Promoting innovation

A SMART SKILLS MANUAL

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MEAS aims at promoting and assisting in the modernization of rural extension and advisory services worldwide through various outputs and services. The services benefit a wide audience of users, including developing country policymakers and technical specialists, development practitioners from NGOs, other donors, and consultants, and USAID staff and projects.

Catholic Relief Services (CRS) serves the poor and disadvantaged overseas. Without regard to race, creed or nationality, CRS provides emergency relief in the wake of natural and man-made disasters and promotes the subsequent recovery of communities through integrated development interventions. CRS' programs and resources respond to the U.S. Bishops' call to live in solidarity—as one human family—across borders, over oceans, and through differences in language, culture and economic condition. CRS provided co-financing for this publication.

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Foreword

The Kiumai Producer Marketing Group had a problem. The 38-member group of chickpea growers in Ipililo, a village in Maswa, in the Mwanza region of Tanzania, had enjoyed two successful years. Last year, they sold 51 tons of chickpeas; the year before, 62 tons.

But this year, money was short. There was not enough money to rent a warehouse to store their produce, the group's registration fee had not been paid, and bank charges were eating into their capital. The group needed to get back on track.

A local development organization told the villagers about savings and internal lending groups. The Kiumai members were enthusiastic, as were many other people in Ipililo. They quickly formed seven savings and lending groups and began to save small sums each week. Their confidence returned as they saw how they could help each other meet their immediate needs.

Representatives of the seven groups visited farmers in a neighboring district who had formed a larger association to market their crops. The villagers decided to form their own inter-group association to bring together all the savings and lending groups, with a total of 175 members.

The villagers see many advantages from forming the association: they can market large amounts of produce, start businesses together, help each other with skills, and get funding and training opportunities. They plan to expand their members' chickpea and pigeonpea production, and build a warehouse for their produce. Then they want to start a farmer field school to improve their crop yields.

The experience of the Kiumai Producer Marketing Group illustrates the interplay of five critical skills that smallholder farmers need to engage successfully with markets.

- The entry point for the Kiumai farmers was through building **organizational and business skills** to improve production and marketing of pigeonpeas. However, these skills alone were not sufficient to ensure success.
- Through savings and loans, farmers strengthened their **financial skills** and appreciated how they could further consolidated their gains through **disciplined and transparent group management.**
- In parallel, the group with their fellow farmers in Ipililo village saw the opportunities afforded by adopting **innovative** forms of organization that could resolve problems associated with economies of scale in marketing and access to important technical and financial services.
- And finally, the lasting success of Kiumai's business will depend on the ability to maintain their competitiveness. Through a Farmer Field School members will acquire new knowledge, test new technologies and adapt their crop management practices to increase **production** at lower costs and **conserve their natural resources**.

In common with many other development agencies, CRS is incorporating market- and business-oriented approaches into its development efforts. We realize that increasing food production alone cannot move poor rural people permanently out of poverty. Building the capacity of smallholders to engage in profitable enterprises has therefore become an integral part of our agricultural development strategy.

Field agents, extension workers and development managers typically focus on one particular area of expertise. This series of training modules gives them the broad understanding and skills they need to understand the enterprise approach and to build the capacity of local people.

Through building the capacity of local people, we are reshaping the way we support vulnerable communities. As in the case of Kiumai, communities progressively become agents of their own change. They identify and grasp opportunities that turn previous desperation into a brighter hope for the future.

Carolyn Woo

President and CEO, CRS

Preface

This set of manuals on "Skills for Marketing and Rural Transformation", or "SMART Skills" for short, presents an integrated and sequential approach to building vulnerable farmers' capacity to link with markets. The guides are intended for use by development facilitators, field extension agents and community leaders working with poor rural communities. They focus on helping to improve the livelihoods of smallholder farmers by improving the production and marketing of their crops and livestock products.

This guide contains the following parts:

- **The subject matter:** the knowledge and skills you need to master in order to teach the skills. They are printed as lessons on the white pages.
- **Quizzes to test your own knowledge.** These are printed on the light green pages. The answers are given at the end of the guide.
- **Exercises:** these are guides to follow in helping the groups master the knowledge and skills they need. These are printed on the pages marked with a green stripe. The lesson plans are also available as a PDF document at www.crsprogramquality.org/smart-skills-for-farmers/. You can print out these pages and have them laminated so they last longer.

The training methods it contains are proven, and take into consideration the capabilities of field agents and the populations across many countries in Africa, Asia and Latin America. Many examples and records used in the guide come from field experiences and real cases. Names and other information, however, have been changed.

HOW TO USE THIS GUIDE

As a user learning the material. Read through this guide lesson by lesson, section by section, trying to absorb the information presented. Read both the lessons and the accompanying exercises. At the same time, picture how you would use the information and techniques described to help you work with farmers on developing their agro-enterprises. At the end of each lesson, answer the short quizzes. Check your answers with the list at the end of the guide. If you get all the answers right, congratulations! Go on to the next lesson. If you did not get all the answers right, go back to review that section again before moving on to the next lesson.

As a trainer working with field agents. You can use this guide to teach other field agents. You can present the information in the text, then work through the exercises with the participants. Guide the field agents on how they should conduct and monitor the training sessions. For some of the exercises, you can ask the field agents to pretend that they are farmers.

As a field agent working with farmers and other rural people. Once you have taken this course and passed the quizzes, you can use the guide to work with community members to develop their skills. Every group and every situation is different, so this guide cannot anticipate every problem you may come across. You should adapt the relevant items as necessary and use this guide as a basis for building your own series of learning events. If in doubt, check with your supervisor or ask your colleagues for advice.

Before teaching these materials, review and modify the following elements for your own local situation:

- **Names** of people, villages, and groups.
- **Currency**.
- **Amounts of the items** shared in the examples. These amounts could vary based on the target group's income levels. If the amounts are either too large or too small, participants may not feel that these tools apply to them.
- **Stories.** There may be more relevant examples for your community that will better communicate the objectives.
- Items being **bought and sold.**
- Types of **income generating activities.**
- When items are sold based on the **local seasons.**

Wherever possible, work in a **participatory manner** with the participants. This means you should make sure that it is the participants who are gathering and analyzing information and making decisions that will affect them. Your role is to facilitate their learning, not to do the job for them.

As a reference source. You can also use this guide as a reference. If you need to check on a technique or concept, look it up in the table of contents.

LEARNING ONLINE

If you are a CRS staff member or partner, you can also study the ideas in this guide online, through an e-course. Contact your CRS supervisor for a username and password. Once you have been registered for online courses you can begin the e-learning version.

The e-courses use the same text, quizzes and exercises as in this guide. Many of the tables are presented as **forms** that you can fill in online to help you record and analyze the data you have collected.

SMART SKILLS GUIDES

This series consists of the following guides.

- Introduction to SMART Skills for rural development
- Organizing and managing farmers' groups
- Understanding natural resources
- Managing natural resources
- Facilitating saving and internal lending and savings communities (SILC)
- Financial education
- Marketing basics
- Seven steps of marketing
- **Promoting innovation (this guide).**

These titles are also being developed as distance learning products. As the process is rolled out and experimented with in different situations, we look forward to receiving feedback on modifications and improvements so that these learning products can be continually improved.

FARMBOOK SUITE

Farmbook Suite is a set of integrated mobile tools that have been developed to help agents support farmer groups. The tools are designed to assist with registration and basic data collection, improve training, support business planning, market analysis and monitor geo-referenced service delivery.

Farmbook Suite has several features to meet the needs of farmers, field agents and project managers:

- **Map & track for implementation and basic monitoring of farmer groups.** This application collects important farmer data to streamline and strengthen farmers' registration, e-learning, business planning and monitoring and evaluation at scale.
- **SMART Skills e-learning.** These courses provide agro-enterprise training to help farmers to increase production, grow their incomes and engage with markets.
- **Farmbook business planner.** This tool guides field agents and farmers through the process of creating business plans that are based on participatory value-chain studies.

These features will allow field agents to do the following:

- Register a farmer group
- Track the delivery of training to farmer groups by field agents
- Collect monitoring and evaluation information using digital forms
- Take e-learning courses
- Use the business planner to write a business plan
- Analyze pre- and post-season costs, revenue and profitability.

To learn more about Farmbook, visit the CRS.org website.

Acknowledgments

This manual and the other manuals in this series are the product of a process that initiated in 2002 with Agroenterprise Learning Alliances in East Africa and Central America. Catholic Relief Services (CRS) and the International Center for Tropical Agriculture (CIAT) were co-facilitators and among the principal participants in these Learning Alliances. Since 2002, many other organizations and individuals have contributed to the content by adding new knowledge and experiences and by reviewing the materials brought together here.

The manual's production was supported by the United States Agency of International Development, through the Modernizing Extension and Advisory Services (MEAS) project, which funded editing, graphics production and a writing clinic.

The editorial team wish to recognize Ariel Bleth, Beth Medvecky and Jonathan Schofield, whose innovations course developed for the Great Lakes Cassava Initiative was the principal source of material for this manual.

We also acknowledge the many farmers and other community actors that have participated in CRS's development activities across three continents and whose needs and demands we hope are reflected in the orientation of the manual.

Our thanks too to Jorge Enrique Gutiérrez, who produced the graphics.

Shaun Ferris

Rupert Best

Paul Mundy

Introduction

Many small-scale farmers in the developing world learn how to grow crops and raise livestock in a very practical way: by working in the fields and by tending animals. They grow food for their families, and sell any extra to visiting traders or at the local market. But they have rarely studied farming in school and know little about how to earn more money by producing and marketing their produce in a better way.

This manual aims to help you, **the field agent**, assist groups of farmers maintain the gains they make in improving their production and marketing by building their capacity to look for, experiment with, and apply new ideas or technologies that resolve their constraints or problems. The module will help you facilitate locally-relevant learning sessions with farmers and others that wish to form an **innovation group**.

Farmers are constantly making observations, developing ideas, and taking risks to put these ideas into practice in order to increase their livelihood, food security, and income generating options. They have effectively been innovators for a long time – knowing through observation, learning through informal experimentation, and performing studies to solve problems. And often the result is an innovation – an improvement or changes in knowledge or technologies that result in an increase of productivity or competitiveness of the crops and livestock that farmers produce and market.

This manual illustrates the basic principles of innovation and experimentation which can be used in a variety of settings and situations with farmers and other rural actors.

As a field agent working with farmers to increase production and improve marketing, you will need a range of skills. These include:

- Group organization and management
- Financial management
- Marketing and agroenterprise
- Natural resources management for sustainable production
- Innovation (this manual)

These skills are covered in separate modules in this series. The farmers you work with will also need these skills. One of your tasks is to help the farmers learn and practice these skills so they can improve their incomes from agriculture. The manual *Introduction to SMART Skills for rural development* guides you on how to plan and implement a training curriculum to give them these skills.

PURPOSES OF THIS MANUAL

This manual has two main purposes:

- To help you **learn about why innovation is important, how it occurs, and how it can be fostered** in farmers, farmer groups, and other rural people.
- Once you have mastered the knowledge and skills yourself, to help you **teach innovation skills** to farmers and other rural people.

ACTIVITIES COVERED

You can apply the principles of innovation explained in this manual to:

- **Agricultural technology and practices:** increasing productivity or introducing a new crop or livestock product.
- **Management of the ecosystem** and of the natural resources that are used in the production process.
- **Post-harvest technology and practices**, related to conservation and storage, processing, product quality, packaging and transport.
- **Marketing** and the presentation of the product in the market.

WHAT TYPE OF FARMER ARE WE TARGETING?

This module is about how to help small-scale farmers in developing countries organize themselves into a research or innovation group and what they need to do to ensure that the group is able to carry out the steps of an innovation process.

We will assume that the farmers cultivate 1–2 ha (roughly 2–5 acres). They do not own mechanized tools, use little fertilizer and other inputs, and are not well organized. We also assume they have few links to formal financial institutions such as banks or microcredit institutions, and that they sell their produce mostly to informal traders or in the local market.

Of course you can also use the ideas in this manual with people in other situations: farmers with less land and whose principal sources of income come from selling their labor rather than from agricultural or livestock activities, or from taking part in non-farm income generating activities such as petty trading of agricultural products, food preparation and sale, activities that process farm products, etc. They can also be used with farmers who cultivate a larger area or who are slightly better off, or people who depend mainly on livestock for a living.

AFTER LEARNING ABOUT INNOVATION

After setting up an innovation group and taking them through the innovation process, farmers will be able to:

- Analyze their situation and problems and find solutions
- Implement, monitor, and evaluate their experiments and trials of production, postharvest and marketing technologies and practices
- Establish links with other groups and institutions that may be able to support them with information, technology, and other types of advice

WHAT IS IN THIS MODULE

This manual takes you through the steps that a group of farmers undertake during a process of innovation. It includes the skills and knowledge you will need to lead a farmer research or innovation group through that process. Each of the steps involved is accompanied by one or more exercises.

