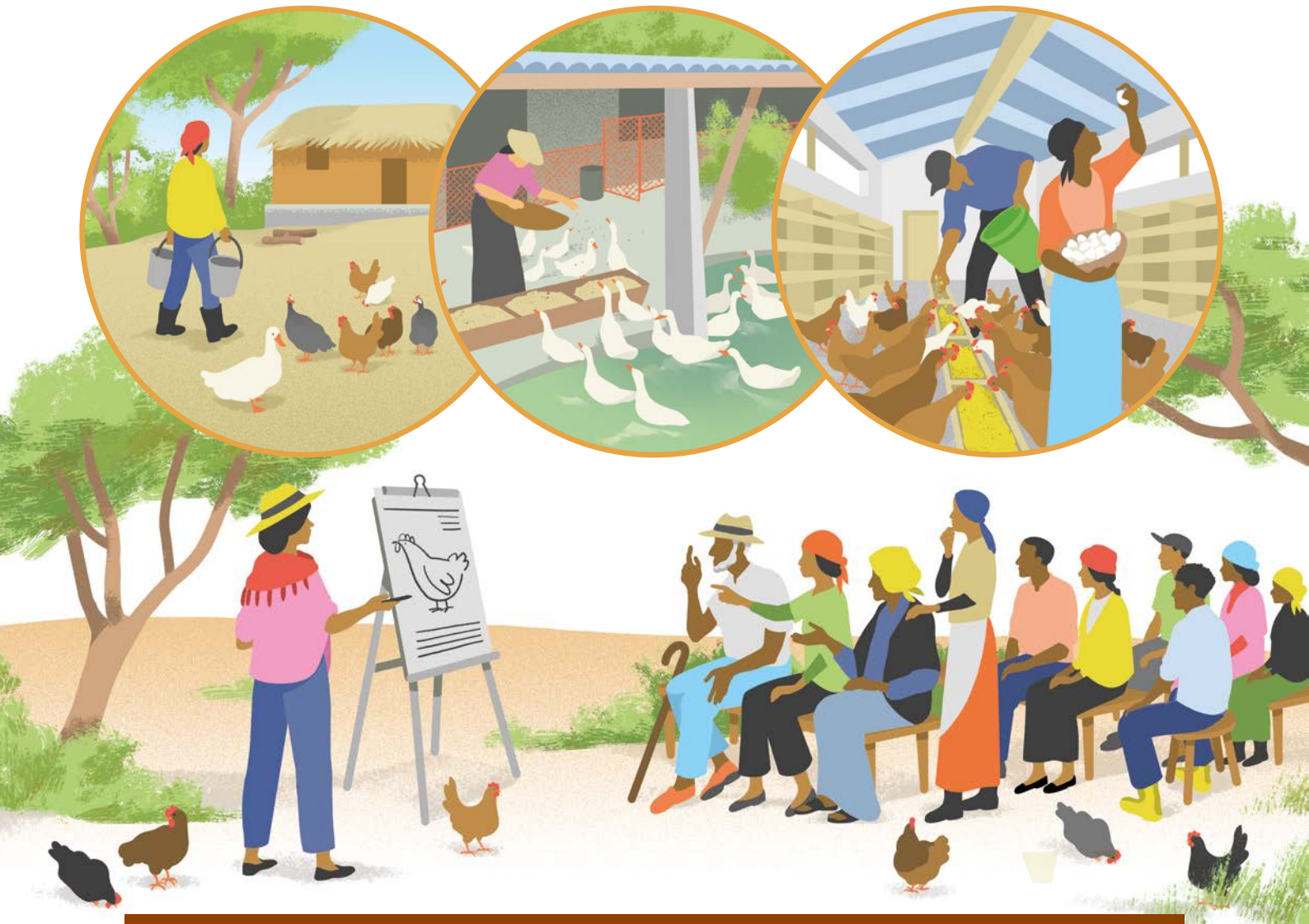
Food and Agriculture Organization of the United Nations

IFAD
Investing in rural people

Farmer field schools for family poultry producers

A practical manual for facilitators



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Contents

Annexes

Foreword

The poultry sector continues to grow and become industrialized in many parts of the world. An increasing human population, greater purchasing power and urbanization have been strong drivers of growth. However, small-scale, family-based poultry systems continue to play a crucial role in sustaining livelihoods in low- and middle-income countries, supplying nutritious animal-source food to resource-poor and rural households, providing important support to women farmers, and playing specific and important socioeconomic roles.

