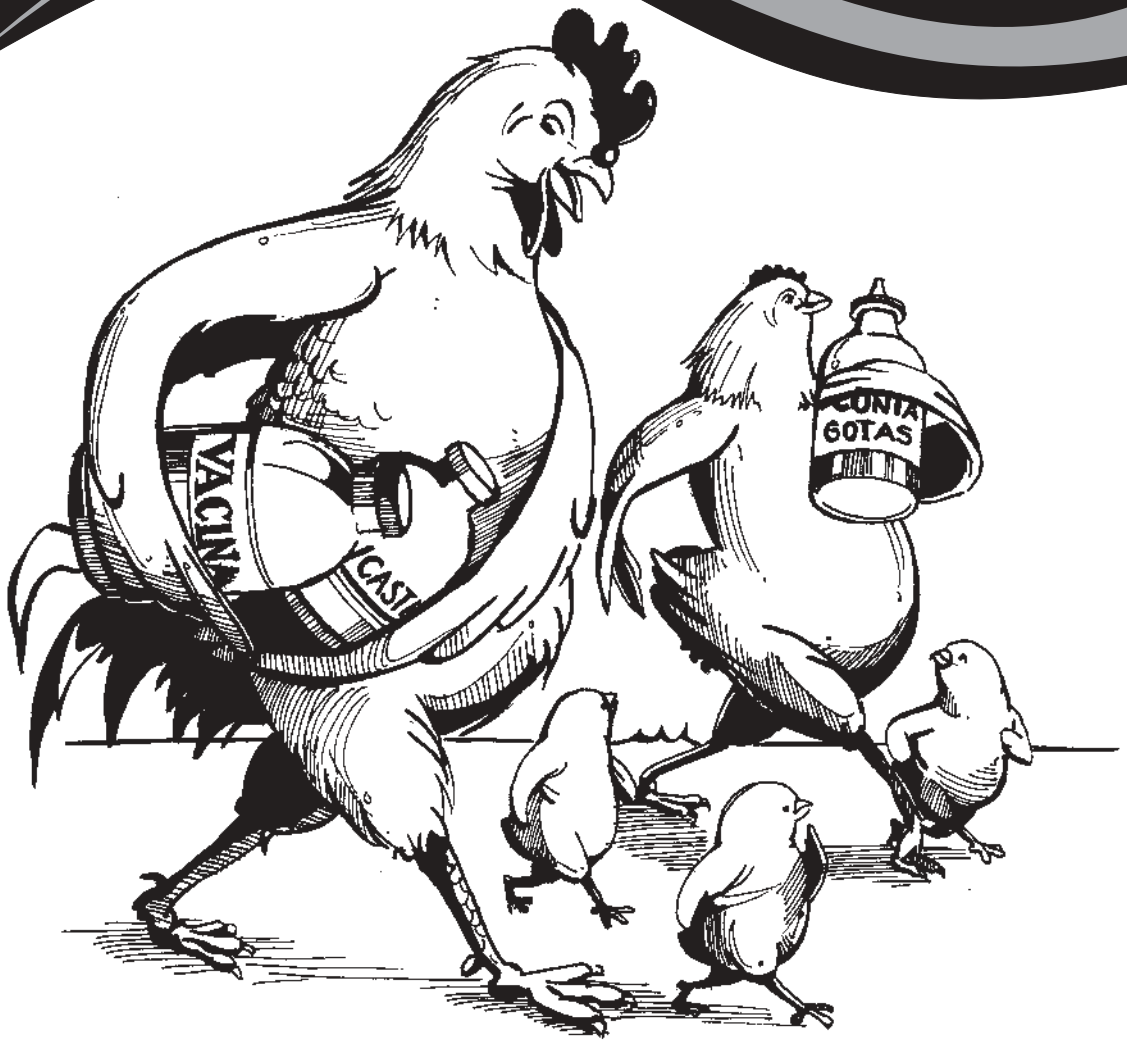
COMBATING



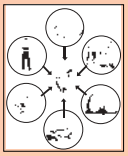
NEWCASTLE DISEASE

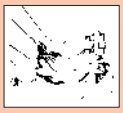
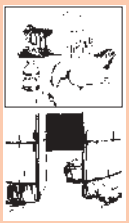
Appendix 1.1:
Newcastle disease control flip chart

An ND flip chart can be constructed using images found in this manual and the commentaries given below. The chart should be printed so that the commentary is visible to the presenter while the picture is being demonstrated to the audience. This is done by printing the commentary for image being shown on the backside of the previous image.

N° in flip chart	Page n° in this manual	Picture	Commentary
1	94		**Newcastle disease and its control** **How to use this flip chart** 1. Read the written part that accompanies each illustration and practise presenting the information at home before your first public presentation. 2. Present each illustration in a way that people can see it clearly and ask your audience to explain what they see in it. 3. Once everyone has agreed on what the drawing shows, you can present the written part that accompanies each picture. NOTE: the oral presentation starts here! Figure 1. Newcastle disease is a problem for chicken farmers all around the world. In Mozambique,[5] Newcastle disease causes many deaths in both village chickens and chickens raised in urban areas.
2	28		Figure 2. Apart from Newcastle disease, there are other diseases that can kill chickens. What are they? Newcastle disease is the disease that kills more chickens than any other diseases. Therefore, we need to be able to recognise the characteristics of this disease. The name given to Newcastle disease varies from country to country and sometimes from district to district. For example, in English speaking countries it is called Newcastle disease, In many Asian countries it is called Ranikhet Disease. What is the name of Newcastle disease here?
3	29		Figure 3. Look at this picture. What can you see? The wings of the chicken are drooping. In some countries, the farmers say that the chicken is wearing a coat or that it's coat is dragging on the ground. Its feathers are fluffed up. Its head is twisted and sometimes its head will be swollen.
4	30		Figure 4. Please describe what you can see in this image? The chicken has diarrhoea that is often green in colour. This means that when the bird goes to the toilet it will pass green liquid rather than firm, well-formed manure. The diarrhoea makes the feathers at the rear of the bird dirty.
5	31		Figure 5. What does this picture show? This chicken has a twisted neck and fluffed up feathers. Often it will have difficulty breathing.

[5] Insert the name of your country here.

6	32		Figure 6. What is happening here? There are many dead chickens. What disease can cause so many deaths in chickens? Newcastle disease is the only disease that can cause many deaths in a short period of time.
7	34		Figure 7. What birds do we have here? We have a turkey, a pigeon and a duck. These birds can spread Newcastle disease. Turkeys and the pigeons can get sick from Newcastle disease. Adult ducks can get Newcastle disease but they will not die. However, ducklings can get sick from the disease. If you see that ducks of all ages are dying from a disease, it is because of another disease that attacks ducks. It is not Newcastle disease.
8	35		Figure 8. What can we see here? We can see a woman and a man. The woman has a sick chicken. The man is carrying a tray with some garlic, washing powder and chillies. Have you ever used treatments like these? Did it work? Do you know of other traditional treatments? When do you use these treatments? Is it when the chicken is already sick or before the chicken gets sick?
9	38		Figure 9. Here we have a drawing that is a bit complicated. The drawing shows some ways that Newcastle disease can be spread. We will look at it part by part. In the centre we have a healthy chicken. Around the chicken are circles containing different items. On top we have a chicken with diarrhoea (liquid manure). To the right is dog that is eating a dead chicken. Next there are some eggs. Then a car. There are some leftover parts after a chicken has been slaughtered, some feathers, bones and internal parts. The last circle shows a man and his foot prints. Newcastle disease is caused by very small particles that we cannot see with our eyes. For example, the disease particles from a sick bird could sit on the shell of an egg and be transported to new areas. The particles could also be transported on shoes, bird cages, baskets and vehicles. Do you have any questions about this drawing?
10	39		Figure 10. What does this picture show us? We can see a woman who is worrying about her chickens. She is wondering what she needs to do to raise healthy chickens.