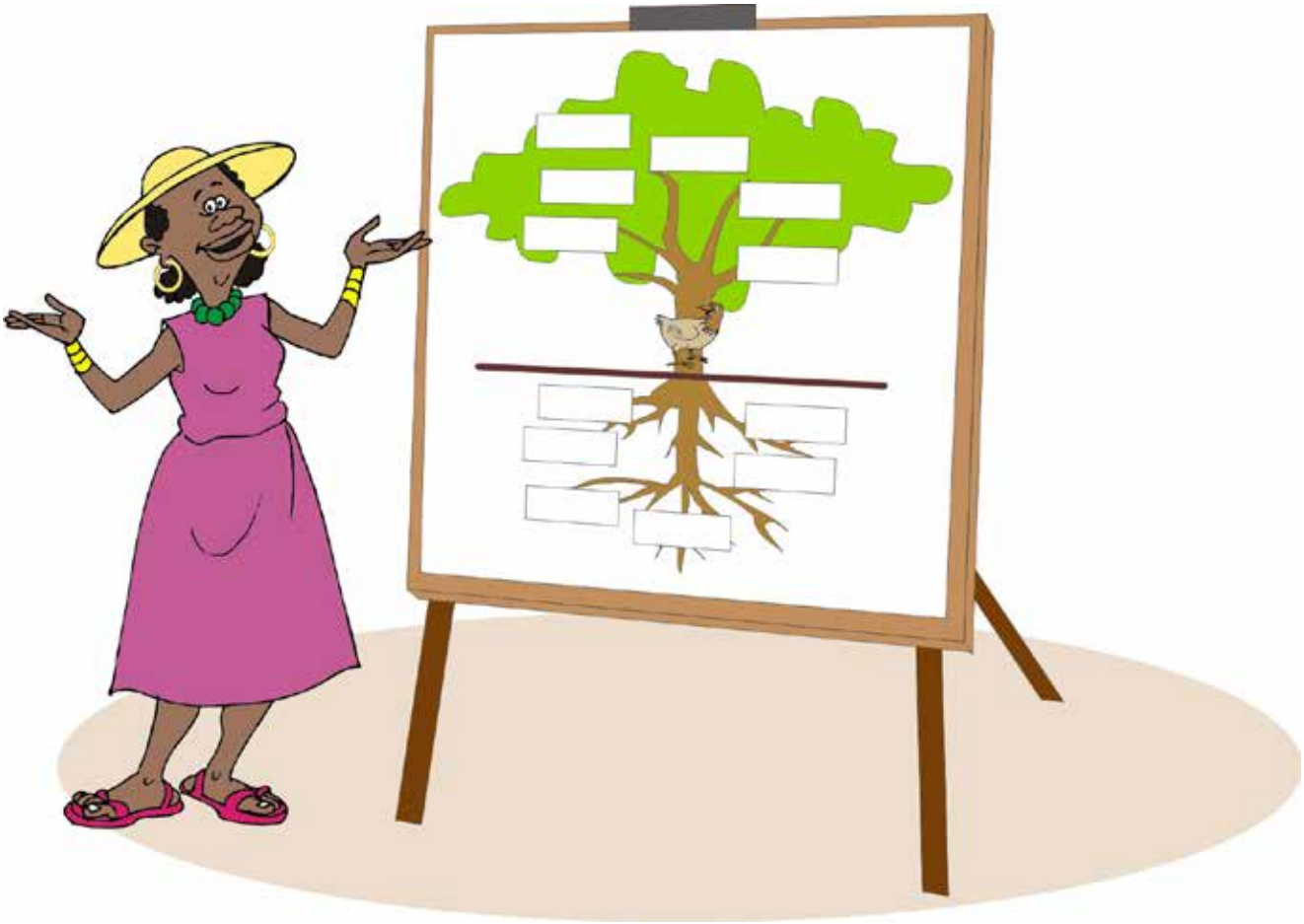
The manual is made up of seven lessons:

1. **Introduction to innovations.** Explains what innovation is and why it is important for smallholder farmers and other rural people.
2. **Identifying and understanding problems.** Deals with how farmers can identify topics to research that can help them solve their most important problems
3. **Exploring possible solutions.** How to look for different solutions and decide which are the best to experiment with.

4. **Designing experiments.** Explains how to set up an experiment with treatments and controls.
5. **Collecting and recording observations.** Deciding on what information to record, how to collect it and how to record it.
6. **Analyzing and evaluating the results.** Methods and tools for making the analysis evaluation of results easy.
7. **Applying findings and sharing knowledge.** Ways for making use of the results of the experiments and sharing with others in the community what you have found.

The seven lessons in this manual can be organized to be done with farmers as they go through the innovation process. Each lesson will take between 1 and 3 hours. See the exercises and farmer lesson plans for ideas on how to present the materials. Feel free to adapt the ideas and exercises where appropriate.

Lessons



LESSON 1. INTRODUCTION TO INNOVATIONS

IN THIS LESSON

After this lesson you will be able to:

- Describe what an innovation is, and why it important for rural people.
- List different types of innovations.
- Describe the role of field agents in helping farmers innovate.
- List the key characteristics of members of an innovation group.

AN INNOVATIVE VILLAGE

Welcome to the village of Desa Baru! Let us introduce you to some of the villagers, and and show you how they are trying to improve their lives.

This is **Albert.** He notices that if he plants maize in a field where he has sown beans the year before, the maize seems to grow better. He decides to alternate maize and beans in his fields from now on.

Beatrice gets some seeds of a new tomato variety from her aunt in another village. She sows them in her garden and is pleased when they produce a bumper crop.

Charity wants to grow the new tomatoes too, but she is not sure if they are any better than the variety she already grows. So she asks for a handful of seeds to sow them in a corner of her garden so she can compare the two varieties.

Dana wants to know if she can sell tomatoes. She goes to the market to find out about prices and potential buyers.

Everett is tired of having to shell maize by hand. He also repairs bicycles, so he has a workshop and some tools. He designs and makes a maize-shelling machine from wood and bits of an old bike.

THE IMPORTANCE OF INNOVATIONS

For rural communities to improve their livelihoods, they have to change the way they do things. They have to grow more and better-quality produce, reduce their costs, and improve how they process and market their harvest. All these changes are **innovations**. They all help to improve people's lives and incomes in some way.

Innovations are also vital for another reason: the **world is changing**. More and more people mean that it is necessary to grow more on the same amount of land. But the soil is degrading and water is becoming scarce. A changing climate means farmers have to plant new types of crops and change the way they produce food. New marketing opportunities are arising, but markets are becoming more competitive and demand better quality.

AN INNOVATION IS AN IMPROVEMENT OR CHANGE IN KNOWLEDGE OR TECHNOLOGY THAT RESULTS IN AN INCREASE OF PRODUCTIVITY OR COMPETITIVENESS OF A GIVEN PRODUCT.

HOW MIGHT INNOVATIONS OCCUR?

Innovations may come about in various ways.

- They may be the result of a **chance observation** – like Albert who saw that his maize grow better after beans.
- They may be **introduced from elsewhere** – like Beatrice and the vegetable seeds from her aunt.
- They may be the result of a **deliberate experiment** – like Charity, who compared the two varieties of tomato.
- They may result from a **survey** – like the one that Dana made of the market for tomatoes.
- They may be the result of an **invention** – like Everett's maize sheller.

TYPES OF INNOVATIONS

Innovations may come into all stages in the production and marketing of farm products:

- **Agricultural technology:** increasing productivity or introducing a new product.
- **Management of the ecosystem** and of the natural resources that are used in the production process.
- **Post-harvest technology**, related to conservation and storage, packaging and transport.
- **Marketing** and the presentation of the product in the market.

ROLE OF RESEARCH, EXTENSION, AND FARMERS

Developing new technologies is one of the main roles of research institutions. Scientists at these institutions study problems, come up with ideas for solving them, conduct experiments to test their ideas, and evaluate their results.

The researchers pass on their findings to extension workers and field agents, who in turn introduce them to farmers.

Does that mean that farmers and other rural people should leave research to researchers?

No – for several reasons:

- **There are only a few researchers**, and they cannot possibly solve all the problems that farmers face.
- **Solutions already exist** for many problems, but rural people often do not know about them. They need to go out and find those solutions.
- **Farmers and other rural people constantly make observations**, develop ideas and take risks to put these ideas into practice. They can make a huge contribution to their own development.
- **Conditions vary** from place to place and from farm to farm. Rural people need to adapt solutions to suit their own soils, climate, abilities and pockets. They can take into account factors that outsiders do not know about or understand.
- **People are much more likely to adopt** ideas that they themselves have identified and tested.

FARMERS PLAY A VITAL ROLE IN GENERATING AND SPREADING INNOVATIONS.

SUGAR FOR SHOES

Here is an example of local people taking into account factors that were important to them.

In Honduras, a well-meaning NGO tried to persuade farmers to plant vetiver grass along the contours on slopes to control erosion. But the farmers' fields were so small that they could not afford to grow anything that did not produce food, fuel, or fodder. Instead, some of the farmers planted sugarcane instead of vetiver along the contours.

When the NGO project ended, farmers who had grown vetiver switched to sugarcane. They harvested and sold the cane in time to pay for their children's school fees, shoes and supplies.

NEEDED: A SYSTEMATIC APPROACH

What the farmers in Honduras lacked was a systematic way to compare different practices and choose the best option for them.

This module shows you how to help farmers identify problems and analyze their causes and effects, find and test solutions, and put these into effect.

It is possible for individual farmers to develop, test and implement innovations on their own. But innovations are more effective and spread faster if rural people are organized to solve problems they face.

A SYSTEMATIC APPROACH CAN MAKE INNOVATION EFFORTS MUCH MORE EFFECTIVE.

ROLE OF FIELD AGENTS

You can support rural people to innovate by helping them:

- Analyze their problems and seek solutions.
- Get organized to obtain information, conduct research, and evaluate and spread the results.
- Monitor and evaluate their activities.
- Develop links with other groups and organizations (such as research institutions) that may be able to support them.

THE FIELD AGENT'S ROLE IS TO FACILITATE, ORGANIZE AND TRAIN PEOPLE

ORGANIZING INNOVATION GROUPS

Not everyone in a farmers' group is likely to be able or interested in doing research. And experiments and surveys are best done by a small number of people. Here are two ways to organize this:

- **Innovation groups.** Help interested members of the community organize as separate innovation groups. These groups can then conduct experiments and spread them to other people in the community.
- **Innovation subcommittees.** Help each farmers' group form subcommittees that focus on innovation. These subcommittees report their findings to their parent group.

Some things to consider when helping such groups or subcommittees get organized:

- **Ensure representation.** Make sure that women and poorer people in the community are adequately represented.
- **Start small.** Encourage the groups to focus on a small number of manageable subjects. It is tempting to try to solve a lot of problems at the same time – or to start with the big problems. But this is not usually realistic.
- **Aim for success.** At first, choose problems that can be solved easily. That builds interest and research skills.
- **Ensure that ideas spread.** Encourage regular, open discussion, and find ways that the innovation groups or subcommittees can share their findings with the wider community.

ORGANIZE GROUPS TO DEVELOP AND TEST INNOVATIONS

WHO SHOULD BE IN AN INNOVATION GROUP?

The size of an innovation group depends on the topic or area it covers. For crops, groups should have at least 10 members, with 15–20 being optimum. Smaller groups of 6–10 are sometimes sufficient for market or post-harvest topics.

Sometimes the members will come from an existing farmers' group such as a farmer field school or marketing group. The innovation group is then a sub-group of the larger group.

Some things to look for in members:

- **Time and resources (land, materials, etc.) to participate.** Testing innovations takes time and perseverance. Members must be enthusiastic and have a vision of the advantages of learning to benefit others in the community.
- **Representativeness.** Aim for a balance in terms of age, gender, wealth and, if relevant, ethnicity. Different people have different ways of looking at a problem and have different ideas of they want in a solution. If the group consists only of men, women may feel that its findings are not relevant to them.
- **Experience and expertise.** At least some members should be

THE INNOVATION GROUP

known locally for their experience and expertise, for instance in growing a particular crop, or making deals with buyers.

- **Experimentation.** In many communities certain people are interested in trying out new ideas. They are always the first to test a new type of seed or try out something they have seen elsewhere. Try to get such people into the group.
- **Communication.** Innovation is not just about experimenting or learning. It is also about sharing findings and encouraging others to adopt them. Members should be good at communicating with their friends and neighbors.

Not everyone in the group will have all of these characteristics. But the group as a whole should have a mix of people with these attributes.

BASIC PRINCIPLES OF A PARTICIPATORY PROCESS

- Play a neutral role. Do not dominate (or allow others to dominate) meetings. Encourage all to express their opinions freely.
- Ensure that the least articulate people (often women) and marginalized members of the community are able to contribute and to benefit.
- Cross-check information by asking different people and using different participatory tools to cover the same issue ("triangulation").
- Learn from different stakeholders and involve them in all stages of the process. Value their knowledge and skills.
- Link with research institutions and other possible sources of information about innovations.
- Ensure that local communities make as many as possible of the decisions. But participatory tools are not an end in themselves: they are a way of finding solutions and should always lead to concrete activities implemented in the communities.
- Make sure that activities are sustainable and continue after outside support has ceased.

USE YOUR PARTICIPATION SKILLS TO ORGANIZE INNOVATION EFFORTS

LESSONS IN THIS MANUAL

The remaining lessons in this manual guide you through the following steps:

- **Lesson 2. Identifying and understanding problems.** How to help local people analyze the problems they face.
- **Lesson 3. Finding more information.** Ideas on where to find ways to solve the problems.
- **Lesson 4. Exploring possible solutions.** Thinking through the implications of various potential solutions.
- **Lesson 5. Designing research.** Planning experiments to test ideas.
- **Lesson 6. Collecting and recording observations.** How to manage the experiment and collect the right types of data.
- **Lesson 7. Analyzing and evaluating the results.** Working out what the findings mean.
- **Lesson 8. Applying findings and sharing knowledge.** Planning what to do with the results.

CONCLUSION

In this lesson we learned why innovations are vital for rural people to improve their income and livelihoods, and to deal with changes in the world around them. There are many types of innovation, and good ideas can come from many different sources.

Farmers and other rural people can play a key role in identifying, developing, testing and implementing innovations as these are things they already do.

Your role as a field agent is to help rural people innovate by making the process more systematic. You can organize innovation groups, either as part of existing community groups, or as stand-alone groups. You can also train them on how to develop and test new ideas. In the next lesson, we'll look at the first step in innovation – how to identify and understand problems.

QUIZ 1

Answers at the end of the guide.

1. Farmers who are well known for trying out new things and observing how some plants grow better than others are good candidates for innovation groups.

   A. True
   B. False

2. The role of the field agent in the innovation process is to:

   A. Make contact with the nearest agricultural research station and obtain the best seeds for farmers to produce.
   B. Make sure that the most advanced farmers, especially those with access to extension and credit services, are part of the innovation group.
   C. Guide the community in selecting innovation group members that have the appropriate experience and expertise, experiment on their own and have the ability to communicate to others what they see and what they learn.
   D. Lead the innovation group through steps that make up the innovation process with the goal of building their capacity to continue the process on their own.

3. Why is innovation important for rural people?

Select all that apply.

   A. It makes an enterprise more competitive
   B. It helps pay school fees
   C. It stops floods from occurring
   D. It builds the capacity to solve problems without depending on others for solutions

4. You need a genius in your group to be innovative.

   A. True
   B. False

5. The field agent's role in supporting farmer group innovation is to:

   A. Assist local communities analyze their situation and problems and find solutions
   B. Assist communities to implement, monitor and evaluate their activities
   C. Help local communities and groups to establish links to other groups and institutions that may be able to support them
   D. Play a neutral role, not dominating or allowing others to dominate meetings, rather encouraging all to express their opinions freely
   E. All of the above

6. Where do the best innovations come from?

   A. Farmers
   B. Researchers
   C. Extension staff
   D. Impossible to say – innovations can come from anywhere

LESSON 2. IDENTIFYING AND UNDERSTANDING PROBLEMS

IN THIS LESSON

After this lesson you will be able to:

- Describe how farmers can prioritize their problems.
- Guide farmers in constructing a problem tree.
- Help farmers choose among ways to solve their top problem.

INTRODUCING ACHIENG

Achieng grows maize and vegetables, she raises chickens, and she keeps a couple of goats for their milk.

Like most farmers in her village, she faces many problems. Her maize does not yield well, pests attack her vegetables, she has too few chickens, and her goats yield only a little milk.

PRIORITIZING PROBLEMS

Achieng and her friends know they cannot tackle all their problems at the same time. Instead, they want to solve one at a time. They decide to focus first on chickens.

The friends list their problems, and then vote on the highest priority. Chickens got nine votes, compared to five votes for maize (Table 1). So Achieng and her friends decide to look for ways to increase the number of chickens.