As we move forward with the development of sustainable, resilient food systems, we must ensure that we promote poultry production that yields high-quality animal-source foods that are safe to consume while applying agroecological and other sustainable practices and ensuring appropriate animal welfare standards. Achieving sustainable family poultry production in the face of transboundary animal diseases such as highly pathogenic avian influenza (HPAI), climate change, emerging infectious diseases such as COVID-19, variable farmgate prices and antimicrobial resistance is a complex endeavour that requires feasible strategies that are appropriate to local cultural, economic and geographical circumstances.

Through the education and empowerment of farmers, the farmer field school (FFS) approach can contribute to strengthening knowledge of holistic agro-ecosystem management, improving decision-making skills, facilitating group collaboration and encouraging local innovation, particularly by women and young people. Family poultry producers, both women and men, are thereby enabled to achieve sustainable food production and livelihood and resilience improvements and to enhance their contribution to global food security and attainment of the Sustainable Development Goals (SDGs).

Over the past two decades, the Food and Agriculture Organization of the United Nations (FAO) and the International Fund for Agricultural Development (IFAD) have used the FFS approach extensively to foster poultry development while facilitating the sharing of knowledge and experience. The results and impact delivered in developing countries have shown that for successful poultry FFS and long-term sustainability, it is essential to ensure good-quality facilitation and learning activities.

To enhance the contribution of poultry FFS to improving the livelihoods of family poultry producers, facilitators should be provided with information that gives them a better understanding of how best to apply the FFS approach within different family

poultry systems. Through the practical activities proposed in this manual, facilitators can enable family poultry producers to learn and value new and local practices in their specific situations and environments, allowing for sustainable changes in practices and behaviours. This manual aims to fill existing knowledge gaps in order to contribute to improving the quality of the growing number of poultry FFS implemented by governments, international organizations, non-governmental organizations (NGOs) and other stakeholders.

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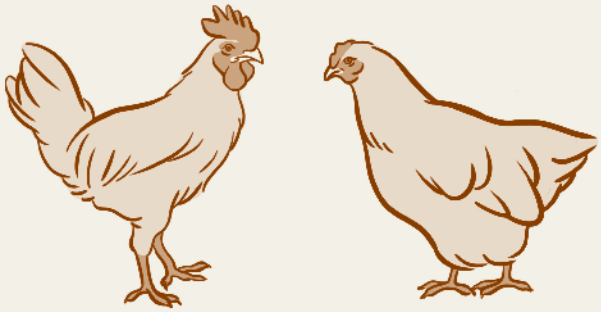

Acronyms

AESA	agro-ecosystem analysis
FAO	Food and Agriculture Organization of the United Nations
FFS	farmer field school
IFAD	International Fund for Agricultural Development
M&E	monitoring and evaluation
ND	Newcastle disease
NGO	non-governmental organization
PRA	participatory rural appraisal
SDG	Sustainable Development Goal

About this manual

Guide to the guidance boxes

Boxes with **chapter objectives** have a **green** background.

Boxes with **key information** have an **orange** background.

Boxes with **recommendations** have a **yellow** background.

Who is this manual for?

The intended users of this manual are the facilitators of farmer field schools (FFS) on poultry. Poultry FFS facilitators are not teachers; their key role is to guide and accompany the learning process by creating a space where participants can learn creatively about the selected enterprise through non-formal adult learning approaches. FFS facilitators may be government staff, NGO extension workers, producer organization staff, community-based animal health workers, community leaders, or farmer role models/champions.

Key characteristics of a good FFS facilitator:

- trained in FFS methodology by a qualified FFS master trainer;
- has facilitation and participatory skills;
- is available and accessible to the farmers;
- is able to conduct peer-to-peer interactions and has a good attitude towards farmers' opinions;
- is creative and innovative;
- is technically capable;
- is resourceful;
- is accountable to farmers.

The aim of this manual and how to use it

This manual is intended for field use by facilitators in the preparation and implementation of poultry FFS. It aims to help them prepare and implement good-quality FFS and focuses on working with women and men farmers in order to improve family poultry production under any production system ranging from extensive to small-scale intensified, in line with farmers' aspirations and local conditions. Chickens are the most common poultry in such systems and they are therefore the focus of practical activities in this manual.