11	51		Figure 11. What can we see here? There is no known cure for Newcastle disease. The only option is to prevent chickens from getting sick by vaccinating them against Newcastle disease. Chickens should be vaccinated at least one month before the disease is expected to occur. It is very important that only healthy chickens are vaccinated. Once a chicken gets sick, it is too late to give the vaccine. After vaccination the chickens can be slaughtered and eaten without causing any problems for people. There are different types of vaccine. We are using a Newcastle disease vaccine called I-2.[6] It is made in Mozambique[7] and can remain effective even if it is held outside a refrigerator for two months. This vaccine is useful because we know that we do not have many refrigerators in our villages.
12	42		Figure 12. What do we have here? We have the head of a chicken and someone putting a drop into its eye. The best way to give the Newcastle disease vaccine is by putting a drop into the eye of the chicken. This skill can be easily learnt by farmers. The vaccine is mixed with fresh and clean drinking water before it is given to the chicken. Each chicken of all ages, from one day old to adults, needs only one drop in one eye. Look at the picture again. You can see that the eye-dropper is held straight and this is important to make sure that a drop of the correct size is given to the chicken.
13	50		Figure 13. What is shown here? We have a calendar with instructions added to it. The calendar has the months of March, July and November[8] marked in black. These are the months when vaccination is to happen so that chickens are vaccinated every four months. By vaccinating every four months, the chickens will be protected all year around. Plus newly hatched chicks will also be protected. To make sure that we have the vaccine in time for the vaccination, we should count the number of chickens that we have and order the vaccine well before the campaign.
14	61		Figure 14. What can we see in this picture? We said earlier that the vaccine could stay outside the refrigerator for two months[9] but this does not mean that you do not need to take care of it. In the top part of the picture we can see that the vaccine was left in the sun. When this same vaccine was given to a chicken, the bird was not protected and got sick from Newcastle disease. It is important to keep the vaccine in a cool, dry place. It should not come in contact with heat or sunlight. In your house, you can keep the vaccine near the base of a clay water pot or wrapped in a damp cotton cloth. Keep it in the shade as shown in the lower part of the picture. When you must transport the vaccine in the field, wrap the vaccine in a damp cloth and carry it in an open weave basket with a lid. Remember to vaccinate chickens in the shade.

[6] Insert the name of the vaccine you are using.
[7] Insert the name of the country were the vaccine was produced.
[8] Insert the names of the months that correspond to your vaccination program.
[9] Insert the interval appropriate for the vaccine in use.

15	66		Figure 15. What can we see here? Now we are going to talk about how we can avoid spreading Newcastle disease from one village to another. The woman in this picture bought a chicken at the market and is bringing it home. After a few days, all of her chickens died. It is important that we do not bring new birds to our farms when Newcastle disease outbreaks are occurring in nearby villages.
16	67		Figure 16. Tell me what you see here. We can see one woman with a chicken and two chicken houses. What is she doing? She is taking a sick chicken away from the main chicken house to stop it from spreading the illness to her other birds. Once the bird is sick, it cannot be vaccinated. All you can do is offer it food and water and a safe place to rest. Do many farmers have two chicken houses? Maybe not. What could you do to keep sick chickens away from healthy chickens.
17	68		Figure 17. What is happening here? On top we can see many dead chickens. What do you do when many chickens die from Newcastle disease. When a bird is very sick, it is better to slaughter it. No sick or dead chickens should be carried from one house to another, or to new villages where the chickens are still healthy. Any chicken that has died from disease should be burnt or buried. If you do not burn or bury the whole chicken, make sure that the parts that you have not used are burnt or buried. These unused parts may be feathers, bones or internal parts. In the bottom of the picture, the woman is putting feathers and other parts of a bird into a pit. When chickens have died from Newcastle disease, do not try to introduce new birds into the same area for at least 30 days.
18	69		Figure 18. What can we see here? There are two types of chicken houses. Do you have a chicken house at home? What type is it? A good chicken house will stop diseases spreading easily between birds. Big chickens can get into an elevated chicken house. The floor in this house is made with poles to allow the manure to fall through to the ground away from the birds. Hens with chicks cannot sleep in raised chicken houses. They must be kept in houses on the ground. It is important that the door to the chicken house is large enough for the ground inside to be cleaned. Always remove the bark from the wood so that parasites such as fleas, lice and mites cannot hide under the bark. Clean your chicken houses at least once a week. After cleaning, put ash on the ground and the walls to stop problems with fleas and mites.

19	71		Figure 19. Tell me what you see here? Village chickens usually find their own food. But if we can give them a little extra food, then they will produce more. A bird that eats well will also be better able to fight off disease and will respond better to vaccination. Good nutrition is very important for young chicks. How can we give chicks more food? We can give them leftover food, ground rice or maize, green leaves, insects and ground shells. Give them clean water as well. The cage in this picture can be used to give small amounts of food to the young chicks without feeding the hen. This means that when you do not have a lot of food available, you can give very small amounts to the chicks only.
20	72		Figure 20. What is happening here? We have two women talking. One of the women has a sick chicken. We know that Newcastle disease is not the only thing that causes problems in our chickens. If you have any questions, always ask someone from the veterinary or extension services. They are there to help you. This is the end of my presentation. If you have any questions or comments, I will be happy to talk with you about them.

Appendix 1.2: Other material on ND control

ACIAR Material

A ND field manual — a 112 page manual entitled 'Controlling Newcastle disease in village chickens: A Field Manual', aims to provide information to senior veterinarians and veterinary field staff on ND and its control.

A ND laboratory manual — details the small scale production and quality control of live, thermostable ND vaccine.

A flip chart — an illustrated A3 flip chart, with clear, largely self-explanatory line drawings and an accompanying narrative. It can be used for training and in the field, with farmers, to explain the characteristics of the vaccine and its application. Local frontline extension staff translate the narrative into the appropriate local language. (Appendix 1.1)

A poster — consists of a large black and white line drawing of a rooster, ND vaccine vials and an eyedropper. The poster provides space for the local vaccinator to write the place, date, time and contact person for the next ND vaccination campaign. (Appendix 1.3)

A pamphlet — provides an introduction to ND and its control. It is printed on both sides of an A4 sheet and is easily reproduced. It is useful for front line extension staff, literate farmers, farmers' associations and school children. (Appendix 1.4)

A 2002 ND vaccination calendar — this calendar highlights the months in which vaccination campaigns should be implemented, prompts vaccinators to get their orders for vaccine in well before the campaign begins and reminds distributors when they should have the vaccine in stock. (Appendix 1.5)

A ND vaccination song — recorded in Portuguese and three African languages by the Mozambican Musicians Association, the song was conceived after visiting one of the vaccine field trial sites. Its words are included in the Portuguese version of the ND field manual.