TABLE 1 PRIORITIZING PROBLEMS

PROBLEM	VOTES	PRIORITY
Poor maize yields	𝍸	2
Cabbage pests	𝍸	3
Too few chickens	𝍸 𝍸	1
Low milk yield from goats	𝍸	4

See Exercise 2a for how to prioritize problems.

UNDERSTANDING PROBLEMS

Chickens are important to Achieng. She and her family eat the eggs, and occasionally kill a chicken to eat. She also sells chickens or eggs in the market, or gives them to friends or visitors.

But only a few chicks ever grow to maturity. Her best hens hatch as many as 15 eggs. But they roam free and search for their own food. The mother hens cannot protect them all, and hawks and other birds of prey steal many chicks.

Plus, many of the villagers' chickens die from Newcastle disease. The women have to build up their flocks again from scratch.

PROBLEM TREES

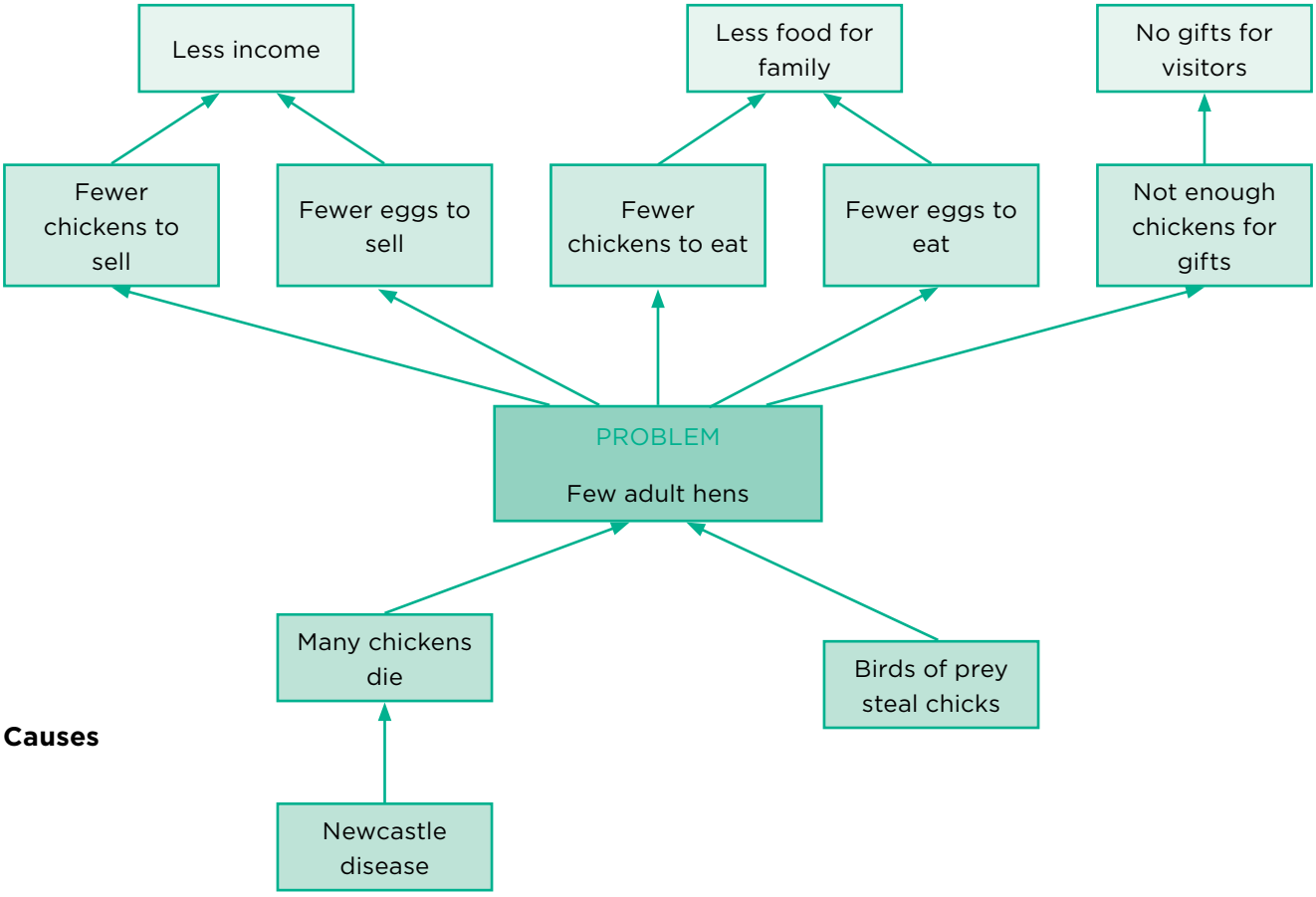
Understanding the root causes of a problem is important to find the most effective solution. One way to do this is build a **problem tree** showing the causes and effects of the problem.

Achieng draws a problem tree for her chicken production. It shows that if she can get more chicks to reach maturity, she can improve her income, have more food for her family, and give presents to her visitors.

Achieng and her friends realize there are two root causes of why so many chicks die: Newcastle disease, and birds of prey.

See Exercise 2b on how to construct a problem tree.

Effects



Causes

ACHIENG'S PROBLEM TREE

CHOOSING POTENTIAL SOLUTIONS

How can Achieng and her friends increase the number of chickens in their flocks? They first list the **root causes**: Newcastle disease and birds of prey (Table 2).

They then note their **current practices**: they do not vaccinate their chickens, and they let the hens and chicks roam around to search for food.

What **potential solutions** did Achieng's group see? In a third column they write "vaccinate" and "protect chicks."

For each potential solution, they then list the **constraints**: the difficulties they see in putting the solution into practice. For vaccine, for example, it is difficult to find someone to supply the vaccine, and it is expensive to vaccinate just a few chickens.

Finally, they suggest some ways of **overcoming these constraints**. They agree to look for a vaccine supplier, and if they find one, to pool their money so they can vaccinate all their chickens at once.

Table 2 summarizes their discussions. They have identified some concrete ways to overcome their problem of too few adult chickens. They do not know yet whether these approaches will work. That is the subject of the next lesson.

See Exercise 2c for how to help farmers choose among topics.

TABLE 2 ACHIENG'S TOPIC SELECTION MATRIX

ROOT CAUSES OF PROBLEM	CURRENT PRACTICE	POTENTIAL FOR IMPROVEMENT	CONSTRAINTS	SUGGESTED TOPICS
Newcastle disease	None	Vaccinate	Finding vaccine Cost of vaccine	Find source of vaccine Pool money to buy vaccine
Birds of prey	Free range	Protect chicks	Lack of time	Keep young chicks under basket Provide feed

CONCLUSION

In this lesson we showed you the importance of identifying and understanding problems and their causes. One way to do this is by drawing a **problem tree**. This tool helps you differentiate between immediate and underlying problems, as well as the causes and effects of a problem. Once you have identified and prioritized problems, the participants should identify and discuss possible solutions.

QUIZ 2

Answers at the end of the guide.

1. In the innovation process, identifying the cause of a problem should be done after the experiment is designed.

   A. True
   B. False

2. Your group has identified soil erosion as a major problem. Which of these are causes of soil erosion, and which are results?

   A. Poor soil fertility
   B. Cutting trees
   C. Silting up of irrigation canals
   D. Landslides
   E. Plowing on steep slopes
   F. Allowing animals to graze freely

3. Which are potential solutions to the soil erosion problem?

Select all that apply.

   A. Fencing off areas to prevent animals from grazing there
   B. Planting trees and grass along the contours
   C. Growing potatoes instead of fodder crops
   D. Building checkdams on gullies

4. Achieng faces many problems on her farm. Match each problem with a possible cause.

PROBLEM	CAUSE
A. Poor maize yields	1. Attacks by birds of prey
B. Cabbage pests	2. Lack of manure
C. Too few chickens	3. Continuous cultivation
D. Low milk yield from goats	4. Poor-quality feed

5. Abbas's group has voted on what problems to tackle. The seven men in the group want to work on "low maize yields", while the five women said "too few chickens" was more important. What do you advise them to do?

   A. Do what the majority (the men) want
   B. Do what the minority (the women) want
   C. Try to deal with both problems

6. Bernard's group are making a problem tree for their mango marketing. They have identified "poor-quality mangoes" as the central problem. Which of the following are potential causes of this problem, and which are effects?

   A. Bad weather
   B. Low mango prices
   C. Mango pests
   D. Few buyers interested

EXERCISE 2A. CHOOSING WHICH PROBLEM TO ADDRESS

This exercise enables the group to determine the most important problem to address. It gives each person the same voice as everyone else. This is important to ensure that the richer or more powerful farmers do not dominate the decision making.

Source: FAO. Piloting farmer field schools

OBJECTIVE

After this exercise the participants will be able to:

- List and prioritize problems and choose which one to address.

EQUIPMENT NEEDED

- Large sheet of paper, marker pens (or blackboard and chalk).

EXPECTED OUTPUTS

- A prioritized list of problems, and agreement on which the farmers wish to address.

TIME REQUIRED

- 1 hour

PREPARATION

- None

SUGGESTED PROCEDURE

1. Divide the participants into small groups of 3–4 people.
2. Ask each group to identify two or three major problems they face in crop or livestock production, processing or marketing.
3. In plenary, ask the groups to report the problems they have identified. Write all the problems on the large sheet of paper, one above the other. Draw horizontal lines between the problems to separate them.
4. Explain to the participants that they each have three votes. They should vote for the three problems that they think are the most important. They vote by drawing a vertical stroke (|) next to each of these three problems.
5. Each of the participants goes individually to the chart to put three strokes next to their priority problems.
6. When everyone has finished, add up all the strokes next to each problem. The problem with the highest score is the one the participants as a whole think is the most important.
7. Review the results to ensure that there is a consensus. Then discuss whether the problems represent the topics they would like to study further and learn about during the farmer field school.

NOTES

Men and women often have very different ideas on what the most important problems are. Consider dividing the group into men and women to do this exercise.

Similarly, cattle owners and crop growers are also likely to think that different problems are important. They may decide to form separate groups to find solutions to their own problems.

You can also do this exercise with illiterate farmers using symbols or drawings to represent the problems. Give each person 3 (or 10) stones or dried beans. Each person votes by putting a certain number of stones or beans against each problem: more for serious problems, less (or none) against less important problems. When everyone has voted, count up the number of stones or beans against each problem to find out which people think is the most important.

EXERCISE 2B. PROBLEM TREE

This exercise enables farmers to analyze the causes and effects of their problems.

OBJECTIVE

After this exercise the participants will be able to:

- Explain the causes and effects of problems, and identify possible solutions.

EQUIPMENT NEEDED

- Large sheets of paper, marker pens (or blackboard and chalk).

EXPECTED OUTPUTS

- Diagram showing the causes and results of a problem.

TIME REQUIRED

- 1 hour

PREPARATION

- None

SUGGESTED PROCEDURE

1. Divide the farmers into small groups. Give each group a large piece of paper and some marker pens.
2. Ask each group to select one **crop or livestock** type that they grow or a **product** they produce (such as maize, milk or coffee). Then ask them to think of the biggest problem they face with this product (e.g., a pest or disease, low yields, or problem with processing). Ask them to write this problem (or draw a picture showing it) in the middle of the large sheet of paper.
3. Ask each group to think of the **results** of the problem. Write each result on the paper and connect them with arrows to show how they relate to each other.
4. Ask each group to think of what **causes** the problem. Write this cause underneath the problem on the sheet. If the group identifies several causes, they should write each one on the paper, and connect them with arrows to show how they relate to each other.
5. Ask each group to present their problem tree to the plenary. Invite the members of the other groups to comment on and ask questions about the trees.
6. Ask the groups to save their diagrams so that they can be used in a later session.

QUESTIONS TO STIMULATE DISCUSSION

- What is your biggest problem with a particular crop or livestock type?
- What are the consequences of this problem? What other problems does it cause? Does one consequence in turn create other problems?
- Why does this problem occur? When does it happen? What causes it? Does something else cause that?

NOTES

Instead of writing on a piece of large sheet of paper, you can use several smaller pieces of paper or cards. Write each problem, cause or effect on one card, then put them on the table or on the ground and move them around so they are in the right order. Show the links between them with sticks or pieces of bamboo or string. This makes it easy to adjust the diagram as you go on. Copy the final diagram onto paper to make a permanent record.

To make the diagram easier to understand, first draw a big tree on the paper. Write the problem on the trunk, the causes on the roots, and the results on the branches and twigs

EXERCISE 2C. SELECTING TOPICS TO STUDY

This exercise enables farmers to select possible solutions to problems that they wish to test.

OBJECTIVE

After this exercise the participants will be able to:

- List various possible solutions to a problem.

EQUIPMENT NEEDED

- Large sheet of paper, marker pens

EXPECTED OUTPUTS

- Table showing potential solutions to the problem.

TIME REQUIRED

- 1 hour

PREPARATION

- Choosing which problem to address (Exercise 2a), Problem tree (Exercise 2b)

SUGGESTED PROCEDURE

1. Invite members of the group to review the results of the problem tree
2. On a large sheet of paper, draw six columns (Table 3). In the leftmost column, ask the farmers to list the main problems they have identified in the previous exercises.
3. For each problem, ask the farmers what they currently do to deal with it. Write these in the second column.
4. Ask the farmers for ideas on how to solve the problem. Write these ideas in the third column.
5. Ask them to think of constraints that make it difficult to put these solutions into effect. List these ideas in column 4.
6. Ask the farmers to suggest ways of overcoming these constraints. Write these in the column 5.
7. Ask the farmers to vote on which solutions they would like to explore further. Note these in the last column.

NOTES

Encourage the farmers to offer their own ideas on how to solve the problems. Prompt them with questions or suggestions if necessary. Feel free to suggest additional potential solutions if they fail to do so.

TABLE 3 FORM TO ANALYZE AND SELECT TOPICS FOR STUDY

PROBLEMS	CURRENT PRACTICE	POTENTIAL FOR IMPROVEMENT	CONSTRAINTS	SUGGESTED TOPICS	PRIORITY

LESSON 3. FINDING MORE INFORMATION

IN THIS LESSON

After this lesson you will be able to:

- List several possible sources of solutions to a problem.

EXPLORING SOURCES OF INFORMATION

Achieng's group knows that chicken farmers in a nearby village faced similar problems and had found solutions. They decide to visit them to find out more about their approach to tackle problems with the chickens.

The visit teaches them a lot about raising chickens. Their hosts tell them about an input dealer who sells vaccine, and shows them how to vaccinate their poultry using eye drops.

They go to visit the dealer. She tells them that for the vaccine to be effective, all the chickens have to be vaccinated at the same time. One bottle of vaccine is expensive, but contains many doses – enough for all the chickens in the village.

WHERE TO FIND SOLUTIONS TO PROBLEMS

You should encourage farmers and other rural people to look for information from as many sources as possible. You can also help them search for information. Here are some possible sources:

Other farmers. Get them to talk to their neighbors, and arrange field visits to other villages and projects.