- This manual is a collection of examples to inspire FFS facilitators. The FFS participants, with the help of the FFS facilitator, should choose and/or adapt appropriate activities and exercises that are based on their needs and relevant to the local context and environment.
- The manual should be complemented by other FFS material. Other FFS manuals and guides that provide complementary information on the FFS approach and on what can be done in an FFS are useful resources when planning and implementing an FFS. Links and references to useful resources can be found in the section References and further reading.
- The manual should be adapted for local use. Where necessary, contents should be tailored to the local setting and needs and to the literacy level of the facilitators by, for instance, including additional illustrations and adapting or simplifying the language.
- In most situations, the manual should be introduced, explained and used to develop capacity during the training of facilitators or in an ad hoc training session. This will help facilitators to make the best use of the manual and to understand what content to focus their attention on, based on local conditions and needs.
- The manual is a living document. It will be updated over time and will benefit greatly from feedback and adjustments following field testing and validation.

How was the manual developed?

The manual was developed using a participatory process involving specialists knowledgeable in FFS and family poultry practices from across the developing world. A conceptual workshop was held at FAO Headquarters in Rome from 16 to 18 August 2019, a writing team convened in September 2019, a validation workshop – including pre-testing of key components with family poultry producers near Kilifi in Kenya – was held from 22 to 24 October 2019, and the resulting draft was edited. The draft manual was also tested in a number of field projects and training events prior to publication.

Some of the exercises and activities presented were developed during the workshops in Rome and Kilifi, while others were adapted from existing manuals.

Structure of the manual

The manual comprises two modules.

Module 1: Poultry farmer field school establishment and learning activities

The first part of module 1 describes how to prepare a poultry FFS and develop a curriculum. The identification of gaps in knowledge, skills and practices that limit production and productivity is highlighted as a key element of FFS preparation. How to tailor learning and the curriculum to specific local needs and the local context are also described.

The second part of the module focuses on the implementation of a poultry FFS and activities for developing family poultry production and marketing. It provides guidance on FFS core activities. It explains how to integrate entrepreneurship and marketing, promote information exchange and dissemination through activities such as field days and exchange visits, and plan and implement post-FFS learning.

Module 2: "Need-to-know" information on poultry production and health and on the facilitation of farmer field schools

Module 2 provides technical information and reference material on poultry production and health to refresh and complement the knowledge of facilitators who already possess a sound understanding of the topics. Information on various facilitation methods and non-formal education is also provided.

The manual includes annexes with handouts, tools and templates that can be used as a reference or adapted for use in poultry FFS throughout developing regions.

The section on references and further reading aims to help facilitators by identifying complementary resources, including manuals, multimedia and technical papers.

Understanding key concepts and terms

Family poultry production

"Family poultry" refers to the full variety of poultry production systems that are practised by individual families as a means of obtaining food security, income and gainful employment. The poultry raised include a wide range of birds from indigenous to commercial breeds, and from chickens to Muscovy ducks, mallard ducks, pigeons, quails, guinea fowls, geese, pheasants, turkeys and ostriches.

Family poultry accounts for up to 80 percent of poultry stocks in low-income, food-deficit countries where small-scale farmers raise poultry in small numbers, ranging from a single bird up to several hundred (FAO, 2014).

See (module): ***Socioeconomic aspects of family poultry production (2.1.2)***

Family poultry can play a crucial role in supporting the lives and well-being of many poor households, and FFS facilitators can:

- assist family poultry producers in increasing productivity, production and household incomes;
- help family poultry producers to move from subsistence to market-oriented enterprises;
- bridge gaps in food and nutrition security;
- facilitate women's empowerment and gender equity as women are commonly in charge of this sector and often have inadequate access to skills development.

Production systems

To assist facilitators in tailoring their work according to local family poultry production systems, information in this manual is separated according to whether it applies to extensive production, comprising small-scale extensive scavenging and extensive scavenging, or intensified production, comprising semi-intensified and small-scale intensified (Table 1). This classification highlights the characteristics of each production system not only in terms of breeds and husbandry inputs, but also in terms of market characteristics that are essential to a successful poultry business.

The spectrum of production systems from extensive to intensified is diverse, especially in areas where the reliable input supply that is essential to intensified production is absent. Extensive production systems with birds of indigenous breeds are low-input and are often part of mixed farming enterprises, whereas intensified production systems with commercial breeds are high-input and often the household's only business enterprise.