An audio-cassette with radio programs — a radio drama and a question and answer program in Portuguese and four African languages are broadcast together with the ND vaccination song on national and community radio. The text of the programs is included in the Portuguese version of the ND field manual to facilitate the local recording of programs in other African languages.

A play — was developed by a local theatre group with experience in community development after visiting one of the vaccine field trial sites in Mozambique. This piece runs for 20 minutes and covers most aspects of ND control including the need to vaccinate before chickens get sick and to pay for the vaccine. As the drama's text is included in the Portuguese version of the ND field manual it can be used, in the form of role-plays, during the training of extension workers and community vaccinators. Role plays developed and performed by participants are encouraged during training sessions.

FAO Material

FAO Technology Review Paper on Newcastle Disease in Village Chickens — A review providing information on Newcastle disease and its control in village chickens. It includes a description of ND, its diagnosis, epidemiology and practical control methods.

English version available from:

Improvements in Rural Poultry in Developing Countries Website
Internet: http://www.vsap.uq.edu.au/RuralPoultry

The Australian Centre for International Agricultural Research
G.P.O. Box 1571
Canberra ACT 2601 Australia
Fax: +61-2-62170501
E-mail: aciar@aciar.gov.au
Internet: http://www.aciar.gov.au

Portuguese version available from:

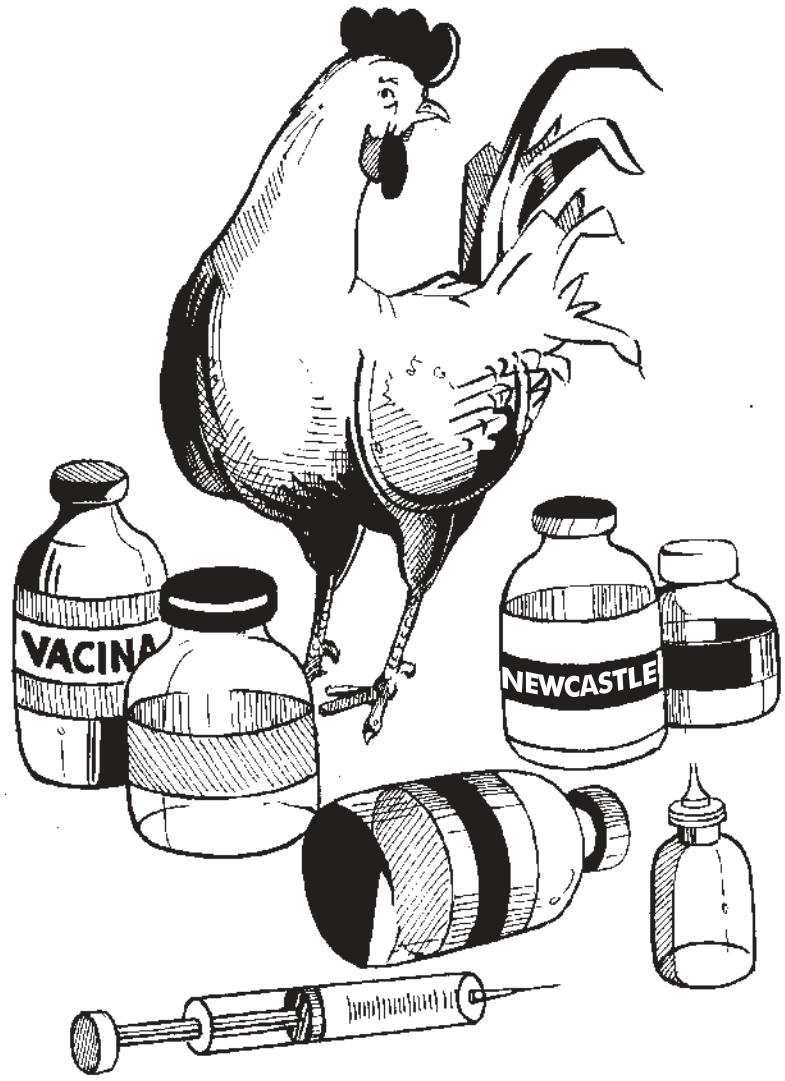
The National Veterinary Research Institute
C.P. 1922
Maputo, Mozambique
Fax: +258-1-475172
E-mail: inivei@teledata.mz or inive@cfmnet.co.mz
Internet: http://www.vsap.uq.edu.au/RuralPoultry

French version available from:

Food and Agriculture Organisation of the United Nations
Internet: http://www.fao.org/ag/aga/agap/lpa/fampo1/fampo.htm
http://www.vsap.uq.edu.au/RuralPoultry

Appendix 1.3:
ND vaccination campaign poster

FIGHT
NEWCASTLE DISEASE



VACCINATE YOUR CHICKENS

PLACE: _____
DATE: _____
TIME: _____

FOR MORE INFORMATION CONTACT: _____

Appendix 1.4: ND control pamphlet

This pamphlet can be prepared in an A5 format by simply folding an A4 page in half. It may be produced in large numbers by a commercial printing company or in small numbers by photocopying.

Combating Newcastle Disease with I-2 Vaccine

What is Newcastle disease?

Newcastle disease is one of the major constraints to the production of village chickens. The disease is caused by a virus that can cause up to 100% mortality in susceptible chickens. In Mozambique[10], outbreaks of Newcastle disease can occur once or twice a year. The timing of the outbreaks may vary from province to province. The fact that Newcastle disease has a local name in each part of Mozambique[11] (for example *muzungo* [in Shangana], *mbendeni* [in Xitsua], *ete-éma* [in Emacua] and *chigubo-gubo* [in Shona]) indicates the importance of the disease.

Clinical signs of Newcastle disease

The clinical signs of Newcastle disease vary considerably according to the type of the virus involved, the type of bird, the age and health of the bird and environmental conditions. Consequently, no clinical signs can be regarded as specific for Newcastle disease.

- Chickens infected with virulent (strong) Newcastle disease virus may die without showing any signs of illness.
- The chicken fluffs its feathers and appears to 'have its coat dragging on the ground' (Figure 1).
- Sleepy and not eating.
- Slight difficulty breathing.
- Severe difficulty breathing with distress and gasping.
- Swelling of the head and neck.
- Greenish diarrhoea.
- Marked decrease in egg production.
- Shaking, twisted neck and paralysis of wings and legs will sometimes be seen in advanced stages of the disease.
- Many chickens may die, sometimes almost all die.
- Other poultry such as turkeys and pigeons may also be affected. Normally ducks are resistant to the disease but on occasions, ducklings may be affected.

How Newcastle disease spreads

Newcastle disease is very contagious. This means that the disease can spread from one chicken to another very easily.

Infected birds pass Newcastle disease virus out in their droppings and on their breath. The virus spreads from one chicken to another or from one chicken house to another via:

[10] Insert the name of your country here.

[11] Insert the local names for ND in your country.

- breathing contaminated air;
- drinking contaminated water;
- eating contaminated feed;
- contact with sick birds;
- contact with contaminated products (such as contaminated meat, intestines, egg, feathers);
- contact with people (the virus can travel on shoes, clothes, etc);
- contact with parts of infected birds (such as egg shells, feathers, etc.).
- contaminated chicken houses;
- contaminated cars, hoes, cages and baskets.