Innovators. Some farmers are known as innovators: they try out lots of new ideas.

Researchers. Get in touch with a nearby research institute. Even if the scientists cannot answer your specific question, they may know where to go for the information.

Extension workers. Government and NGO extension agents often have training and expertise in specific areas.

Input dealers. They supply seeds and agrochemicals, and may have details on how to use them.

Traders. They may know a lot about markets, prices and commodities.

Business service providers. Organizations such as banks, microfinance institutions and business services can often provide advice on technical, financial and organizational issues.

The internet. Search for the information you need, but make sure it is relevant to your area before passing it on.

Books, farming magazines, and training materials. Check your project or organization library for useful materials.

Experiments. You can help the farmers test promising ideas on a small scale to see if they work. We will discuss this further in the following lessons.

Radio and television. Programs about farming and rural development can introduce people to new ideas.

See Exercise 3 for how to help participants identify promising sources of technical information.

CONCLUSION

In this lesson we covered the different ways farmers can find solutions to their problems. These include people (other farmers, extension workers, researchers, innovators, input dealers, service providers, and traders), and venues (the internet, radio and television, books and magazines, and experiments). Remember that each of these has strengths and weakness, so make sure you have a combination of people and venues when looking for sources of information.

The next lesson will discuss how to explore potential solutions.

QUIZ 3

Answers at the end of the guide.

1. What is innovation?

   A. Innovation is invention

   B. Innovation is a process that takes an invention, adapts it to local conditions and makes it available for use by many people

2. Which of these is likely to be the best source of information on solutions for problems faced by smallholders in your area?

   A. A research institution focusing on high-tech agriculture

   B. A project with smallholders in a neighboring, but much drier, province

   C. A successful group of farmers in the next village

   D. An input supplier who sells expensive chemicals

3. Books and the internet are always good sources of information.

   A. True: They have been checked carefully and are always reliable

   B. False: They often have useful information, but you should always test it to see if it works in your area

4. Hamid is trying to find a solution to pests on his cabbages. Match each statement with the person most likely to say it.

STATEMENT	PERSON
A. "Buy this pesticide to control insects"	1. Researcher
B. "Show me one of the pests so I can see what it is"	2. Input dealer
C. "We have used a spray made of chili peppers"	3. Farmer in neighboring village

5. "For this vaccine to work, all the chickens in the village have to be vaccinated at the same time", says the input dealer. What should Achieng do?

   A. Vaccinate her own chickens, and let her neighbors worry about theirs

   B. Organize all the chicken farmers in the village to vaccinate their chickens

   C. Do nothing – the bottle of vaccine is too expensive and she has too few chickens to make it worthwhile

6. What sources should farmers use for solutions to their problems?

   A. Extension workers and researchers: they have the best answers

   B. The Internet: it has information about everything!

   C. Other villages who have solved similar problems.

   D. Input dealers and traders.

   E. All of the above.

EXERCISE 3. SEEKING TECHNICAL INFORMATION OR ADVICE

This exercise helps participants think of where they can find information about different technologies.

OBJECTIVES

After this exercise the participants will be able to:

- List promising sources of information on various technologies.
- See the advantage of seeking information from outside sources.

EQUIPMENT NEEDED

- Large sheets of paper, marker pens

EXPECTED OUTPUTS

- Lists of promising sources of information on various technologies

TIME REQUIRED

- 1 hour

PREPARATION

- None

SUGGESTED PROCEDURE

1. Divide the participants into groups, and ask each group to choose an enterprise (such as maize growing or raising chickens).
2. Ask the groups to write all the sources of technical information for their enterprise on a large sheet of paper. Go around the groups and prompt them if necessary.
3. Ask them to rank the sources according to how useful they are.
4. Invite each group to present their lists and rankings.
5. Invite the other participants to suggest additional sources of information.
6. Facilitate a discussion about the merits of different information sources.
7. Ask the participants what they think is the best way to approach each of the most promising sources.

QUESTIONS TO STIMULATE DISCUSSION

- Where do you normally go if you need to solve a particular problem?
- Are there any people in the village who are experts? How about individuals or groups in nearby villages? Perhaps someone has a relative who has studied agriculture?
- Can you get information from the radio, newspapers, magazines, the internet?
- Does the local extension office offer training? Is there a research institution nearby?
- Can seed dealers or traders offer any information?

Other farmers

Extension workers

Business service providers

Radio and television

Innovators

Input dealers

The internet

Experiments

Researchers

Traders

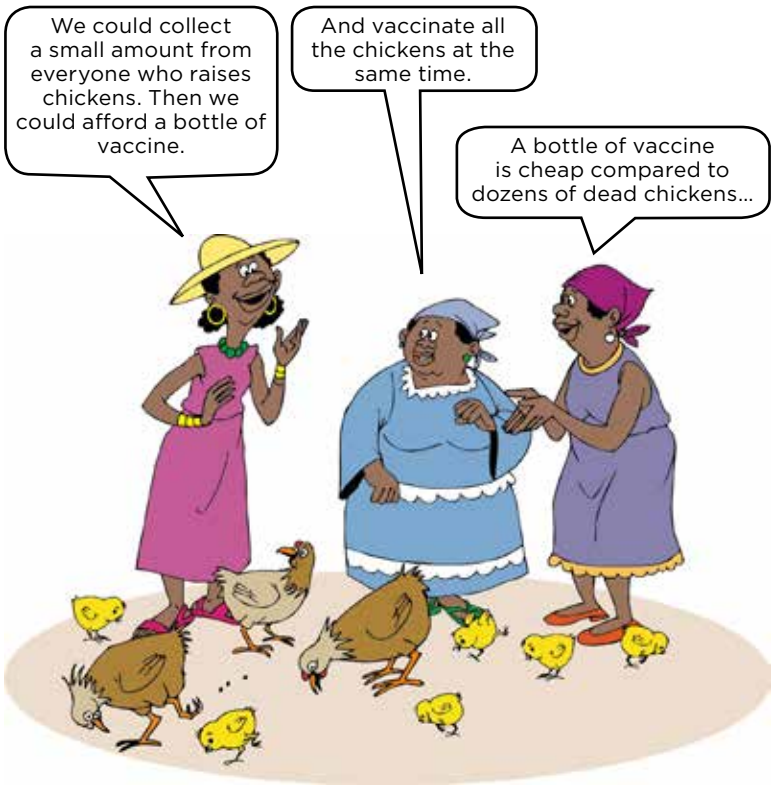
Books, farming magazines, and training materials

LESSON 4. EXPLORING POSSIBLE SOLUTIONS

IN THIS LESSON

After this lesson you will be able to:

- Give examples of an all-or-nothing technology and one that can be tried out on a small scale.
- Describe how to help farmers find out about all-or-nothing technologies
- List the likely benefits and disadvantages of an innovation



PUTTING IDEAS INTO PRACTICE

Achieng's group discuss the idea of vaccinating against Newcastle disease.

If the farmers are confident that the solution will work, they may decide to put it into practice straight away.

You may need to help them get organized to pay for inputs (like vaccine), coordinate activities, contribute labor, or pool their produce for marketing.

ALL-OR-NOTHING TECHNOLOGIES

It is not realistic for Achieng's group to try out the vaccination on a small scale. To be effective, all the chickens have to be vaccinated. It is a question of all, or nothing.

Some technologies are naturally large-scale. Farmers have to adopt these technologies in full: it is not possible to try them out on a small scale.

Examples are new irrigation schemes, erosion-control measures, and expensive equipment.

To help the farmers decide whether they want to adopt these technologies:

- Organize visits to other villages which already use these technologies.
- Arrange for specialists (such as researchers, extension agents, or input suppliers) to talk to the farmers.
- Make sure that the farmers understand how to use the technology and what they have to do to make it a success. Arrange training for them if necessary.
- Discuss with the farmers the implications of the technology: the costs and benefits, the pros and cons.

SOME TECHNOLOGIES, LIKE THIS IRRIGATION CANAL, ARE ALL-OR-NOTHING

TRYING THINGS OUT ON A SMALL SCALE

But many technologies are not all-or-nothing. It is possible to try them out on a small scale first, and it is a good idea to do so. That helps people decide whether to adopt them. It also helps people learn about the technique and builds their confidence in it. It lets people adapt the technique to suit their needs, and keeps the cost low if it does not work.

These technologies include new crop varieties, practices such as plant spacing and timing of planting, ways to control pests, treatment of diseases, feeding of animals, and so on. You can help the farmers organize experiments so they test these ideas.

OTHER TECHNOLOGIES, SUCH AS A NEW CROP VARIETY, CAN BE TRIED OUT ON A SMALL SCALE

IDEAS TO TEST

During her visit to the neighboring village, Achieng notices some baskets made of bamboo. How about if she kept the young chicks under such a basket to protect them from birds of prey? She discusses this with Dorcas and Josephine, two other members of the group.

This is a technology that the farmers can test on a small scale. They could put a few hens and their chicks under baskets to see if it helps the chicks survive. If it works, they can then gradually use baskets to protect more and more chicks.

THINKING OF IMPLICATIONS

But keeping the chickens confined under baskets might result in two new problems: feeding them, and avoiding pests and diseases.

How can you help Achieng and her friends decide whether to use the baskets?

Help the farmers think carefully about the implications.

- What are the advantages and disadvantages?
- Does this solution fix the problem they are concerned about?
- Does it require something they do not have?

- Has anyone in this neighborhood tried it?
- Why did it work for that farmer?
- How much time and money will this solution save (or cost)?
- Can they change it to suit their own needs?
- Are they willing to experiment with it?

Achieng lists these considerations in a table (Table 4).

See Exercise 4 for one way of guiding participants how to do this.

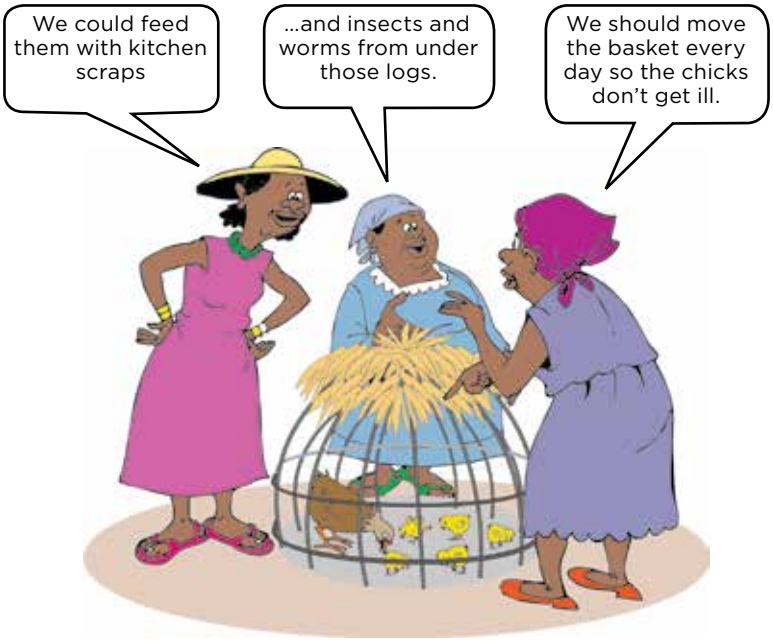


TABLE 4 CONSIDERATIONS AND LIKELY RESULTS OF CONFINING CHICKS UNDER BASKETS

PROBLEM	Chicks eaten by birds of prey
SOLUTION	Keep chicks under a basket
CONSIDERATIONS	**LIKELY RESULTS, COMMENTS**
Cost	Moderate cost: use local materials to weave baskets
Labor	High cost: finding food is labor-intensive
New knowledge/skills?	Low
Effectiveness	High: effective against birds of prey
Simplicity	Simple
Possible benefits	High: • More mature chickens = more to sell = more income • More mature chickens = more eggs and meat = more food for family • Collect droppings to add to compost
Possible negative impacts	High: • Lack of feed • Risk of pests and diseases

POSITIVE AND NEGATIVE CONSEQUENCES

Help the farmers think of all the possible positive and negative consequences.

- **How will it affect the farm?** Growing more of one crop may mean producing less of another.
- **How will it affect the ecosystem?** Clearing land to plant a crop may result in erosion or destroy trees that serve as a windbreak.
- **How will it affect the household's finances?** Can they afford the investment? Can they take the risk?
- **How will it affect men, women and children?** Will it mean more work for someone?

CONCLUSION

In this lesson we showed you how some innovations are **all-or-nothing**: it is not possible to try them out on a small scale. Help local people become familiar with them by organizing visits and training, and getting them to discuss the pros and cons, and thinking through the implications. Other technologies can be tried out on a **small scale**. Help the local people to decide which of these they want to test, and how to organize the trials.

In Lesson 5 we'll show you how to design a research experiment to test potential solutions to the problems faced by farmers.

QUIZ 4

Answers at the end of the guide.

1. Which of these technologies is it easy for a group of smallholders to try out on a small scale?

   A. Diverting a river to irrigate crops
   B. Testing new varieties of crops
   C. Removing vegetation that harbors biting flies
   D. Building a road to improve access to market

2. Achieng's group has listed some possible constraints to keeping chicks under baskets. Which is not likely to be a problem?

   A. It will be necessary to feed the chicks
   B. The group will have to make baskets
   C. The chicks may fall ill if the basket stays in the same place
   D. The neighbors may complain about the noise

3. Here are some positive and negative consequences of starting to keep dairy cattle. Put each one into the correct category.

CONSEQUENCES	CATEGORY
A. We will need a loan to buy equipment	1. Farm
B. We can use the dung to fertilize the fields	2. Ecosystem
C. It will be more work for the women who feed the animals and do the milking	3. Finance
D. We will have to grow fodder to feed the cows	4. People

4. Achieng and her friends are considering using a vaccine against Newcastle disease in their chickens. "It's all or nothing!" she says. What should she and her friends NOT do?

   A. Visit a neighboring village to see how to use the vaccine
   B. Get advice from the field extension agent
   C. Talk to the input dealer
   D. Vaccinate a few chickens to see if the vaccine is effective

5. "We must put all the chickens under baskets to protect them against birds of prey," says Achieng. Is she right?

   A. Yes: only then can they see if the baskets are effective
   B. No: they can try it with a few baskets first

6. Here are some negative consequences of some new technologies. Match each technology with its possible consequences

TECHNOLOGY	POSSIBLE CONSEQUENCES
A. Vaccinating chickens	1. Erosion
B. Keeping chickens under baskets	2. High cost
C. Growing more crops to sell	3. Fewer crops to eat
D. Clearing land to plant crops	4. More work for women

EXERCISE 4. EXPLORING POSSIBLE SOLUTIONS

This exercise helps participants explore possible solutions to their problems by identifying positive and negative characteristics. You can use this exercise for both all-or-nothing technologies and ones that participants can try out on a small scale.

OBJECTIVE

After this exercise the participants will be able to:

- Explore possible solutions to their chosen problem.