See (annex): ***Family poultry production systems (Annex 1)***

Table 1. Characteristics of the four family poultry production systems commonly practised in low- to middle-income countries.

Criterion	Small extensive scavenging	Extensive scavenging	Semi-intensified	Small-scale intensified
Production/farming system	Mixed, poultry and crops, often landless	Mixed, livestock and crops, sometimes small land area	Usually poultry only	Poultry only
Other livestock raised	Rarely	Usually	Sometimes	No
Flock size (adult birds)	~1–5	~5–50	~50–200	~50–900 broilers* ~30–500 layers
Poultry breeds	Local	Local or crossbred	Commercial or crossbred or local	Commercial
Stable access to affordable inputs and services required for market-oriented intensified production and markets where large numbers of birds or poultry products can be sold at sustainable prices in a single day	No	No or rarely	Most of the time	Yes
Source of new chicks	Natural incubation	Natural incubation	Commercial day-old chicks, or (rarely) natural incubation	Commercial day-old chicks, pullets or artificial incubation
Feed source	Scavenging, almost no supplementation	Scavenging, occasional supplementation	Limited scavenging, regular supplementation	Commercial balanced ration or "farm-made" balanced ration
Drinking-water	Almost no dedicated supply	Occasional supply	Regular supply	Regular supply
Poultry housing	Seldom; usually made from local materials or kept in owner's house overnight	Sometimes; usually made from local materials	Yes; conventional materials; houses of variable quality	Yes; conventional materials; good-quality houses
Access to veterinary services and veterinary pharmaceuticals	Rarely	Sometimes	Yes	Yes
Mortality (without vaccination)	Very high >70%	Very high >70%	Very high >70%	Very high >70%
Mortality (with effective vaccination against endemic vaccine-preventable diseases)	Medium <30%	Medium <30%	Low to medium <20%	Low <10%

Criterion	Small extensive scavenging	Extensive scavenging	Semi-intensified	Small-scale intensified
Biosecurity risk and management strategy	Medium: community biosecurity strategy required; rate of spread of disease within flocks usually lower than in intensified systems	Medium: community biosecurity strategy required; rate of spread of disease within flocks usually lower than in intensified systems	High: community and individual unit biosecurity strategy required; rate of spread of disease within flocks usually somewhat lower than in intensified systems	High: individual poultry unit biosecurity strategy required; rate of spread of disease within intensified units usually high
Access to reliable electricity supply	No	No	Most of the time, reliable electricity supply or renewable energy	Yes, reliable electricity supply or renewable energy
Existence of conventional cold chain	No	Rarely	Yes, rarely	Yes
Access to urban markets	Rarely	Rarely or indirect	Most of the time	Yes
Products	Live birds, meat	Live birds, meat, eggs	Live birds, meat, eggs	Specialized in a single product: live birds, meat or eggs
Time devoted each day to poultry management	<30 minutes	<1 hour	>1 hour	>1 hour

* Can reach 2 000 in some countries.

Note: This classification of family poultry production systems is a guideline and not intended to be prescriptive.

Source: Adapted from FAO, 2014.

Poultry farmer field schools

What are poultry farmer field schools?

The FFS approach is a form of non-formal adult education. An FFS is best described as a "school without walls" where groups of 20–25 farmers learn through observation and experimentation. In the process, group members acquire technical skills, strengthen group cohesion and design strategies for improving livelihoods through better understanding of value chains, while also defining opportunities for business and enterprise development.

In poultry FFS, activities are designed to enable participants to learn by doing and to drive innovation by building on local knowledge while testing, adapting and validating practices and scientific concepts developed elsewhere. Exchange of information and generation of knowledge are fostered through sharing of observations, brainstorming on corrective measures, and facilitated discussions that lead to decision-making. The FFS process follows systematic steps of problem and solution analysis rather than standard recommendations or learning packages. During each learning cycle, farmers test two or three prioritized possible practices/technology options such as promising research findings or local innovations developed by farmers. In this way, farmers become active learners and independent decision-makers promoting what works in their local context. This is a process of participatory and inclusive learning.

*See (annex): **Poultry farmer field schools (Annex 1)***

See (external): FFS guidance document (FAO, 2016a)

Poultry FFS phases

The preparatory and implementation activities for a poultry FFS can be grouped into the three phases described in the following.