How to Control Newcastle Disease

Vaccination

Chickens cannot be cured once they get sick from this disease. The only way to combat Newcastle disease is to stop chickens getting the disease. Vaccination is the best way of preventing chickens getting sick from Newcastle disease.

The I-2 vaccine retains its activity for up to two months when kept below 28°C and away from sunlight. This makes it ideal for use in areas where there is no refrigeration.The refrigerator (temperature 4–8°C) is the best place to store the vaccine. Remember that the vaccine must never be frozen. When stored at 4–8°C, the vaccine will last until the expiry date shown on its label if it has not been mixed with a diluent (water). If there is no refrigerator or no cool box with ice, then it is best to store the vaccine wrapped in a damp cloth or near the base of a clay water pot away from sunlight. To carry the vaccine in the field, use a cool box with ice if possible. Otherwise wrap the vaccine in a damp cloth and carry it in an open weave basket with a lid. Remember also that vaccination is best performed in the shade.

The I-2 vaccine is given using an eye-dropper to place one drop of vaccine into one of the bird's eyes. The eye-dropper should be supplied with the vaccine to ensure that the drop is the correct size and that the plastic in the eye-dropper will not destroy the vaccine.

Preparing the vaccine

The correct dilution of the vaccine is very important.[12]

- Boil local drinking water and leave to cool in a covered container.
- Do not use metal containers to store boiled water.
- Do not use treated tap water because the chemical in the water will destroy the vaccine (if no other water is available, let the tap water stand overnight to allow the chlorine to go away).
- Ask the supplier of the vaccine and the eye-dropper what volume of water is needed to dilute the vaccine correctly.
- After diluting the vaccine, use within two days according to the following guide:
  Day 1 ⇒ 1 eye drop per chicken (i.e. first day of vaccination campaign)
  Day 2 ⇒ 2 eye drops per chicken
  Day 3 ⇒ Throw away.

[12] Include this section if working with freeze-dried vaccine.

Vaccination guidelines

- Commence vaccination one month before Newcastle disease outbreaks occur most commonly.
- The dose (one eye drop) is the same for chickens of all ages (from day old to adult).
- If all of the first drop did not enter the eye, apply a second drop.
- Use eye-droppers provided by the company making[13] the vaccine.
- **Do not vaccinate sick chickens.**
- Chickens may be eaten immediately after vaccination.
- The vaccine will not cause problems in people.
- It takes 7 to 14 days for a chicken to develop adequate protection against Newcastle disease after vaccination.
- Chickens should be revaccinated every 4 months[14] as their level of protection will start to fall after this time.

Control during an outbreak of Newcastle disease

- Do not sell or give away birds that are sick. The disease can spread from one village to another by the movement of sick birds.
- The disease can also spread between villages via the movement of people, cars, other animals and parts of infected birds (such as eggs, feathers, etc.).
- Separate sick chickens from healthy chickens. Make sure that water and food is available for sick birds.
- If a bird is very sick, then it is best to slaughter it.
- It is best to burn or bury dead birds. If for some reason, it is not possible to do this, any part of the chicken that has not been used should be buried or burnt.
- Sick birds should not be vaccinated.
- When an outbreak of Newcastle disease has commenced in a village, it is best not to vaccinate as it is impossible to identify birds that are incubating the disease but not yet showing signs of illness.
- After an outbreak wait for at least one month after the last chicken has died before bringing in new birds.
- Remember to always contact the Veterinary Service, Extension Service or your community livestock worker when birds show signs of illness or poor production is a problem.

Other control measures

- Do not introduce new birds during the periods of the year when Newcastle disease occurs more frequently.
- Do not return from market with chickens that have failed to sell. Instead, arrange to keep them in another place.
- Minimise contact between chickens and other poultry, such as ducks, pigeons, turkeys and guinea fowl.

[13] Or selling the vaccine if it is not made locally.

[14] Insert the interval appropriate to local recommendations.

- Good housing can reduce disease transmission. An elevated chicken house that is well-ventilated and allows manure to fall through to the ground will minimize contact with infectious agents.
- House hens with young chickens in a safe chicken house that is cleaned regularly.
- Provide some extra feed such as maize bran, ground grains, green leaves, ground shells, insects and worms for poultry. Small amounts of extra feed for chicks will help them grow better.
- Always provide water; fresh clean water is best when available.

Remember:

Vaccinate healthy chickens only;

Chickens must be revaccinated every 4 months;[5]

Not all chickens respond well to vaccination and so a small number may still die from Newcastle disease;

The vaccine protects against Newcastle disease only.

For further information, please contact:

Laboratory Name: *Insert relevant details here.*

Laboratory Address:

Tel:

Fax:

E-mail:

And, your local veterinary and extension services.

Appendix 1.5:
ND vaccination calendar for 2002

CONTROL
NEWCASTLE DISEASE

VACCINATE YOUR CHICKENS
EVERY 4 MONTHS WITH LIVE THERMOSTABLE ND VACCINE

2002

☑ Task completed

Count chickens Order vaccine

January

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

May

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Vaccine available locally

February

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

June

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Vaccinate chickens

March

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

July

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

November

S	M	T	W	T	F	S
					1	2
3	4	6	5	7	8	9
10	11	13	12	14	15	16
17	18	20	19	21	22	23
24	25	27	26	28	29	30

April

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

August

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

December

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

For more information: Australian Centre for International Agricultural Research,
G.P.O BOX 1571, Canberra, ACT, Australia. Tel: +61-2-62170500, Fax: +61-2-62170501
E-mail: aciar@aciar.gov.au

ACIAR

Appendix 2:
Materials and equipment required for training

Discussion sessions

Item	Number of units	Comment
Blank flip chart or butcher's paper or white/black board, or alternative	1	For writing notes on at the front of the training area.
Name tags	1 per participant	Can be made using index cards and safety pins to save money.
Adhesive	1 packet	Adhesive such as Bostik™ or Blu Tac™ is useful for sticking sheets of paper to the wall.
Overhead projector (optional)	1 projector	Not essential but useful if available. Access to a second projector is handy should the first one break down. Arrange a spare bulb.
Overhead projector sheets, suitable for photocopying (optional)	1 box of 50 sheets	Sufficient to copy the illustrations required for the training sessions and some extras for writing notes. Required only if using an overhead projector.
Felt pens or chalk	2 or 3, each a different colour	To write on the flip chart or board.
Exercise books	1 per participant	For each participant to record information during the training session. Hard cover books are best as the vaccinators will go on to use these books to record their field activities.
Pens or pencils	1 per participant	For writing during the course. Black or blue pens are best.
Newcastle disease control flip chart	At least 1 copy	If you have funds, it is useful for each participant to receive a copy of the ND control flip chart. Preparation of the flip chart is discussed in Appendix 1.1.
Extension material: poster, calendar; basic instructions for vaccine use; a guide to organizing a vaccination campaign, etc	1 of each per participant	See appendices 1, 5 and 6 for master copies of these items.
Vaccination registration sheets	1 per participant	To record farmers' names and the number of chickens vaccinated. Master copy available in section 3.4.2.
Certificate of participation	1 per participant	An example is given in Appendix 8.