EQUIPMENT NEEDED

- Large sheets of paper, marker pens

EXPECTED OUTPUTS

- A list of criteria to decide whether it is worth pursuing a potential solution to a problem.

TIME REQUIRED

- 1 hour

PREPARATION

- Exercise 2c **(**Selecting topics to study**)**

SUGGESTED PROCEDURE

1. Remind participants of the problem they had chosen and the solutions they had identified (in Exercise 2c). Explain that they will now explore these solutions in more detail. Discuss why it is important to think of positive and negative consequences of an innovation before implementing it.
2. Ask the participants to think of the criteria they would use to judge an innovation: things like the cost, feasibility, effectiveness, amount of work needed, ease of use, benefits, problems it might cause, and so on. List these criteria on a large sheet of paper.
3. Divide the participants into groups, and ask each group to select a problem they want to solve.
4. Ask them to think of between one and three possible solutions to the problem. Get them to draw a table like Table 5 on a large sheet of paper, with one column for each potential solution.
5. Ask them to list the criteria from Step 2 (above) in the first column of their table.
6. Invite them to fill in the remaining columns in the table with the likely results and any comments (see Table 4 for an example). If the group is evaluating more than one potential solution, ask them to compare among them.
7. Invite the groups to report on their discussions to the plenary.
8. Highlight those considerations that the groups thought were most important. Which potential solutions appear to be the most promising, and why? Which ones would they reject, and why?
9. If the group evaluated more than one solution, ask them to select the one that they would like to pursue further.

TABLE 5 FORM FOR EXPLORING POSSIBLE SOLUTIONS TO A PROBLEM

PROBLEM						
CONSIDERATIONS	**Solution 1:**		**Solution 2:**		**Solution 3:**	
Cost						
Labor						
New knowledge/skills needed						
Effectiveness						
Simplicity						
Possible benefits						
Possible negative impacts						
Other considerations						

LESSON 5. DESIGNING RESEARCH

IN THIS LESSON

After this lesson you will be able to:

- List different types of research.
- Explain what is meant by "treatment" and "control", and explain why a control is necessary.
- List six principles to remember when designing research.
- Describe some research subjects in crop growing, livestock raising, post-harvest processing, and marketing.
- Design an experiment to test a simple technology.

WHAT IS RESEARCH?

"Research" sounds as if it is complicated, expensive and demands lots of skill and specialist equipment. Some research is indeed like this – it is best done by scientists in research institutions.

But other types of research are simpler and easy to do. In fact, **many farmers do research every season**: they try out new crops, they look for ways to increase their yields, and they seek out information on the best prices. **All these things are research!**

IT'S NOT JUST SCIENTISTS WHO DO RESEARCH... FARMERS CAN DO IT TOO!

TYPES OF RESEARCH

Here are some types of research that farmers and other rural people can do easily.

Crop experiments: testing crop varieties, planting and harvesting dates, plant spacing, fertilizer applications, pest and disease management...

Livestock trials: testing new breeds or species of animals, different types of feed and housing, ways to control pests and diseases...

Post-harvest processing trials: testing ways to harvest, dry and store crops, methods to process the output...

Market research: gathering information about potential markets, prices, standards and value chains.

We will look first at crop experiments before returning to Achieng's group to look at livestock trials. At the end of this lesson we look at post-harvest processing and market research.

CHOOSE AN APPROPRIATE COMPARISON

Suppose you want to test a new maize variety. You buy some seed and sow your field. You wait for it to grow, and then you harvest it and count how many bags you store. You find you have 20 bags. But last year you harvested 25 bags of the old variety. You conclude that the new variety is no good.

But wait a moment! Maybe the weather last year was better. Maybe the old variety would have produced only 15 bags this year. And come to think of it, you applied more fertilizer last year. And some cattle broke into your field just before harvest this year and trampled some of the crop.

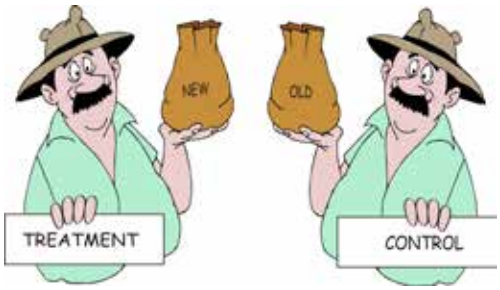
Comparing one year with another is not a good idea: there are too many other factors that may affect the yield. You need a **better way** to compare the two varieties.

AN EXPERIMENT SHOULD COMPARE ONE THING WITH SOMETHING ELSE.

TREATMENTS AND CONTROL

To account for other factors, you decide to split the field in two: you plant one half with the new variety, and the other half with your old one. You plant both halves the same day, and you apply the same amounts of fertilizer to each half. You can now compare the yield from the two halves of the field, and be confident that the difference is because of the variety, and not the weather or some other factor.

In research jargon, the new variety is called the "treatment," while the old variety is the "control."



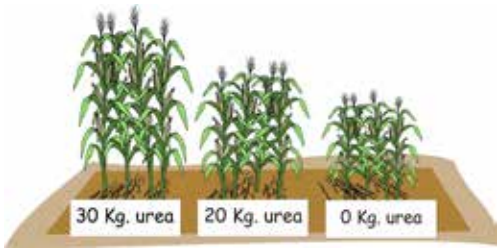
NEW TECHNIQUE TO TEST = TREATMENT

WHAT FARMERS ALREADY DO = CONTROL

MORE THAN ONE TREATMENT

Now suppose that you want to test two new varieties at the same time. You would then have **two treatments** (the new varieties) and **one control** (the old variety). You split the field into **thirds**, and plant one-third with each type of seed.

Of maybe you want to test different amounts of fertilizer: you normally apply 30 kg of urea per hectare, but want to see if more or less fertilizer would give you a bigger yield or earn more money.



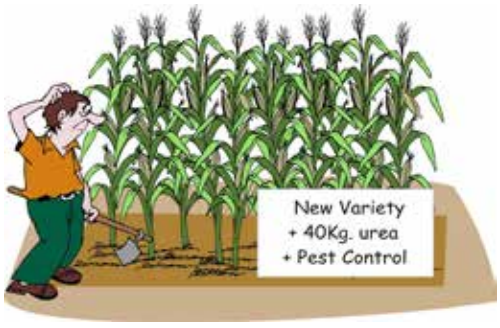
TESTING THREE FERTILIZER DOSAGES

KEEP IT SIMPLE

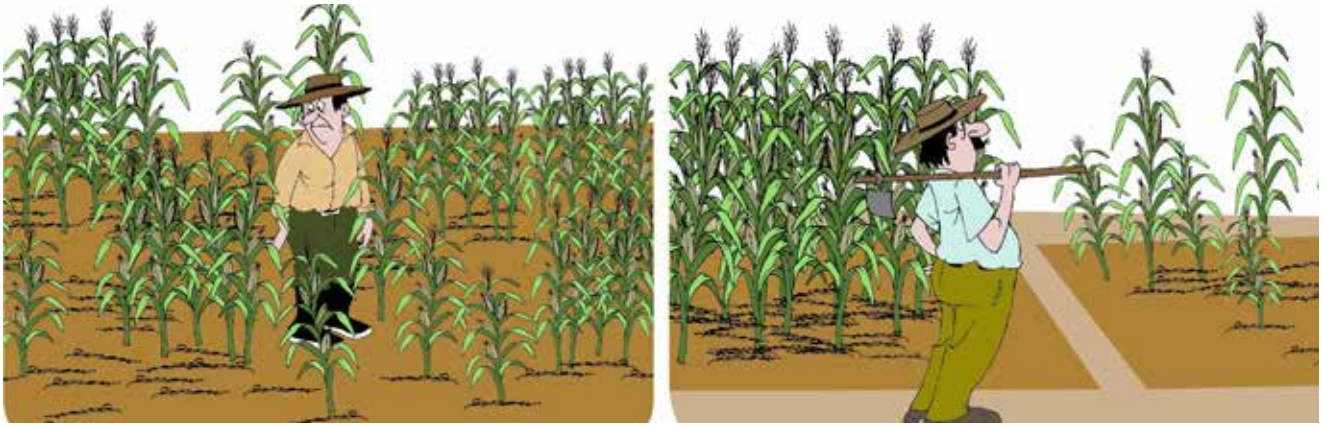
Imagine you want to test a new variety, different fertilization rates, and a new pest-control technique on your maize. Should you test them in the same field at the same time?

No. That would cause confusion. How would you tell what caused a good yield: was it the variety, the fertilizer, or the pest-control method? Or some combination of all three?

It is better to keep it simple and **test one thing at a time**. Choose which you want to test first (say, the varieties), then wait till next season to test the fertilizer rates or the pest-control methods. If you cannot wait that long, test the varieties in one field, the fertilizer rates in another field, and the pest-control in a third field.



TEST ONE THING AT A TIME: EITHER VARIETIES, OR FERTILIZER RATES, OR PEST CONTROL METHODS, BUT NOT ALL TOGETHER



STARTING SMALL REDUCES YOUR RISKS IF SOMETHING GOES WRONG

START SMALL

It can be risky doing an experiment on a whole field. What if the new variety fails completely? The whole family may go hungry.

Instead of using a whole field for your experiment, you can save money and reduce the risk of failure by setting aside just a small part of the field.

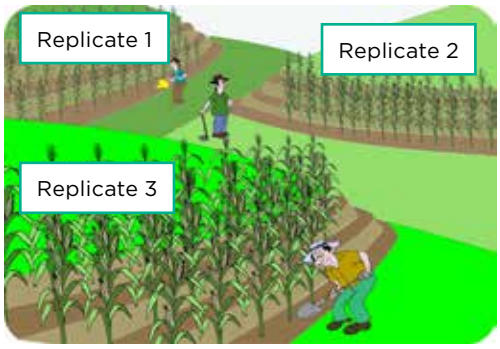
Measure out several plots carefully – say, 10 m by 10 m, and mark them with sticks. Sow one variety in each plot. Put a sign next to each plot so you know what variety you have sown there.

REPEAT EXPERIMENTS

You plant two plots: variety A in plot A, and variety B in plot B. At harvest time, you find that variety A yields more. You conclude that it is better than variety B.

But wait: maybe something else caused the higher yield in plot A. Maybe the soil there is more fertile. Maybe it is further down the slope, so gets more water. Perhaps the soil is deeper and less stony. Maybe plot A gets more sun, or is more sheltered from the wind. Or perhaps your neighbor's cattle broke through the fence again and trampled the plants in plot B.

How to avoid such chance factors ruining your experiment? The answer is to repeat the experiment in several different places. In research jargon this is called **replication**.



REPLICATING EXPERIMENTS GIVES YOU CONFIDENCE IN THE DATA

If possible, repeat the experiment in three different places. Here are two ways to do this:

- Get three farmers to plant the test plots on their land. Try to make the plots as similar as possible: on similar soils, slopes and cropping history.
- If you want to test three varieties, plant nine plots in a field: three for each variety.

MAKE THE PATTERN RANDOM

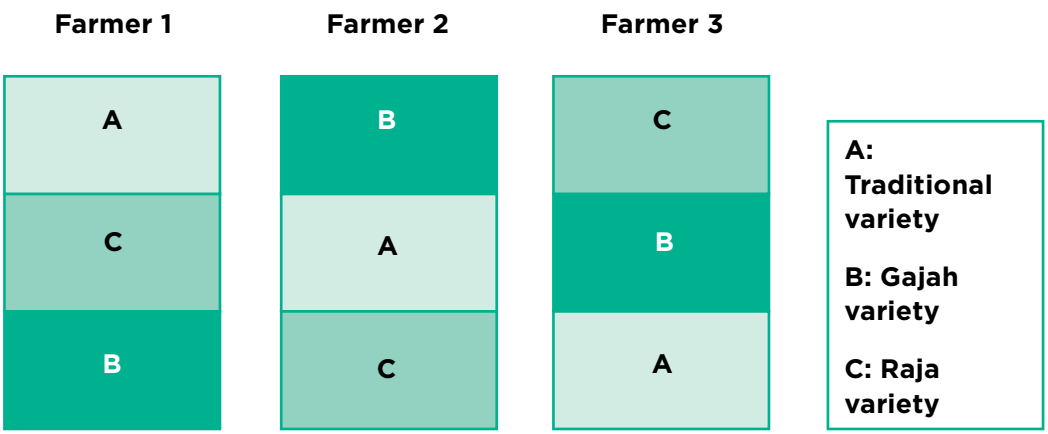
If you repeat (**replicate**) the experiment, make sure the treatments are in a different order in each of the plots. You should assign the plots at random – by chance.

For example, three farmers plant test plots with three different varieties, A, B and C. Their farms are all on a slope. They lay out their plots like in the figure below.

DECIDE WHICH VARIETY GOES IN WHICH PLOT AT RANDOM. THAT AVOIDS FACTORS LIKE SLOPE OR SOIL FERTILITY FROM AFFECTING THE RESULTS OF THE EXPERIMENT

KEEPING RECORDS

Keep careful records of what you have sown, the dates of sowing, weeding and harvesting, etc. Make a sketch of the plots so you know what treatment is in what plot – in case the signs get lost or mixed up.



KEEP A CAREFUL RECORD OF WHAT TREATMENT IS WHERE

LIVESTOCK TRIALS

Let us now look at how Achieng's group applies these principles to test using baskets to protect chicks from birds of prey.

1. **Choose an appropriate comparison.** The women need to compare the confined chicks (the treatment) with those that are free to roam as usual (the control).
2. **Start small to reduce the risk of failure.** They start with just two clutches of chicks per person. They each take two hens that hatch about the same number of chicks – about 10 chicks so there are plenty of chicks at the start of the experiment. They put the hens and chicks under baskets.
3. **Keep it simple.** They test just a single innovation: the baskets. As far as possible, they keep everything else the same as for the free-roaming chickens: the same feed, the same amount of water, and so on.
4. **Repeat the experiment.** Achieng, Dorcas and Josephine all do the experiment in

their own backyards with two hens and their chicks. That gives them six replicates – enough to get a good idea of whether the baskets are effective at protecting the chicks.

5. **Make the pattern random.** The women agree to move the baskets each day so the chicks can scratch in a new place and so they do not have to walk on their own droppings. That will keep them clean and healthy. It will also avoid problems like having the baskets in the sun all the time – which might affect the chicks' survival.
6. **Keep records.** The women keep a careful record of the number of chicks under the baskets, the number that run around free, and how many of each are lost. They also note how much time they spend collecting feed for the chicks, and the chicks' general health and vigor.

LIVESTOCK TRIALS FOLLOW THE SAME RULES AS CROP EXPERIMENTS

EXPERIMENTS WITH LARGER ANIMALS

Doing experiments with chickens is relatively easy. But experiments with cattle and other animals are difficult because farmers only have a few and each animal is valuable. The farmers cannot risk even a small drop in productivity.