Appropriate and efficient planning and implementation of an FFS initiative is critical in enabling communities increasingly to take the lead in developing and expanding their poultry enterprises and in stimulating lasting improvements in production, consumption and marketing.

Phase 1: Preparatory phase

The *preparatory phase* involves all the activities that must be carried out before FFS meetings can be started: baseline studies, selection and training of facilitators and beneficiaries, awareness-raising meetings with communities and their leaders, development of a group action plan, and design and setup of experiments, for example. This phase generally requires between one and three months in countries or areas where master trainers and facilitators exist, but may take longer in environments without sufficient local capacity.

See (module): ***Preparatory phase (1.1)***

Phase 2: FFS learning phase – production and entrepreneurship/marketing learning stages

The poultry *production learning stage* begins when the FFS meetings start. It should last for an entire production cycle – from batch to batch in intensified systems and from egg to egg in extensive systems.

The *entrepreneurship/marketing learning stage* may run in parallel with the production learning stage or start later on during the learning phase. It aims at strengthening the marketing abilities and entrepreneurial skills of FFS group members, thereby helping them to better leverage market opportunities.

See (module): ***Farmer field school learning phase (1.2)***

Entrepreneurship is a key component of a poultry FFS

FFS can help poultry producers to become more entrepreneurial in running their farms. Producers are helped to leverage market opportunities more effectively and to produce more for markets and profits. A successful poultry FFS will:

- enable participants to exploit economic opportunities created by their improved knowledge, skills and networks;
- facilitate savings, cost sharing, access to microcredit, marketing, job creation and livelihood diversification;
- help participants to understand market and price dynamics, and key actors and their roles and interests;
- create linkages among different value chain actors;
- create wealth, promote social cohesion and build resilience.

Entrepreneurship and marketing activities are particularly important in attracting and engaging participants, especially young people.

See (module): ***Strengthening entrepreneurship/marketing (1.2.2)***

Entrepreneurial knowledge and skills equip family poultry producers to compete in their local environment and to make profits by taking advantage of market opportunities.

Phase 3: Post-FFS learning phase

During the post-FFS learning phase, participants implement what they have learned during the learning phase and try to find new ways of learning as a group, including participating in coordinated FFS cluster meetings that support networking and facilitate the start-up of new FFS, hosting visiting groups, and undertaking marketing and value addition that give sustainability to the practices learned in the poultry FFS. The group can continue working together to define other challenges for which new knowledge and skills need to be mastered.

See (module): ***Post-farmer field school learning phase (1.3)***

MODULE 1

Poultry farmer field school establishment and learning activities

1.1 Preparatory phase

Chapter objectives

- To describe the role and responsibilities of facilitators during the preparatory phase.
- To guide facilitators in the successful implementation of key preparatory activities and provide practical recommendations.

The preparatory phase is key to the success of a poultry FFS. Ensuring high-quality learning requires thorough planning and the participation of family poultry producers and the community to provide a better understanding of the local context, constraints, priorities and needs. A facilitator should work in close collaboration and consultation with the project team during this phase.

Main activities of the preparatory phase

- Understanding the context and target community:
  - pre-condition survey/assessment;
  - baseline studies.
- Building FFS capacity:
  - selection and training or refresher training (if previously trained) of master trainers;
  - selection and training of facilitators.

The FFS facilitator takes up his/her role

- Introducing the FFS to the target community and its leaders:
  - awareness-raising meeting.
- Forming and formalizing an FFS group:
  - FFS group formation and organization;
  - selection of the learning activity/enterprise;
  - identification of the learning site/host farm.
- Developing the FFS group action plan:
  - identification of key problems and possible solutions;
  - design of comparative experiments;
  - preparation of an enterprise curriculum.
- Creation of a participatory monitoring and evaluation plan.

1.1.1 Understanding the context and target community

1.1.1.1 Pre-condition survey/assessment

Prior to implementing a poultry FFS in a new area, a pre-condition survey/assessment should be carried out by an experienced FFS specialist or master trainer using participatory tools. This activity has the following aims: assessing local practices and opportunities, identifying preliminary objectives, identifying stakeholders, identifying alternative solutions, assessing the suitability of the FFS approach, assessing lessons learned, and identifying any FFS specialists or master trainers in the region.