Practical sessions

Item	Number of units	Comments
Vaccine	2 vials per participant	Out-of-date or reject vials of vaccine may be used for practical sessions where chickens are not vaccinated.
Eye-droppers	1 per participant	Use eye-droppers that have been tested and recommended by the suppliers of the vaccine. Ensure that the eye-droppers are or will be available locally.
Syringes	1 per participant	10 mL syringes are usually the most appropriate for the dilution of freeze-dried vaccine vials containing 250 doses or less. Try to choose syringes of a good quality that will endure field conditions.
Needles (optional)	1 per participant	Needles are not essential to this training course as you may decide to teach participants how to get the vaccine from the vial without using a needle. Use 21 gauge needles or larger.
Chickens	1 per two participants	If at all possible, try to use village chickens and do the practical sessions with chickens at farmers' homes. If this is not possible, make sure that you have adequate conditions to house the chickens during the course.
Village chicken farmers (optional)	Variable	If it is possible to practise vaccination in the village situation, participants will have an opportunity to practise speaking with farmers about vaccination against ND.
Thermometers	3	These should measure ambient temperatures from 0 to 50°C (i.e. not clinical thermometers) as they will be used to check the internal temperature of containers to be used to transport vaccine.
Woven baskets and other options for transporting vaccine	3	Required to choose the type of local container that would be most appropriate for the transportation of vaccine
Cotton cloth	3	Used to wrap the vaccine in before placing it in the vaccine transport container. Need not be new.
Cool box	1 per participant	If the areas where you are working are sufficiently wealthy, you may decide to issue participants with a cool box to transport the vaccine. To make this decision ask three questions: 1. Can the vaccinator afford to buy a cool box after the project finishes? 2. Are cool boxes available for purchase locally? 3. Is ice available locally? If the answer to any of these questions is 'no, ' then it is recommended that you do NOT provide cool boxes.

Appendix 3:
A kit for community vaccinators

- Syringe (10 mL or smaller if appropriate), needle optional;
- Calibrated eye-dropper;
- ND Vaccine;
- Cool box and ice pack or damp cloth and basket;
- Record book and pencil; and
- Chicken marker — leg band, wing tag, coloured thread or cord etc.

Appendix 4: Selection of eye-droppers

Eye-droppers are made of flexible plastic, preferably low density polyethylene. The ideal eye-dropper has a removable tip, protected by a cap that screws on. A suitable eye-dropper should:

- hold a suitable volume of vaccine;
- not inactivate (destroy) the vaccine virus; and
- deliver drops of an appropriate size.

Capacity of eye-droppers

Eye-droppers of up to 30 mL capacity can be used. It is not necessary to place a full 30 mL of vaccine in these droppers. The volume of vaccine that is used will depend on the number of chickens to be vaccinated, and the size of the drop delivered by the dropper.

Testing for antiviral activity

Vaccine virus will be killed on exposure to some plastics. A sample of a new batch of eye-droppers should be tested before use in the field. This test must be done in a laboratory that is able to measure the infectivity of the vaccine virus.

Size of drops

The volume of diluent used to reconstitute freeze-dried vaccine, or to dilute liquid vaccine, will depend on the size of the drop that is formed by the eye-dropper. It is best to use an eye-dropper that produces more than 40 drops per mL. If the eye-dropper produces 66 drops per mL (an ideal number) it means that each drop is approximately 15 mL. This volume is ideal for the small eye of a chicken.

Human eye-droppers are not as convenient for use in chickens. These often produce drops of 30 mL to 35 mL (33 to 28 drops per mL). Such drops are large compared to the size of a chicken's eye and splashing of the drop and wastage of the vaccine can occur.

Each new batch of eye-droppers should be calibrated to ensure that chickens receive the correct dose of vaccine.

Further information

Alders, R. and Spradbrow, P. 2001. Controlling Newcastle Disease in Village Chickens: A Field Manual. ACIAR Monograph Nº 82, 112pp.

Young, M., Alders, R., Grimes, S., Spradbrow, P., Dias, P., da Silva, A. and Lobo, Q. 2001. Controlling Newcastle Disease in Village Chickens: A Laboratory Manual. ACIAR Monograph.

Appendix 5.1: Basic instructions on the use of live, thermostable freeze-dried Newcastle disease vaccine

- The vaccine will protect against Newcastle disease **only** (Use the local name for ND when appropriate)
- Do not vaccinate sick chickens.
- Chickens may be eaten immediately after vaccination.
- The vaccine will not cause problems in people.
- It takes **7 to 14 days** for a chicken to develop adequate protection against Newcastle disease after vaccination.
- Chickens should be revaccinated **every 4 months**[a] as their level of protection will start to fall after this period.
- A dose (one eye drop) is **the same for chickens of all ages** (from day old to adult) and for males and females.
- If all of the first drop did not enter the eye, apply a second drop.
- Use 7 mL[b] of suitable fresh water (see below) to dilute a 250[c] dose vial of vaccine supplied by the National Veterinary Research Institute.[d]
- **Preparing water suitable for dilution of the vaccine** —
  - — boil local drinking water and leave to cool in a covered container,
  - — do not use metal containers to store boiled water,
  - — do not use treated tap water because the chlorine will destroy the vaccine (if no other water is available, let the tap water stand overnight to allow the chlorine to go away)
- **Storage and durability of vaccine**
  - — this vaccine is thermostable but you still need to treat it carefully!
  - — DO NOT FREEZE.
  - — in the fridge at 4°C it will last until the expiry date given on the label, if not diluted.
  - — outside the fridge if stored in a cool, dark place it will last for two months if not diluted.
  - — transport in the field using a cool box and ice pack if available or wrap the vial in a damp cloth and carry it in a covered open-weave basket (to keep it cool and away from sunlight).
- **After diluting the vaccine,** use within two days according to the following guide:
  - — Day 1 ⇒ 1 eye drop per chicken (i.e. first day of vaccination campaign)
  - — Day 2 ⇒ 2 eye drops per chicken
  - — Day 3 ⇒ Throw away.

For further information contact:[e] National Veterinary Research Institute, Maputo, Tel: 01-475171, Fax: 01-4757172, E-mail: inive@cfmnet.co.mz, Mobile phone: 082-306315

[a] Insert the interval appropriate to local recommendations.
[b] Insert the volume appropriate for eye-droppers used locally.
[c] Insert the appropriate number of doses.
[d] Insert the name of the local producer or supplier as appropriate.
[e] Insert the relevant contact details.

Appendix 5.2: Basic instructions on the use of live, thermostable 'wet' Newcastle disease vaccine

- The vaccine will protect against Newcastle disease **only** (Use the local name for ND when appropriate)
- Do not vaccinate sick chickens.
- Chickens may be eaten immediately after vaccination.
- The vaccine will not cause problems in people.
- It takes at least **7 to 14 days** for a chicken to develop adequate protection against Newcastle disease after vaccination.
- Chickens should be revaccinated **every 3 to 4 months**[a] as their level of protection will start to fall after this period.
- A dose (one eye drop) is **the same for chickens of all ages** (from day old to adult) and for males and females.
- If all of the first drop did not enter the eye, apply a second drop.
- **Storage and durability of vaccine**
  - this vaccine is thermostable but you still need to treat it carefully!
  - DO NOT FREEZE.
  - in the fridge at 4°C it will last until the expiry date given on the label, if not diluted.
  - outside the fridge if stored in a cool, dark place it will last for two weeks.
  - transport in the field using a cool box and ice pack if available or wrap the vial in a damp cloth and carry it in a covered open-weave basket (to keep it cool and away from sunlight).
- **After diluting the vaccine,** use within two days according to the following guide:
  - Day 1 ⇒ 1 eye drop per chicken (i.e. first day of vaccination campaign)
  - Day 2 ⇒ 2 eye drops per chicken
  - Day 3 ⇒ Throw away.