Some ways around this:

- **Test fodder and feeding.** Fodder production is important, and farmers may be interested in doing tests on improved fodder, pasture production and livestock feeding.
- **Compare existing practices.** Instead of doing an experiment, the farmers could visit different farms to observe traditional and new livestock management practices.
- **Compensate for losses.** A group of farmers could agree to compensate members who suffer lost production if an experimental treatment fails.

BE CAREFUL WITH TRIALS WITH BIG ANIMALS: THEY ARE VALUABLE!

POST-HARVEST PROCESSING

You can also design experiments to test different types of handling after harvest. Some examples:

- **Drying and preservation:** What is the best way to dry grain or preserve a crop? How long should you dry grain for?
- **Storage:** What is the best way to store a crop? How can you protect it from pests or mold?
- **Processing methods:** How best to process the crop? How to increase its value so it fetches a higher price?
- **Quality tests:** Which variety produces the best-quality output? Which has the best taste or fetches the highest price?

AN EXPERIMENT ON GRAIN STORAGE

MARKET RESEARCH

It is important that farmers study the market for the products they are thinking of producing.

Sources of information include:

- Buyers, traders, wholesalers, processors, retailers, consumers.
- Research and extension organizations.
- Banks and microfinance institutions.
- Input suppliers, business service providers.
- Mobile phones, market information services, radio, internet.

RESEARCH IS A VITAL PART OF MARKETING

Things to study:

- **Different products:** prices, quality requirements and standards, amounts needed, packaging requirements, terms of delivery and payment.
- **The value chain:** the chain of people and organizations who buy, process and sell the product, from the farmer to the consumer.
- **Service providers:** people and organizations who provide services to the value chain, such as finance, transport, processing, information and inputs.

IDEAS FOR MARKET RESEARCH

- **Conduct a simple survey** of sample of people who might purchase the product. That can reveal consumer preferences, needs and constraints, what they are willing to pay, and how many might buy the product.
- **Use mobile phones** to get information on prices from urban markets to inform negotiation of farm-gate prices.
- **Learn from others** who specialize in the product or have started a similar enterprise.
- **Talk to extension and local NGO staff** who have experience in marketing.
- **Form a marketing research team** to gather information to share with the wider community.

For more information on market research, see the training module on Marketing.

SELLING PIGS OR MAKING BREAD?

Here is an example of the difference market research can make.

A group of Nicaraguan women have formed a community savings and lending group. Over the last 6 months they have collected some savings. They decide to try a small business together.

Their first choice is to raise pigs, which fetch a high price. But the group's field agent recommends they first do a simple market survey. She explains how to identify market opportunities and evaluate costs, benefits and feasibility.

The group discovers that pigs need a lot of water – which is scarce in their village. But the small shops in three nearby villages never have enough bread. So the group develops a business plan and use their savings to build clay ovens and a small shed. They now bake bread and sell it twice a week.

CONCLUSION

In this lesson we've learned about how farmers and other rural people are already experienced researchers: they try out new things every season. We also covered the different types of research farmer groups can carry out including crop experiments, livestock trials, post-harvest processing, and market research. Remember that when planning an experiment, choose one or more "treatments" (new techniques) and compare them with what the farmers already do (the "control"). In order to learn from the experiments, keep them simple by testing only one thing (such as type of crop variety or amount of fertilizer) at a time. Also, start small, and repeat ("replicate") experiments to make sure the findings can be relied on.

Lesson 6 will show you how to collect and record the information you gather from the experiment.

QUIZ 5

Answers at the end of the guide.

1. Who can design and do a successful experiment?

   A. Extension agents
   B. University scientists
   C. Farmers
   D. All of the above

2. When designing an experiment, one should...

Select all that apply.

   A. Replicate treatments on different plots or farmers' fields
   B. Randomize the pattern of replicated treatments to reduce bias
   C. Study many factors at one time to gain more results per experiment

3. The field agent has to have experience in setting up agricultural experiments to be able to facilitate the innovation process effectively.

   A. True
   B. False

4. In an experiment, you should do everything you can to make sure the treatment produces a higher yield than the control.

   A. True
   B. False

5. "To find out if the new variety yields more, just sow a field. That will give you all the information you need!" says Dr Abdullah. Is she right?

   A. Yes. If the crop yields well, you should plant more next season.
   B. No. You need to compare it with the variety you normally plant to see the difference.

6. Mary's group wants to run an experiment on planting onions. Mary says they can test two things at the same time: onion varieties and fertilizer application. Henry says it is better to test these things separately. Who is right?

   A. Mary. They can save time by testing these in the same field at the same time
   B. Henry. It is easiest to test varieties and fertilizer separately

EXERCISE 5. DESIGNING AN EXPERIMENT

This exercise leads the participants through designing an experiment. It is best if the participants can plan an experiment that they will then put into practice. But you can also use the exercise to plan hypothetical experiments. In this case, try to make them as realistic as possible.

OBJECTIVE

After this exercise the participants will be able to:

- Plan an experiment involving a crop or type of livestock

EQUIPMENT NEEDED

- Large sheets of paper, marker pens

EXPECTED OUTPUTS

- A design for an experiment

TIME REQUIRED

- 1 hour

PREPARATION

- Exercise 4 (Exploring possible solutions)

SUGGESTED PROCEDURE

1. Ask the participants to recall the problem and solutions they discussed in Exercise 4, and the priority solution they wished to pursue further. Tell them that they will now design an experiment to test whether the solution is indeed better than the current practice.
2. Invite the participants to get back into the groups they were in for Exercise 4.
3. Ask the groups to design an experiment to test their priority solution.
   - The experiment should contain: one or more "treatments" (new technologies they wish to test), and a "control" (the current practice).
   - It should be simple and small.
   - It should have at least three replications.
4. Ask the groups to present their plans to the plenary. Facilitate a discussion of their plans.

QUESTIONS TO STIMULATE DISCUSSION

- Why is it important to start small?
- What can happen if the comparison you make is not appropriate or fair?
- Is the experiment simple enough? Or does it try to test too many types of innovations at the same time?
- What types of information should be observed and recorded?
- Why is it important to conduct an experiment more than once?

LESSON 6. COLLECTING AND RECORDING OBSERVATIONS

IN THIS LESSON

After this lesson you will be able to:

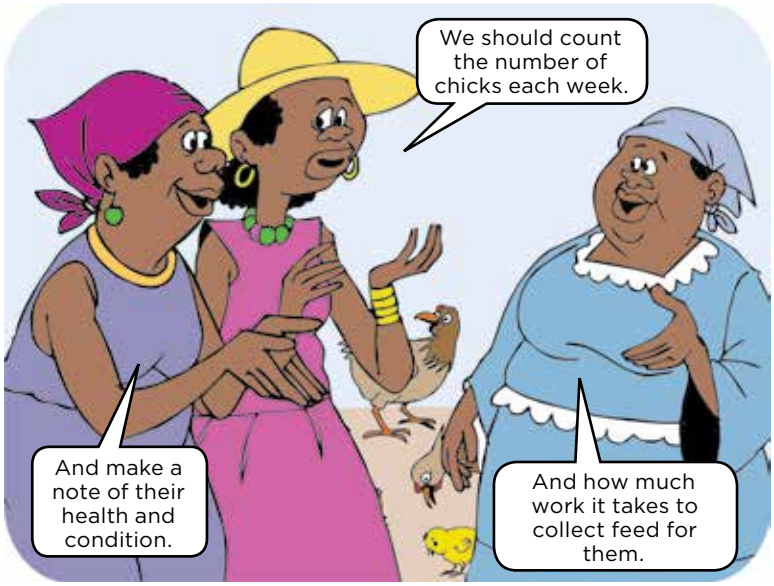
- Describe some things to measure in an experiment to test crop yields.
- Explain how to measure each thing.
- Design a form to record data from an experiment.

DECIDING WHAT INFORMATION TO COLLECT

Achieng's group is deciding what information to collect on their experiment.

It is important to keep good records of an experiment. Things to decide:

- What do you want to count or measure?
- How will you measure it?
- When (and how often) should you measure it?
- How to keep records?



WHAT DO YOU WANT TO COUNT OR MEASURE?

Achieng's group decides that they need to record three types of information:

- The number of confined and free-roaming chicks that survive over an 8-week period
- The general health and vigor of the confined and free-roaming chicks
- The labor required to feed the chicks.

They will need to record the first two types of information for both the confined and the free-roaming chicks. They will have to record labor only for the confined chicks, since the free-roaming birds look for their own food.

DECIDING WHAT DATA TO COLLECT

OBSERVATIONS FOR CROP EXPERIMENTS

The observations will depend on the type of experiment. If you are comparing a local maize variety to two new varieties, the observations might include:

- Dates of planting, weeding, and harvest.
- Amount, type, and dates of fertilizer application
- Number of plants that show pest or disease symptoms, type and severity of infection (each week)
- Plant height (each week)

- Number of plants harvested (at harvest)
- Weight of cobs harvested (at harvest).

Note that you are only really interested in the weight of the cobs harvested. But things like pest and disease attacks are important too: they will help you interpret the results of the experiment and decide whether to adopt the new variety.

Recording this other information also shows whether all the plots are treated the same.

It is tempting to collect lots of information from an experiment. But that takes time and effort, and makes it harder to analyze the results. It is better to measure just the most vital things, and make a note of other things as you notice them.

DON'T TRY TO COLLECT TOO MUCH INFORMATION

HOW WILL YOU MEASURE IT?

You need to decide exactly how and when to measure or count each observation.

For example, how do you measure plant height? From the ground up to the growing tip? Or up to the top of the highest leaf (which may be higher). Do you use a tape measure?

How do you measure maize yield? Do you count the number of cobs? Do you weigh the grain? Before husking or after husking or shelling? Before or after drying? Are your scales accurate? If you count bags, how many kilograms does each bag contain? Are the bags a standard size?

DECIDE WHAT TO MEASURE AND HOW TO MEASURE IT

WHEN AND HOW OFTEN TO MAKE OBSERVATIONS?

It is a good idea to visit experiment plots regularly – perhaps each week. That lets the group observe what is happening to the crop (or the animals, if it is a livestock trial) and maintains their interest in the experiment. Observing the crop carefully also increases their awareness of certain aspects, such as how a pest may damage a crop over time.

Some types of information need to be collected regularly: plant height, pests and diseases, weed problems, and health of animals.

Other types of data need to be noted only once: planting and harvesting dates, amount of fertilizer used, and yield.

TIPS FOR DATA COLLECTION AND OBSERVATION

Take all measurements under the same conditions, using the same methods.

Be as uniform as possible when applying treatments and collecting data.

Collect data from each plot separately: do not add together the plots with the same treatment. (You may do this at the end of the experiment if it is clear that there have been no problems in running the experiment.)

Note additional useful observations: the weather, types and amount of weeds, pest damage, soil conditions, dates of weeding and fertilizer applications, things that went wrong, diseases, chemicals applied, and who worked on which plots.

HOW TO RECORD INFORMATION

Some tips:

- Individual sheets of paper can easily get lost. Instead, use a sturdy exercise book that is big enough to record all the observations you make for your experiment.
- Use separate pages for different record sheets.
- Always include the date that observations are made.
- If more than one person is recording the information, have a space on the sheet for that person's name.
- Record observations immediately when they are made. Write them directly in the book, not on a scrap of paper to be transferred later.
- Write the observations neatly and clearly.
- Do not change or erase an observation that you made earlier. Instead, write a note or clarification with the correction.

DESIGNING FORMS FOR RECORDS

You need to design forms so you can record your observations. Here is the form Achieng's group design to record the number of chicks (Table 6).

The women decide to count the chicks every Saturday evening when they get back from the market.

The form has two columns: one for the **treatment** (chicks confined under baskets), and one for the **control** (free-roaming).

There is one row for each week, up to 8 weeks (when the chicks will be big enough to fend for themselves).

There is an extra row at the bottom so they can calculate percentages.

Each of the three women copies the blank table into their own exercise book.

TABLE 6 FORM FOR RECORDING CHICK SURVIVAL

Start date		End date	
WEEK		**UNDER BASKETS**	**FREE-ROAMING**
Number hatched			
Number of chicks alive at end of week	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
Percent of chicks surviving (number of chicks alive at 8 weeks, divided by number of chicks hatched x 100)			

RECORDING HEALTH OF CHICKS

The women also want to compare the general health and vigor of the confined chicks with those that are free. They record things like the condition of the chicks' feathers, their relative size, and whether or not one group looks healthier than the other (for example, one clutch might be sluggish and the other active).

They will collect this information once a week, at the same time as they count the chicks.

They decide they can record their observations about the comparison on a single line (Table 7).

TABLE 7 RECORD SHEET FOR OBSERVATIONS ON THE CHICKS' HEALTH AND VIGOR

WEEK	COMMENTS
1	
2	
3	
4	
5	
6	
7	
8	

RECORDING LABOR

Recording labor can be tricky: for work that is done throughout the day, it is difficult to remember accurately how many minutes someone spends. It is even more difficult to remember how much time one spent yesterday or the day before.

Some guidelines:

- Record each task and the amount of time it takes to do it.
- Update the records every day.
- If several people do the work, keep a note of how long each one takes.

Table 8 shows a form to use or adapt.

TABLE 8 RECORD SHEET FOR DAILY LABOR

WEEK	MINUTES TAKEN							
	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
1								
2								
3								
4								
5								
6								
7								
8								

SIMPLE WAYS TO RECORD DATA

Many farmers and other rural people are not used to writing things down. Some are illiterate. Such participants can still do research! But you may need to find simpler ways of letting them record observations.

Consider using simple line drawings instead of words, and strokes instead of numbers (||| = 3) (Table 9).

You can also use sticks, stones or large seeds as counters. For example, to keep track of labor, a farmer could put a counter in a pot every time she goes to fetch feed.

TABLE 9 IT IS POSSIBLE FOR ILLITERATE PEOPLE TO KEEP RECORDS

 Achieng's chicks	 Under baskets		 Free-roaming	
Hatched	𝍸 𝍸 ||	12	𝍸 𝍸 |||	13
Week 1	𝍸 𝍸 |	11	𝍸 |||	8
2	𝍸 𝍸 |	11	𝍸 |	6
3	𝍸 𝍸	10	||||	4
4	𝍸 |||	8	|||	3
5	𝍸 |||	8	|||	3
6	𝍸 |||	8	|||	3
7	𝍸 |||	8	|||	3
8	𝍸 |||	8	|||	3

KEEP IT SIMPLE

When doing an experiment or conducting a survey, it is tempting to collect lots of data because it is interesting or might come in useful.

But collecting mountains of data can take a lot of time, and the information can be hard to analyze. So it is better to decide on just a few things to observe, and to make sure you keep careful records of these. Choose these carefully, involving several people in the discussion so you get different points of view.

You can have a "Notes" column in your form to write observations on other aspects you do not measure regularly.