See (external): FFS guidance document (FAO, 2016a)

1.1.1.2 Baseline studies

Information and data collected during the baseline surveys before implementation are crucial for assessing the performance and impact of an FFS. Baseline information helps to define indicators for monitoring and evaluation (M&E) and allows comparisons to be made between local knowledge and practices before the start of an FFS and after its implementation. It also helps establish priorities and identify entry points for the field school curriculum. Finally, it provides information about the social context, gender dynamics and potential social vulnerabilities in the community.

See (external): FFS guidance document (FAO, 2016a)

1.1.2 Building farmer field school capacity

Any poultry FFS initiative, whether part of a small project or a larger national programme, needs to ensure that a sufficient pool of competent and experienced master trainers and facilitators are available for the intervention. Building adequate FFS capacity will involve organizing training and/or refresher training events.

See (external): FFS guidance document (FAO, 2016a)

1.1.3 Introducing farmer field school to the target community and its leaders

Any new initiative will be better received if its aims and objectives are presented to and discussed with community leaders and members from the outset. Local protocols should be observed to ensure that this introduction runs smoothly and that meetings are held in the most appropriate order.

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Before you start working with the local community, as a facilitator you should gain a broad understanding of the community and its poultry production practices, including:

- intensified and/or extensive poultry production systems;
- major poultry diseases;
- marketing opportunities for existing poultry farm produce;
- opportunities for value addition for poultry produce;
- risks involved in poultry farming and how to mitigate them;
- poultry species and breeds kept;
- existing output markets;
- availability of input and service providers.

ACTIVITY 1. Community awareness-raising meeting

As a facilitator, you should run the community awareness-raising meeting with the assistance of project staff. The following actors should be invited to the meeting:

- local leaders/chiefs and village elders;
- poultry producers who share common facilities (such as an output market);
- civic leaders, opinion leaders and local government representatives.

!

Local leaders/chiefs and village elders can assist in gathering poultry producers.

Objectives

- To present the FFS approach and explain the mode of learning in an FFS.
- To seek suggestions from community leaders on how to identify poultry FFS participants.
- To assess the interest of local farmers.
- To gather information about poultry production in the area and the general problems faced.

Steps

1. Introduce yourself and provide general information about your project/organization.
2. Explain why you are in the community.
3. Give a short history of FFS. What are the origins of the approach? How did it evolve over the years? Where have FFS been implemented?
4. Explain the approach and its objectives.

The following are some of the key elements that can be mentioned:

- *Learning approach:* adult learning, participatory approach, building skills and knowledge, entrepreneurship.
- *Learning cycle:* normally the length of a production cycle, but in poultry the FFS is often repeated for at least two production cycles.
- *FFS mission:* safe, high-quality food and non-food poultry products produced from healthy birds using safe and socially, economically and environmentally sustainable practices.
- *Main concepts to be covered through experimentation:* good management, sustainable nutrition, health care, participatory decision-making, agro-ecosystem management.
- *Design:* groups of 20–25 participants divided into subgroups of 5–6 people with 1 or 2 facilitators.
- *Target group:* female and male family poultry producers, including young people and people with low levels of literacy.
- *Value adding:* FFS enables participants to develop specializations and market-led production.

!

- Use photos and schematic charts to help community members visualize the FFS and its activities.
- Be careful not to raise the wrong expectations. Poultry producers need to know why they are joining the FFS so that they do not become frustrated or disappointed. If necessary, discuss expectations with the producers who would like to become FFS participants and explain which are reasonable.

5. Answer any questions from the community.

1.1.4 Forming and formalizing a farmer field school group

The formation and formalization of the FFS group is a crucial step and should not be rushed.

1.1.4.1 FFS group formation and organization

Once the programme has been introduced to the community, potential FFS participants should be identified.

Identification and selection of participants

As a facilitator, you should select FFS participants by working together with local leaders/government authorities, farmer representatives and a representative of the project that is funding the FFS.

! Where possible, use an existing group registered with the relevant authority.

For each poultry FFS, 30–35 participants should be selected as groups tend to shrink to 20–25 after the first few sessions. If a larger list of farmers is initially identified, the number should be reduced through well-established and agreed criteria, which could include length of experience in family poultry production, proximity among potential participants, accessibility of markets and other locations, the willingness and motivation of farmers, etc.

Participants must...