For further information contact:[b] National Veterinary Research Institute, Maputo, Tel: 01-475171, Fax: 01-4757172, E-mail: inive@cfmnet.co.mz, Mobile phone: 082-306315

[a] Insert the interval appropriate to local recommendations.
[b] Insert the relevant contact details.

Appendix 6:
A guide to the organisation of Newcastle disease vaccination campaigns

How many doses of vaccine?

Estimate village chicken numbers and if farmers are expected to pay for the vaccine, estimate the number of farmers who may be willing to pay. This will enable you to order an appropriate quantity of vaccine.

When to vaccinate

- Decide in consultation with farmers. Consider weather conditions, the farmers' weekly and annual work plan and the pattern of Newcastle disease outbreaks.
- Begin campaigns at least one month before the season when Newcastle disease outbreaks are more common.
- Campaigns are frequently best held during the weekends or school holidays.
- Postpone the vaccination campaign if is suspected that an outbreak of Newcastle disease is in progress.

Where to vaccinate

- Decide, in consultation with farmers, the location of vaccination
  - — house-to-house visits, or
  - — central vaccination points, for example at village meeting centres.

What do I need?

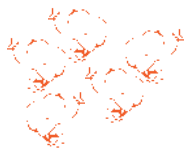
- Make sure that you know where to get
  - — vaccine, of appropriate quality and quantity,
  - — eye-droppers,
  - — registration book to record farmers' names, number of birds vaccinated and payment received.

  and that the materials are available.
- Write a price list in your registration book to assist with the collection of the vaccination fee. The list should show the price of vaccinating one bird through to 30, depending on the average size of a flock.

Monitoring and evaluating your work

To monitor vaccination, try to visit farmers

- One week to one month after vaccination to confirm that vaccinated birds are healthy and
- Two to three months after vaccination to monitor chicken numbers, farmer attitudes to vaccination and to prepare for the next campaign (if vaccination is being done every four months via eye drop).
- If your work is progressing well, you should observe:
  - — an increase in the number of chickens per family/household;
  - — farmers continue to participate in subsequent vaccination campaigns;



— new farmers present their chickens for vaccination at each campaign; and

— payment received from farmers for the vaccination of their chickens is sufficient to buy vaccine for the following campaign and to cover any transport or labour costs involved.

Remember

Vaccinate healthy chickens only.

Always inform farmers of the need to revaccinate their birds.

Never promise protection of all chickens.

Emphasise that the vaccine protects against Newcastle disease only.

Appendix 7:
Formal evaluation of participants

Question	Answer
What type of container can you use to transport vaccine in the field?	Cool box and ice pack, or Woven basket and damp cloth.[15]
How many times a year should chickens be vaccinated against ND? Why?	3 times a year by eye drop, because the level of protection starts to fall after 4 months.
What is the most effective way to vaccinate chickens?	Eye drop.
Can chicks be vaccinated? At what age?	Yes, from one day of age.
Can you vaccinate roosters?	Yes.
Should a sick chicken be vaccinated?	No.
What is the correct dose of vaccine for one chicken?	Day 1 — 1 eye drop per chicken. Day 2 — 2 eye drops per chicken.
For how long can you use a vial of freeze-dried vaccine once it has been opened and diluted?	2 days.
What quantity of water should be used to mix with 250 doses[16] of vaccine?	7 mL[17]
How do you prepare water that will be used to mix with the vaccine?	1. Boil local drinking water and leave it to cool in a covered container. 2. Use clean plastic or glass containers, NOT a metal container to store boiled water. 3. If treated tap water only is available, let the water stand overnight to allow the chlorine to go away.
What are the ways that ND can be spread around?	ND can be spread by people, cars, animals, baskets, cages, and sick birds that came into contact with the particle that causes the disease and the remains of birds (feathers, bones, etc) that died of ND.
How should the vaccination of birds be organised?	In collaboration with farmers and with government livestock and extension services.
How will you know if your vaccination work is going well?	1. No complaints from farmers whose chickens were vaccinated; 2. An increase in the number of chickens per family/household; 3. Farmers continue to participate in subsequent vaccination campaigns; 4. New farmers present their chickens for vaccination at each campaign; 5. Most of the doses in the vaccine vial are used; and 6. Payment received from farmers for the vaccination of their chickens is sufficient to buy vaccine for the following campaign and to cover any transport, equipment or labour costs involved.

[15] The answer depends on what type of container was used during the training session.

[16] Use the number of doses contained in the vaccine vial used during the training session.

[17] The volume will vary according to the type of eye-dropper used and the number of doses per vial of vaccine.

EMBLEM OF MINISTRY/AGENCY

NAME OF ORGANISATION OR AGENCY
Name of section responsible for the training

Certificate of Participation

This is to certify that .....*Name of participant*.....
Particitated in a training course for community vaccinators on the control of Newcastle disease in village chickens, held in .....*Location of venue where training was done*.....,
from ...*Date course started*.... to .....*Date course finished*..... ,20.... .....

Location of where organization is based, *Date certificate signed*

DIRECTOR OF THE ORGANISATION OR AGENCY

Signed and stamp

TRAINER

Signed and stamp

Appendix 9.1: District ND vaccination record sheet

Insert name of agency responsible for supervision of ND control activities — **Newcastle disease control in village chickens**

Locality ND vaccination campaign registration sheet (copy to be submitted to Provincial Veterinary Authority)

District and Region: _____ Type of vaccine: _____ Route of administration:_____ Vaccination campaign: __1__2__3__

Month and year	Name of Locality	N° of chickens vaccinated	N° of vials of vaccine distributed (e.g. 35 x 250 doses)	Total of vaccine sales	N° of farmers involved	N° of community vaccinators involved	N° of extension agents involved	Comments

Prepared by: _____ Position: _____ Date: _____

Appendix 9.2: Provincial ND vaccination record sheet

Insert name of agency responsible for supervision of ND control activities — **Newcastle disease control in village chickens**

District ND vaccination campaign registration sheet (copy to be submitted to National Veterinary Authority)

Region: _____ Type of vaccine: _____ Route of administration_____ Vaccination campaign: __1__2__3__

Month and year	Name of District	N° of chickens vaccinated	N° of vaccine vials distributed (e.g. 240 x 250 doses))	Total sales of vaccine	N° of farmers involved	N° of community vaccinators involved	N° of extension agents involved	Comments

Prepared by: _____ Position: _____ Date: _____

Appendix 10.1:
A guide to the field diagnosis of ND

Diagnosing the cause of mortalities in village chickens is very important as this will help to identify constraints to production. The accurate diagnosis of Newcastle disease (ND) in village chickens is often difficult but when it is achieved it will assist determine the prevalence of ND in the area concerned.

1. The clinical signs of ND vary considerably according to the type (virulence and tropism) of the ND virus involved, the species, age and immune status of the bird, and environmental conditions. As a result, none may be regarded as a specific sign of ND.

- Chickens infected with virulent ND virus strains may die without showing any signs of illness.
- The chicken fluffs its feathers and appears to 'have its coat dragging on the ground' (Figure 1).