DON'T TRY TO COLLECT TOO MUCH INFORMATION

CONCLUSION

It is vital to keep good records of an experiment. First, you must decide what you want to count or measure. Make sure you keep track of the most important things, and do not try to collect too much information. Also, decide exactly how to make each observation, and how often to collect the information. As far as possible, make sure that all measurements are made in the same way, in the same conditions. Use design forms to help you keep the information organized and standard. Also, remember that an exercise book is better to record the data than loose sheets of paper that can get lost.

In Lesson 7 we will look at how to take all the information we've collected and use it to make smart decisions.

QUIZ 6

Answers at the end of the guide.

1. When collecting data, it is not necessary to take all measurements under the same conditions using the same methods.

   A. True

   B. False

2. In an experiment, it's a good idea to measure everything that might come in useful. That way you can be sure of not missing something important.

   A. True

   B. False

3. Match the correct equipment with the thing you want to measure.

TO MEASURE	EQUIPMENT
A. Maize yield	1. Tape measure
B. Number of days between planting and harvest	2. Magnifying glass
C. Plant height	3. Scales
D. Identity of insect pests on crop	4. Calendar

4. "Why go to all of the trouble to write down the number of eggs?" asks Dorcas. How do you respond?

   A. "I need the numbers to report to my supervisor."

   B. "Because memory is unreliable – we all forget things or mix them up."

   C. "You're right: there is no need to write things down as long as you observe carefully."

5. You are testing a new breed of laying chicken. How often should you count the eggs laid?

   A. Every day

   B. Once a week

   C. Whenever it is convenient – every few days

6. You want to measure the amount of time it takes to weed a crop. What is the best way to measure this?

   A. At harvest time, ask people to say how many hours they spent weeding the crop

   B. During the season, ask them to write down the number of hours they spend each day on a calendar

   C. Ask people to estimate how long the weeding will take

   D. Observe the villagers yourself and count the number of hours they spend on weeding

EXERCISE 6. PLANNING DATA COLLECTION

This exercise guides participants through the steps needed to collect and record observations from an experiment. After this exercise, the participants can begin to conduct their own experiments.

OBJECTIVE

After this exercise the participants will be able to:

- Determine what to measure in an experiment.
- Design a method of keeping records.
- Equipment needed
- Large sheets of paper, marker pens

EXPECTED OUTPUTS

- Forms for recording observations from an experiment

TIME REQUIRED

- 1 hour

PREPARATION

- Exercise 5: Designing an experiment

SUGGESTED PROCEDURE

1. Remind the participants of the results of Exercise 5 when they designed an experiment.
2. Divide the participants into the same groups as in Exercise 5. Ask them to list the types of observations they will need to make: yield, plant height, number of chicks, etc.
3. Ask the groups to discuss how they will measure each item, and how often. For example: “Plant height: Every Saturday, measure the height of five plants in each plot with a tape measure. Measure from the ground to the tallest point on the plant.”
4. Ask the groups to design a form for each item, using the large sheets of paper. Make sure they think through the requirements for each type of observation.
5. Invite each group to present its forms and the reasoning behind them to the plenary. Invite comments on each form and suggestions for improvement.
6. Explain why the participants should use exercise books, not loose sheets of paper, to keep their records. Invite them to copy the forms into their exercise books (if they have them).
7. Tell the participants that they are now ready to start their own experiments. Guide them if necessary as they do so.

LESSON 7. ANALYZING AND EVALUATING THE RESULTS

IN THIS LESSON

After this lesson you will be able to:

- Analyze numerical data from an experiment.
- Describe how to check people's opinions about an experiment using focus groups, descriptive evaluation, and subjective scoring.
- Compare the costs and benefits of two technologies in terms of money.

ANALYZING DATA

Eight weeks have passed, and it is time for Achieng and her friends to analyze the data from their experiment.

Everyone brings their exercise books, and they meet in Achieng's house to compare their records.

When they look at Achieng's records (Table 10), they notice two things:

- Many more chicks survived under the baskets than if they were roaming free: Nine of the 12 confined chicks (75%) survived, while only 3 of 13 free chicks (23%) survived.
- After Week 4, no more chicks died, either under the baskets or outside. If free-roaming chicks were OK once they were 4 weeks old, then there would be no need to keep them under baskets for longer than that. That would halve the work needed to collect feed, and would free up baskets: by the 4th week, the chicks were too big to be kept under a single basket.

TABLE 10 ACHIENG'S CHICKS

	UNDER BASKETS	FREE-ROAMING
Hatched	12	13
Week 1	11	8
2	11	6
3	9	4
4	9	3
5	9	3
6	9	3
7	9	3
8	9	3
Percent surviving	9 × 100 / 12 = **75%**	3 × 100 / 13 = **23%**

When Dorcas and Josephine look at their data, they see similar patterns.

REACHING CONCLUSIONS

The friends come to two conclusions:

- Keeping chicks under baskets was a good idea: it enabled more to survive.
- They will keep the chicks under baskets for 4 weeks only.

TOOLS FOR ANALYZING RESULTS

In analyzing the results of your experiment, it's important to consider both quantitative and qualitative data. Quantitative data deals with things that can be measured using numbers such as area, yields, pests, temperature, rain, etc. Data that is observed and more descriptive is called qualitative. Things like farmers opinions and perceptions are hard to express into numbers that's why is easier to describe them. As a field agent, encourage innovation groups to use both quantitative and qualitative tools to analyze their experiments. This will help farmers have a broader understanding of the results and the best way forward.

Here are some tools that participants can use to analyze the results of their experiments:

- Numerical evaluation
- Focus groups
- Descriptive evaluation
- Subjective scoring
- Cost-benefit analysis.

TOOL 1: NUMERICAL EVALUATION

This compares the results of the current practice (the "control") with the alternatives (the "treatments") (Table 11). It lets you draw conclusions for each idea, using the numbers and figures you have collected.

TABLE 11 NUMERICAL EVALUATION OF ACHIENG'S EXPERIMENT WITH CHICKS

	SURVIVAL OF CHICKS AFTER 8 WEEKS			
	Control (Chicks roaming free)		**Treatment A (Chicks under basket)**	
	Hatched	Survived	Hatched	Survived
Achieng	13	4	12	9
Dorcas	10	7	11	8
Josephine	15	7	18	14
Total	38	18	41	31
Percentage survival		**47%**		**76%**

Conclusion: Chicks under baskets survive better!

TOOL 2: FOCUS GROUPS

What did the participants think of the experiment? Facilitate one or more focus groups to openly discuss the ideas, issues, experiences, results, and problems.

Focus groups are a good way to discuss the results of the experiments, decide whether to implement the conclusions, and to plan future research.

Keep in mind that the participants should consider not only their records, but also social aspects (e.g. labor availability), environmental pollution, and human health and nutrition.

TOOL 3: DESCRIPTIVE EVALUATION

Another tool that you can make use of is a simple description of what you liked or did not like about the treatments you chose for the experiment. The group can use Table 12 to list their perceptions of each of the treatments they test. This can be a good way to get a focus group discussion started about the experiment and the results you obtained.

TABLE 12 FORM TO COMPARE OPINIONS ABOUT DIFFERENT TREATMENTS

	THINGS YOU DID NOT LIKE	THINGS YOU LIKED
Control (current practice)		
Treatment A		
Treatment B		
Treatment C		
...		

TOOL 4: SUBJECTIVE SCORING

This is another way to collect people's opinions about the results of an experiment.

Ask people to give a score to each of the treatments for the characteristics they are interested in. Table 13 gives an example.

TABLE 13 SUBJECTIVE SCORING OF AN EXPERIMENT WITH FIVE CROP VARIETIES

1 = bad, 2 = fair, 3 = good

CHARACTERISTIC	TREATMENT (CROP VARIETY)					COMMENTS
	Control	A	B	C	D	
Resistance to pests	3	1	2	3	2	
Resistance to diseases	2	1	2	3	2	
Earliness in maturity	1	1	3	3	1	
General crop vigor	2	1	2	3	2	
Overall (total)	8	4	9	12	7	

You can sum the scores in the bottom row to give you a general idea of what people think overall. But of course some characteristics may be more important than others – so make sure that the participants discuss each in detail.

TOOL 5: COST-BENEFIT ANALYSIS

The new treatment may produce better yields, but how much does it cost? Does it give more profit? You can do a cost-benefit analysis to compare it with the control. You need good records to analyze the costs of inputs, labor, selling price, and yield.

TABLE 14 COSTS AND BENEFITS PER PLOT

		CONTROL (MAIZE)	TREATMENT A (BEANS)
Benefits	Bags of grain	8 bags × 10 shillings	4 bags × 25 shillings
Total benefits		80	100
Costs (shillings)	Seed	0 (own seed)	10
	Fertilizer	20	10
	Labor	30	40
Total cost		50	60
Total benefits – total costs		80 – 50 = **30**	100 – 60 = **40**

Table 14 shows an example for an experiment to compare two crops: maize and beans. The two plots are the same size, allowing us to compare them directly. Let us look first at the benefits.

- The plot of maize produced 8 bags, worth 10 shillings each, resulting in a total benefit of 80 shillings.
- The beans plot produced 4 bags, which were sold for 25 shillings each, or 100 shillings in all.

How about the costs?

- The maize cost a total of 50 shillings to produce, while the beans cost 60 shillings.
- Even though the beans cost more to produce, they gave a higher profit: 40 shillings compared to only 30 shillings for maize.

CONCLUSION

In this lesson we covered five quantitative and qualitative tools for analyzing the results of an experiment:

- **Numerical evaluation:** compares the results of the current practice (the "control") with the new technologies (the "treatments").
- **Focus groups:** focused discussions to get participants' opinions of the experiment and its results.
- **Descriptive evaluation:** a way of finding out what participants liked and did not like about each of the technologies they tested.
- **Subjective scoring:** a way to evaluate opinions about each of the technologies tested.
- **Cost-benefit analysis:** compares the costs and benefits of the different technologies and tells you which one gives the biggest profit.

You can use these tools to help the participants work out what the experiment findings mean, and how to use them on their own farms and in their enterprises.

In the next and final lesson we'll talk about what to do with the findings from your experiments.

QUIZ 7

Answers at the end of the guide.

1. Rupert, Shaun, and Geoff conducted an experiment to test fertilizer. Here are their yields. What do you conclude?

	WITHOUT FERTILIZER (CONTROL)	WITH FERTILIZER (TREATMENT)
Rupert's plot	3 bags	6 bags
Shaun's plot	2 bags	5 bags
Geoff's plot	3 bags	1 bag

   A. Applying fertilizer gives higher yields
   B. Applying fertilizer gives lower yields
   C. There is no difference in yields
   D. It is not possible to draw a conclusion as the yields vary

2. Rupert, Shaun and Geoff find that applying a bag of fertilizer increases their maize yield by 2 bags an acre. A bag of maize fetches 30 shillings in the market. A bag of fertilizer costs 15 shillings. What is the net benefit?

   A. 15 shillings
   B. 45 shillings
   C. 60 shillings
   D. 75 shillings

3. The number of fertilizer bags used in each plot is an example of qualitative data.

   A. True
   B. False

4. Match the analysis method with the correct description.

ANALYSIS METHOD	DESCRIPTION
A. Numerical evaluation	1. Discussions to get participants' opinions of an experiment
B. Focus groups	2. Compares the total profit of the different technologies
C. Descriptive evaluation	3. A way of finding out what participants liked and did not like about the technologies
D. Subjective scoring	4. Compares the results of the current practice with the new technologies
E. Cost-benefit analysis	5. A way to evaluate opinions about each of the technologies tested

5. "Let each of us say what we think of using baskets to protect chicks," says Achieng. What type of analysis is this?

   A. Cost-benefit analysis
   B. Subjective scoring
   C. Descriptive evaluation
   D. Numerical evaluation

6. "Let us give numbers to each treatment so we can compare them: 1 for bad, 2 for fair, 3 for good," says Achieng. What type of analysis is this?

   A. Cost-benefit analysis
   B. Subjective scoring
   C. Descriptive evaluation
   D. Numerical evaluation

EXERCISE 7. EVALUATING AN EXPERIMENT

The exercise enables participants to evaluate the results of their experiment. Do it after they have completed the experiment in the field.

Alternatively, you can manage this exercise before the participants have run their own experiments to give them an idea on how to do the analysis. You can use the examples in Tables 10 to 14 for the participants to analyze, or use data from experiments conducted by groups elsewhere.

OBJECTIVE

After this exercise the participants will be able to:

- Evaluate the results of an experiment and decide on further steps.

EQUIPMENT NEEDED

- Large sheets of paper, marker pens.
- Records from the participants' experiments (or example data from elsewhere).

EXPECTED OUTPUTS

- Analysis of the results of the experiment.
- Decision on what actions to take in the future.

TIME REQUIRED

- 3 hours

PREPARATION

- Help the participants conduct the experiments and record their observations.

SUGGESTED PROCEDURE

1. Ask the participants to briefly describe their experiments and the results.
2. Introduce the **numerical evaluation** tool (Table 11). Help the participants to analyze their data using this tool.
3. Introduce the **descriptive evaluation** (Table 12) and **subjective scoring** (Table 13) tools and help the participants to use it to summarize their opinions about the treatments.
4. Introduce the **cost-benefit analysis** tool (Table 14), and help the participants summarize their costs, income and profits.
5. Facilitate a **focus group** discussion about the findings. Help the participants decide how they will use the results of the experiment on a larger scale next season.

QUESTIONS TO STIMULATE DISCUSSION

- What differences did you see between the treatment with the highest yield and lowest yield?
- Did costs vary between treatments?
- What are the differences in costs compared to outputs (seeds, fertilizer, pesticides, labor...)?
- Did anything unexpected happen? Did this complicate the results?
- Which aspects remain unknown?
- Which new questions are raised, and how could they be addressed?
- What can we conclude from this experiment? Which of the treatments do you want to use on a larger scale next season?

LESSON 8. APPLYING FINDINGS AND SHARING KNOWLEDGE

IN THIS LESSON

After this lesson you will be able to:

- Describe how to share results from research.

SHARING RESULTS

Achieng, Dorcas and Josephine share the results of the experiment with the other members of their farmers' group. They plan how to present the information and what to say.

They describe why they did the experiment – many chicks were being eaten by birds of prey. They described how they came up with a solution – keeping the chicks and mother hen under baskets – and how they tested it.

They present their data, and their conclusion that the baskets effectively protected chicks up to 4 weeks of age.

DECIDING ON FOLLOW-UP

The group is enthusiastic, and they agree on three things:

- All the members who keep chickens will start using baskets to protect their chicks. They will start making baskets straight away! They will ask Achieng and her friends for advice on how to feed the chicks.
- Achieng, Dorcas and Josephine, along with several other group members, will form an innovation committee to try to solve other problems with chicken-raising.
- The group members realize that if they can produce more chickens, there is a promising market in the nearby town. They start working on a plan to produce more chickens and find suitable buyers.

HOW TO SHARE INFORMATION ABOUT INNOVATIONS

Here are some ways that participants can share information about their innovations.