Figure 1: *Farmers in many parts of the world observe that a chicken with ND 'has its coat dragging on the ground.'*

- Sleepy (lethargy) and not eating (inappetence).
- Slight difficulty breathing (respiratory signs such as mild rales and snick can be detected by careful observation).
- Severe respiratory distress and gasping.
- Swelling of the head and neck.
- Greenish diarrhoea.
- Marked decrease in egg production. Sometimes deformed eggs may be produced.
- Shaking (nervous signs of tremor), torticollis, convulsions and paralysis of wings and legs will not be seen until the disease is advanced (Figure 2).

Figure 2: *Torticollis is generally seen in chickens only when ND is at an advanced stage.*

- Mortality may be very high, often reaching 50 to 100% (Figure 3).

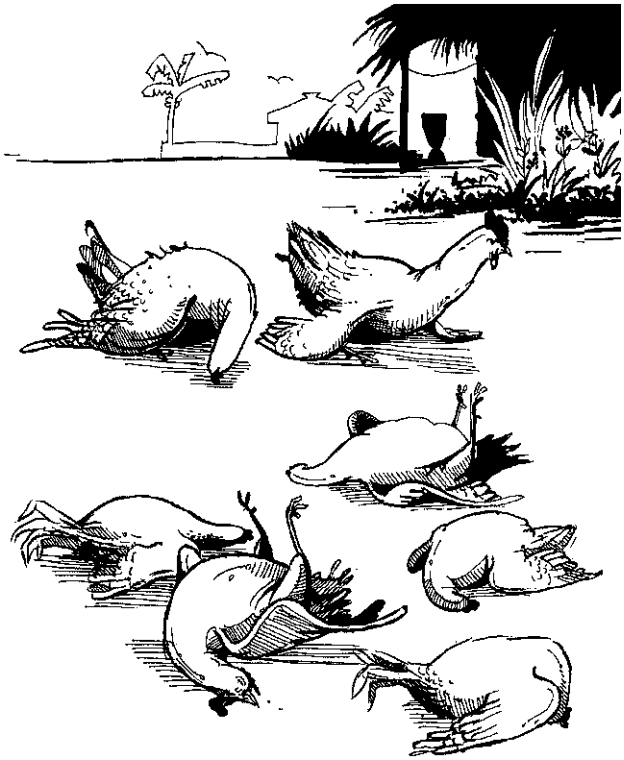


Figure 3: *When mortality of 50 to 100% is observed in a flock of chickens, ND virus is almost always the cause.*

- Other domestic poultry such as turkeys and pigeons may also be affected. Normally ducks are resistant to the disease but on occasions, ducklings may be affected.

2. Post-mortem findings are characteristic but not definitive. ND can be suspected if the following lesions are encountered, particularly in combination (and when the flock history is also consistent with an ND outbreak):

- reddening (congestion) and clear watery fluid (mucous exudates) in the trachea;
- congestion of the lungs (heavier than normal; lungs sink in water/formalin);
- haemorrhages of the mucosa of the proventriculus;
- haemorrhagic and necrotic ulceration of lymphoid patches of the intestine, caecal tonsils and bursa of Fabricius;
- congested ovarian follicles in chickens in lay.

3. Field diagnosis of Newcastle disease

To assist with the diagnostic process, it is best to separate cases according to the level of mortality observed:

- **High mortality —** when 50% to 100% of birds in a flock die with the clinical signs listed above, it is almost certain that the deaths were caused by virulent ND.
- **Low mortality —** this is a more difficult situation to diagnose. In areas where the majority of chickens were vaccinated against ND or have survived a natural outbreak of the disease, the arrival of virulent ND virus will provoke mortality only in those chickens that are not immune. In this case, it is necessary to distinguish ND from other diseases that cause mortalities (such as Infectious Bursal Disease, Fowl Cholera and Fowl Pox). Unfortunately, there is no clinical sign or post mortem lesion that occurs with ND only (i.e. there are no pathonomonic signs). When the causative agent is not easy to diagnose clinically, it is always best to confirm the diagnosis by submitting the appropriate samples to a veterinary diagnostic laboratory.

For more information, please contact:

Laboratory Name: *Insert relevant details here.*

Laboratory Address:

Tel:

Fax:

E-mail:

Appendix 10.2: A guide to the collection and submission of samples for the laboratory diagnosis of ND

The diagnosis of Newcastle disease (ND) is important for several reasons. ND is a disease of international importance and countries are to inform the *Office International des Epizooties* (OIE) when an outbreak occurs. Confirmed outbreaks help national authorities to better understand the epidemiology of ND in their countries and to develop appropriate control strategies. Once ND control activities are underway, it is useful if the cause(s) of mortality among vaccinated birds can be diagnosed. Vaccination against ND cannot provide protection in 100% of birds and this message must be clearly understood by all involved. Also, it is important to diagnose other diseases that will become more apparent (and consequently, more important) once chicken numbers increase as a result of the control of ND.

1. What is Newcastle disease

ND is one of the most important chicken diseases and can cause 50 to 100% mortality in susceptible flocks.

This disease is caused by a virus that can be destroyed (inactivated) quickly at temperatures above 8°C (i.e. the virus is 'thermolabile'). Consequently, it is very important that samples collected from chickens where ND is suspected be kept cool until they reach the diagnostic laboratory.

2. Tissue samples

The best samples for diagnosis are tissues collected at the diagnostic laboratory from sick birds. However, ND can be easily spread by the transport of live birds. If it is difficult to transport live birds to a diagnostic laboratory with minimal risks of spreading disease to other birds, it is advisable to submit the following post mortem samples for diagnosis.

Since virulent ND virus strains are normally thermolabile, it is important to send samples properly packaged with ice packs. Wherever possible, please try to observe the following conditions:

- **Fresh samples.** Samples of spleen, lung and the entire head should be wrapped in plastic and placed into a cool box with ice or icepacks.
- **Where it is not possible to keep the samples cold or when it is not certain that samples will arrive at the laboratory within 24 hours**. Samples of spleen, lung, entire head (or brain) and long bones should be conserved in 50% glycerine (glycerol) in saline and kept as cold as possible during dispatch.

The cool box containing the samples should be clearly identified and accompanied by the following information:

- the name and address of the person sending the samples;
- the date and location where the samples were collected;
- case details — age, sex, breed, vaccination and treatment history, clinical signs, mortality and description of the outbreak; and
- differential diagnosis.

Central laboratories will usually have submission forms to record this information. More details concerning the post mortem of chickens may be found in the companion ACIAR manual entitled 'Controlling Newcastle disease in village chickens: a field manual.'

3. Serum samples

The reliability of any serological test depends to a large extent on the quality of the samples submitted. Haemolysed or contaminated samples will often give unreliable results. Poor quality samples will give poor quality results, and the birds will need to be re-tested.

3.1 Blood collection technique

Blood from domestic chickens is usually collected from a wing vein. Some workers prefer to use a scalpel blade to nick the wing vein and then collect the blood into a tube. This method is quick but blood collected in this manner is more likely to become contaminated. In addition, farmers often object to seeing their birds stained with blood and may not allow them to be bled again. This will cause problems in situations where repeat bleeding of birds is necessary. A full description of a wing vein collection technique using a syringe and needle is given in the ACIAR manual entitled 'Controlling Newcastle disease in village chickens: a field manual.' This technique, once mastered, causes minimal difficulties in the field.

A separate needle should be used for each animal to avoid the risk of mechanically transmitting infectious agents from one animal to another, and/or the transfer of antibodies from one sample to the next.

Paired samples must be collected from the same bird 2 or 3 weeks apart in order to monitor the response to vaccination. Therefore, a means of identifying individual animals is required. Conventional methods such as numbered wing tags should be used when available. If not available, then individual tattoos or physical markings need to be recorded to permit the identification of specific animals.

Contamination of the container and stopper should be avoided. Blood and faecal material should be removed prior to dispatch to reduce the risk of contamination of laboratory staff handling the specimens.

3.2 Labelling of samples

Samples must be labelled serially (e.g., from 1 to 30) with a waterproof pen, preferably on an adhesive label. Do not write on the cap of the tube as it may be removed during testing. Do not label containers with water-soluble ink. It smudges when wet and may rub off if samples are chilled or frozen. Draw a line under numbers that can be misread if inverted, for example 18 and 81. If samples are to be stored, record the date of collection including the year.

3.3 Avoiding haemolysis of samples

Haemolysis occurs as a result of poor collection technique, contaminated equipment or poor handling of the sample once it is collected.

Common causes of haemolysis include:

- slow flow from the needle, due to obstruction of the needle, or failure to insert it directly into the vein;
- heating of samples, usually in cars or after prolonged exposure to direct sunlight during collection;
- freezing;
- contamination of the sample by water;
- contamination by faecal and other material;

- forcible expulsion of blood through a needle;
- bacterial contamination during collection; and
- use of non-sterile containers for collection or storage.

Haemolysis can be reduced by using clean, dry, sterile needles and avoiding contamination by water.

3.4 Storage of sera prior to dispatch

- Blood or serum samples should not be submitted in jars, non-sterile containers or syringes with needles attached.
- Samples should be allowed to clot before transporting them any distance. The samples should be held in a warm place until the clot retracts. Clots may not retract readily in cold weather or if samples are chilled too soon after collection.
- Once the clot has retracted, blood samples must be held chilled to reduce contamination, haemolysis and autolysis.
- If samples cannot be rapidly delivered to the laboratory and delays are likely to occur between collection and testing, it is preferable to separate the serum into a 5 mL or 1.8 mL sterile, screw-capped plastic container and submit the serum sample only. Transfer the original label to the new container or re-label.
- Blood samples for serology must not be frozen until the serum has been separated from the clot. Serum samples can be submitted frozen, provided that there are no blood cells present in the sample.

4. Dispatch of samples

NOTE: Before sending samples, please ensure that:

- the samples are securely packaged;
- the label on the cool box or container has the following:

  URGENT

  To: The name and address of the veterinarian responsible for your closest central veterinary laboratory.

  From: The name and address of the person sending the samples;
- the samples are accompanied by an information sheet; and
- the relevant person in the central veterinary laboratory is informed when the package is expected to arrive and by what means of transport.

For more information, please contact:

Laboratory Name: *Insert relevant details here.*

Laboratory Address:

Tel:

Fax:

E-mail:

Appendix 11: Suggested village chicken curriculum for Community Livestock Workers

1. **Features of a chicken** — simple anatomy
   — healthy and sick chickens
2. **Handling of a chicken**
3. **Husbandry** — housing (adults, hen and chicks, broody hen)
   — ventilation
   — cleaning
   — keeping out predators
   — nutrition
   — young chicks
   — supplements
4. **Diseases**
   — an introduction to the clinical signs, field diagnosis, treatment and control of each of the following:
   - Newcastle disease
   - External parasites
   - Internal parasites
   - Coccidiosis
   - Fowl cholera
   - Fowl pox
5. **Record keeping**
   - number of cases
   - diagnosis and treatment of cases
   - outcome of treatment
   - payment received
   - inventory of stock (pharmaceuticals, etc.)

Appendix 12: Introduction to the control of other diseases of village chickens

A12.1 Control of external parasites

- Management, good housing and hygiene.
- Remove bark from timber used to construct shelters to reduce hiding places for ticks and mites. If possible, timber should be painted with a mixture of paraffin (kerosene) and creosote in equal amounts or with nicotine sulphate (40%).
- Clean shelter and nests regularly, at least every week.
- Place chicken manure on gardens and mix into soil. This will prevent flies from developing in the manure.
- Keep brooding hens free from fleas and lice to prevent infestation of young chicks. When heavy infestations occur, it is best to burn the chicken house or nest and build a new one on a different site. In some areas, farmers will be aware of the leaves of some local plants that if placed around the nest will discourage external parasite infestations.
- Allow chickens to bathe in sand or ash to clean their feathers.
- Apply insecticide (trichlorphon or malathion) to individual birds and housing.
- Scaly leg of chickens can be treated by dipping the leg in paraffin (kerosene) and gently brushing the scales from the leg. The paraffin must not be allowed to touch the skin or feathers.
- Other poultry, dogs, cats and rats should be examined for fleas since they may serve to maintain flea invasions.
- Sunlight, hot dry weather, excessive moisture and freezing hinder development of fleas.

A12.2 Control of internal parasites including coccidiosis

- Treatment of individual birds with tetramisole or levamisole is possible but expensive.
- It is best to prevent infection by frequent removal of manure from the chicken house, provision of feed and water on clean containers and allowing birds to sleep off the ground by providing roosts.
- Cages and houses should be kept clean with droppings removed every week.
- Droppings (faeces) should be broken up to ensure that worm eggs will be killed by drying as quickly as possible.
- Feed and water containers should be cleaned every day if possible.
- Do not allow wet, muddy areas to develop around water containers or anywhere else.
- Do not keep birds on the same area of ground year after year as contamination of the soil will increase.
- Biosecurity is not effective because coccidia oocysts are very resistant.
- Inclusion of coccidiostats in food or water is possible for commercial poultry production.

A12.3 Control of fowl pox

- Management — do not introduce new birds with lesions.
- Virus survives in dried scabs for months or years. Burn infected chicken houses and dispose of all infected birds. Burn or bury all parts of the birds that are unused. After all infected birds have been removed and no new cases occur, build another chicken house on a new site.
- Vaccines are available.

A12.4 Control of fowl cholera

- Treatment cannot be guaranteed to be successful.
- Sulphur drugs in water, oxytetracycline (terramycin™), aureomycin™, novobiocin, lincomycin, spectinomycin in feed. NOTE: the withdrawal period is a minimum of 10 days before slaughter for food.
- Vaccines are available but results not always satisfactory. Good results have been obtained in SE Asia when local isolates are used to prepare a vaccine.
- Good flock management — do not introduce sick or new birds
- Control of rodents (construct elevated chicken houses with an inverted metal or plastic cones on the legs to prevent the entry of predators).
- Bacteria are destroyed by disinfectants, sunlight and heat.

NOTE: More details on the control of these and other diseases may be found on the internet at:

Improvements in Rural Poultry in Developing Countries Website
http://www.vsap.uq.edu.au/ruralpoultry

International Network for Family Poultry Development Website
http://www.fao.org/ag/aga/agap/lpa/fampo1/fampo.htm

Danish Network for Smallholder Poultry Development Website
http://www.poultry.kvl.dk