- Hold meetings to discuss the results of experiments.
- Invite people to visit the experiment site while it is running.
- Run a demonstration of the innovation – for example to show people how to do a particular task.

In addition, you can help them by:

- Arranging cross-visits, field days or training for people from other villages.
- Produce posters, brochures or information sheets about the innovation.
- Organize groups in other villages to test and adopt the innovation.
- Invite the local community radio station to cover the innovation.
- Invite extension workers, government officials and researchers to see the innovation.
- Arrange training for extension workers and villagers.

THE NEED TO KEEP INNOVATING

In a rapidly changing world farmers and those who live off the land constantly need to look for new and better ways of producing more and better quality food, fodder and other materials. This means that the innovation process does not stop once one experiment has been completed.

Help farmers see the value of accessing knowledge and information from a wide range of sources and using it to solve problems on their own. Once one problem has been resolved, there will no doubt be others that need to be tackled.

Some of these problems may need experimentation to find the best solution. Others may require advice from people who have already tested different solutions and have one that fits the community's situation. Both require the ability to seek out new knowledge, either from within or outside the community, and to use it to solve important production or marketing constraints.

As farmers increase the volume they sell, they need to look for opportunities to reduce their costs and improve the quality of their products. This will allow them to increase their income, improve the wellbeing of their families and maintain the competitiveness of their farming business. The innovation skill is at the heart of this on-going improvement process.

CONCLUSION

There is no point in going to the trouble of doing experiments if you do not use the results. You need to:

- Help the participants decide **what action to take** in light of the experiment. Do they want to adopt the innovation. If so, how?
- Help them **share the results** within the community by holding meetings, running demonstrations, arranging training, and helping others adopt the innovation.

We also saw that experimenting and innovating is an on-going process. Rural people that make their livelihoods from agricultural activities need to be constantly trying out new ways of doing things and testing new technologies. In this way, they are able to keep up with changes in the demand for their crops and livestock products or potential threats to their food security like changes in weather patterns or new pests or diseases.

QUIZ 8

Answers at the end of the guide.

1. Once you have finished an experiment, you should keep the results secret so no one else can find out.

   A. True

   B. False

2. You should not share the results until the experiment is over.

   A. True

   B. False

3. Innovation is for big companies, not for groups of smallholder farmers.

   A. True

   B. False

4. Match each of the innovation steps mentioned below with what the farmer members of the innovation group should do in that step.

INNOVATION STEP	WHAT TO DO
A. Collecting and recording observations	1. Farmers set the objective of a trial and the materials and methods they will use. They agree on what data to collect and who is responsible for each task
B. Sourcing information and ideas	2. Once a problem has been clearly defined, farmers identify its causes and effects so they can look for ways to solve it
C. Designing an experiment to test an innovation	3. Farmers collect and record the data from the experiment to compare among different solutions
D. Identifying a problem's causes and effects	4. Farmers seek information and advice about their chosen topic from other farmers, knowledgeable people, extension agents and researchers

5. "We only need to do one experiment," says Dorcas. "When we have found the solution, we will not need to do any more tests." Do you agree with her?

   A. Yes, she's right. Once the problem is solved, no more tests are needed.

   B. No, she's wrong. Even if this problem is solved, other problems will arise.

6. Farmers from the neighboring village want to see how Achieng and her friends have solved the problem with birds of prey. What would you advise Achieng?

   A. Welcome the neighboring farmers and show them the solution

   B. Ask the group to pay to see the solution

   C. Do not allow them to see the solution: they are your competitors!

EXERCISE 8. PLANNING FOR SHARING AND SCALING UP

After doing an experiment or conducting research, it is important to plan how to use the results. This exercise helps participants to do this.

OBJECTIVE

After this exercise the participants will be able to:

- Plan how to share and scale up the findings.

EQUIPMENT NEEDED

- Large sheets of paper, marker pens

EXPECTED OUTPUTS

- Plan on how to share the results of an experiment within the farmers' group and with others.
- Plan on how to put the findings from the experiment into effect.

TIME REQUIRED

- 1 hour

PREPARATION

- Exercise 7 (Evaluating an experiment)

SUGGESTED PROCEDURE

1. Remind the group of the results of the experiment(s) discussed in Exercise 7.
2. Explain to the group that they will create two types of action plan based on the results of their experiment.
3. Split the participants into two groups for each experiment, Group A and Group B.
4. Ask Group A to prepare an action plan on how to share the results of the experiment with other farmers' in the group and with people from other villages.
5. Ask Group B to prepare an action plan on how to put what they have learned from the experiment into effect.
6. Explain that the action plans should show what activities to perform, who will do these activities, and when they will start and be completed. The groups should also estimate how much each activity will cost and how they will cover these costs.
7. After the groups have discussed and drawn up their plans, invite them to share them with the plenary. Facilitate a discussion and invite comments on each plan.

Answers to quizzes

Lesson 1

1. Farmers who are well known for trying out new things and observing how some plants grow better than others are good candidates for innovation groups.

   Correct answer: A. Innovation needs people who want to try out new things and who observe carefully.

2. The role of the field agent in the innovation process is to...

   Correct answer: C and D. It is not the field agent's job to do things for the innovation group, like finding out knowledge or accessing technology. Rather it is to help the group contact others who can provide information or technology. Farmers who have close contacts with extension and credit may not be best member of the innovation group as they may prefer technologies that most farmers cannot afford.

3. Why is innovation important for rural people?

   Correct answer: A and D. Innovation is a process that improves how people do things.

4. You need a genius in your group to be innovative.

   Correct answer: B. A group does not need a genius to innovate, although a highly innovative person can speed up the innovation process. What a group needs is the ability and enthusiasm to search for solutions to their problems, and to test and adapt these solutions to their needs.

5. The field agent's role in supporting farmer group innovation is to:

   Correct answer: E. All of these are important roles.

6. Where do the best innovations come from?

   Correct answer: D. Innovations can come from any source.

Lesson 2

1. In the innovation process, identifying the cause of a problem should be done after the experiment is designed.

   Correct answer: B. Identifying the cause of the problem will help you design an innovation that solves it.

2. Your group has identified soil erosion as a major problem. Which of these are causes of soil erosion, and which are results?

   Correct answer: Causes: B, E, F; Results: A, C, D.

3. Which are potential solutions to the soil erosion problem?

   Correct answer: A, B, D. Growing potatoes (C) is unlikely to control erosion. You can probably think of several additional ways to prevent erosion.

4. Achieng faces many problems on her farm. Match each problem with a possible cause.

   Correct answers: A2, B3, C1, D4

5. Abbas's group has voted on what problems to tackle. The seven men in the group want to work on "low maize yields", while the five women said "too few chickens" was more important. What do you advise them to do?

   Correct answer: C. Maize is important for the men, while chickens are important for the women. It is probably best to try to solve both problems.

6. Bernard's group are making a problem tree for their mango marketing. They have identified "poor-quality mangoes" as the central problem. Which of the following are potential causes of this problem, and which are effects?

Correct answers: causes: A, C; effects B, D

Lesson 3

1. What is innovation?

   Correct answer: B. Innovation often means taking an existing practice from somewhere else and adapting it to your needs.

2. Which of these is likely to be the best source of information on solutions for problems faced by smallholders in your area?

   Correct answer: C. The farmers in the next village probably face the same type of problems as people in your area. They are likely to be the best source. Also explore other potential sources of information before settling on an option to test.

3. Books and the internet are always good sources of information.

   Correct answer: B. While you can get many good ideas from books and the internet, do not rely on them exclusively. Always check that the information is valid in your area!

4. Hamid is trying to find a solution to pests on his cabbages. Match each statement with the person most likely to say it.

   Correct answers: A2, B1, C3

5. "For this vaccine to work, all the chickens in the village have to be vaccinated at the same time", says the input dealer. What should Achieng do?

   Correct answer: B. This would solve the disease problem for Achieng as well as her neighbors.

6. What sources should farmers use for solutions to their problems?

   Correct answer: E. It is a good idea to get ideas from several sources.

Lesson 4

1. Which of these technologies is it easy for a group of smallholders to try out on a small scale?

   Correct answer: B. All the others are large-scale interventions.

2. Achieng's group has listed some possible constraints to keeping chicks under baskets. Which is not likely to be a problem?

   Correct answer: D. Noise is not likely to be a problem.

3. Here are some positive and negative consequences of starting to keep dairy cattle. Put each one into the correct category.

   Correct answer: A3, B2, C4, D1

4. Achieng and her friends are considering using a vaccine against Newcastle disease in their chickens. "It's all or nothing!" she says. What should she and her friends NOT do?

   Correct answer: D. This option will not be effective.

5. "We must put all the chickens under baskets to protect them against birds of prey," says Achieng. Is she right?

   Correct answer: B. They can try this out on a small scale first.

6. Here are some negative consequences of some new technologies. Match each technology with its possible consequences

   Correct answers: A2, B4, C3, D1

Lesson 5

1. Who can design and do a successful experiment?

   Correct answer: D. You do not have to have a degree to do research!

2. When designing an experiment, one should…

   Correct answer: A and B. If you include too many factors, it will be impossible to see which one is important.

3. The field agent has to have experience in setting up agricultural experiments to be able to facilitate the innovation process effectively.

   Correct answer: B. You do not need prior experience in agricultural experiments. But you should read and understand this manual. Seek advice from the local research institution if you need more information.

4. In an experiment, you should do everything you can to make sure the treatment produces a higher yield than the control.

   Correct answer: B. An experiment aims to find out which option is better. It does not try to prove that one option is better than another.

5. "To find out if the new variety yields more, just sow a field. That will give you all the information you need!" says Dr Abdullah. Is she right?

   Correct answer: B. You need to compare the new variety (the treatment) with the old variety (the control). Only then can you see if it is better.

6. Mary's group wants to run an experiment on planting onions. Mary says they can test two things at the same time: onion varieties and fertilizer application. Henry says it is better to test these things separately. Who is right?

   Correct answer: B. Henry is right. It is much simpler to test one thing at a time.

Lesson 6

1. When collecting data, it is not necessary to take all measurements under the same conditions using the same methods.

   Correct answer: B. You want to be able to compare one measurement with another. That means taking them under the same conditions.

2. In an experiment, it's a good idea to measure everything that might come in useful. That way you can be sure of not missing something important.

   Correct answer: B. If you measure too many things, you may end up with confusion. It's better just to measure a few things, but keep notes on other factors that might be of interest.

3. Match the correct equipment with the thing you want to measure.

   Correct answer: A3, B4, C1, D2

4. "Why go to all of the trouble to write down the number of eggs?" asks Dorcas. How do you respond?

   Correct answer: B. It is too easy to forget, especially if the experiment lasts several weeks.

5. You are testing a new breed of laying chicken. How often should you count the eggs laid?

   Correct answer: A. For this sort of experiment, you need to take measurements regularly. Once a week is not often enough.

6. You want to measure the amount of time it takes to weed a crop. What is the best way to measure this?

   Correct answer: B. Asking people to keep a record is probably the best way to measure labor inputs.

Lesson 7

1. Rupert, Shaun, and Geoff conducted an experiment to test fertilizer. Here are their yields. What do you conclude?

   Correct answer: A. In Rupert's and Shaun's plots, the fertilizer more than doubled yields. Why the low yields in Geoff's plot? Something happened: he says that elephants broke in one night and trampled the crop.

2. Rupert, Shaun and Geoff find that applying a bag of fertilizer increases their maize yield by 2 bags an acre. A bag of maize fetches 30 shillings in the market. A bag of fertilizer costs 15 shillings. What is the net benefit?

   Correct answer: B. Two bags of maize are worth 60 shillings, minus 15 shillings for the fertilizer, leaves 45 shillings.

3. The number of fertilizer bags used in each plot is an example of qualitative data.

   Correct answer: B. False. Fertilizer bags can be expressed by numbers so this is a quantitative data.

4. Match the analysis method with the correct description.

   Correct answer: A4, B1, C3, D5, E2

5. "Let each of us say what we think of using baskets to protect chicks," says Achieng. What type of analysis is this?

   Correct answer: C. Comparing opinions is known as descriptive evaluation.

6. "Let us give numbers to each treatment so we can compare them: 1 for bad, 2 for fair, 3 for good," says Achieng. What type of analysis is this?

   Correct answer: B. This type of scoring is subjective.

Lesson 8

1. Once you have finished an experiment, you should keep the results secret so no one else can find out.

   Correct answer: B. It takes a lot of effort to do experiments, so be sure to share the results widely. If you share your findings, you can be confident that others will share their results with you.

2. You should not share the results until the experiment is over.

   Correct answer: B. You can invite people to see an experiment while it is running – for example, to check on plant growth or pest numbers. That will increase interest and the likely impact of the experiment. But make sure that this does not interfere with the experiment itself – for example, do not allow people to damage the plants.

3. Innovation is for big companies, not for groups of smallholder farmers.

   Correct answer: B. Everyone can innovate – households and smallholder farm enterprises, groups of farmers, and up to the largest multinational companies.

4. Match each of the innovation steps mentioned below with what the farmer members of the innovation group should do in that step.

   Correct answer: A3, B4, C1, D2.

5. "We only need to do one experiment," says Dorcas. "When we have found the solution, we will not need to do any more tests." Do you agree with her?

   Correct answer: B. New problems are always coming up that need to be solved.

6. Farmers from the neighboring village want to see how Achieng and her friends have solved the problem with birds of prey. What would you advise Achieng?

   Correct answer: A. Achieng's group has nothing to lose from showing off their solution, and they may be able to learn something from the neighboring farmers in return.

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WEBPAGES

Global Farmer Field School Network and Resource Centre is a decentralized network and resource center to cater for strategies and mechanisms for institutionalization and scaling-up, quality control mechanisms, low cost implementation strategies and mechanisms. It also provides a discussion forum, exchange of experiences, and quick access to resource and training materials, trainers, experts and documentation. www.farmerfieldschool.info/

Prolinnova. Prolinnova is an NGO-initiated multistakeholder program to promote local innovation in ecologically oriented agriculture and natural resource management. www.prolinnova.net/

Promoting innovation

A SMART SKILLS MANUAL

Small-scale farmers in developing countries are constantly making observations, developing ideas and trying out new things. They need to do so to improve their production, adjust to a changing environment and strengthen their livelihoods.

This manual shows how field agents, extension workers and program managers can help farmers do this systematically. It explains how to organize an innovation group and how to help farmers set up experiments, make observations, decide on what works and adopt the new ideas.

The eight lessons cover the following topics:

- Introduction to innovations
- Identifying and understanding problems
- Finding more information
- Exploring possible solutions
- Designing research
- Collecting and recording observations
- Analyzing and evaluating the results
- Applying findings and sharing knowledge.

Each lesson includes guidelines, exercises to do with a group of farmers or with development agents, and quizzes to test your understanding.

This is one manual in a series on SMART Skills – the skills that field agents need to help farmers in developing countries improve their livelihoods.

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