- be interested in learning and not expect material benefits from the FFS;
- share a common enterprise interest (such as broiler production, poultry breeding, extensive poultry production);
- live within a relatively short distance of the FFS learning site (preferably in the same village);
- not have any conflicts among each other;
- be willing to attend all meetings during the FFS cycle;
- be willing to work in a team and share ideas with other farmers, including those who are not FFS participants;
- be willing to invest time in the poultry FFS work and to adhere to requirements for vaccination against Newcastle disease and the protection of chicks from predators.

The mix of genders, ages and literacy levels of the poultry FFS group should be appropriate to local circumstances

Creation of FFS subgroups (five to six people)

For some FFS activities, you will have to split the FFS group into smaller subgroups. A number of criteria can be used to identify the members of each subgroup, such as living within walking distance of each other; having at least one person who can read and write and serve as the subgroup's secretary; local sociocultural factors and dynamics – for example, in some settings subgroups of only men or women might have to be formed; and being willing to support each other with a shared production plan and common production goals.

ACTIVITY 2. Gender analysis

Objectives

- To evaluate how poultry ownership, husbandry and marketing are divided within households in the area.
- To gain a better understanding of gender roles and responsibilities in poultry production.

Examples of questions for stimulating discussion:

- What are the roles of men/women/young people in poultry production?
- Which of the household's livelihood needs are met for different members of the household as a result of keeping poultry?
- Who:
  - controls the income from family poultry production?
  - is a hindrance to family poultry production (if anyone)?
  - makes decisions about poultry production?
- What positive and negative trends encourage family poultry production?

Participatory rural appraisal tools

Each poultry FFS should be adapted to poultry producers' needs and the poultry production calendar in its local setting. Participatory rural appraisal (PRA) tools are designed to increase the facilitator's and producers' understanding of local problems and to help them make decisions regarding FFS implementation. PRA tools also give poultry FFS participants a greater sense of ownership of the learning process.

Objectives

- Determine farmers' needs.
- Establish priorities for poultry FFS activities.
- Set indicators for comparative experiments.
- Monitor implementation of the poultry FFS.
- Investigate special topics.
- Enable participation of people with low literacy levels.

Examples of PRA tools

Tool	Use
Matrix scoring	Selection of focus enterprise
Gender analysis	Selection of participants
Natural resource mapping	Identification of host farm and learning site
Timelines, seasonal calendar	Understanding of seasonal variation in feed availability, poultry disease occurrence, market demand, etc.
Problem tree analysis	Identification of production problems and root causes
Solution tree analysis	Assessment of solution options
Flow diagram	Decisions on when to sell

ACTIVITY 3. Understanding learning through a poultry FFS

Objective

To help farmers understand the FFS approach and its learning process and objectives.

Steps

1. Divide the participants into subgroups of five or six and share out the tasks. For example, if six subgroups are created, four will discuss the objectives and two the principles of poultry FFS.
2. Distribute the handouts for the session to the subgroups, and explain their contents to people with low literacy levels.

*See (annex): **Poultry farmer field schools (Annex 1)***

3. In their subgroups, let the participants read aloud the objectives of the session, and assign an objective to each subgroup. Ask participants to focus on their objective, identify key words and synonyms related to the objective, and translate them into a local language wherever possible.
4. Ask the subgroups working on the principles to make an illustration of each principle.

Guiding questions

- In what ways does the FFS differ from three to five days in a training workshop?
- What are the main immediate and short- and long-term results of a successful poultry FFS?

Next steps/reflection for action

Recall the principles and summarize ways in which participants of a poultry FFS obtain new knowledge.

Develop the FFS group constitution

The FFS constitution should be prepared together with FFS participants and should list the core principles of each poultry FFS group. It can cover such issues as:

- the responsibilities of FFS participants; the FFS group leader, secretary and treasurer; and FFS sub-groups, host teams and their leaders;
- the rules for:
  - selecting group leaders, a secretary and a treasurer;
  - managing FFS meetings;
  - managing FFS funds and grants;
  - managing FFS assets, including assets used in comparative experiments;

- excluding participants from the poultry FFS, if necessary;
- dealing with possible disputes, disagreements and conflicts among participants or sub-groups;
- how and when the FFS group may be dissolved.

1.1.4.2 Selection of the FFS enterprise/main learning activity

The selection of the FFS focus enterprise[1] depends entirely on the needs and interests of FFS participants in their specific local natural, economic and sociocultural environments.

It generally takes two half-day sessions to complete the profiling of a selected enterprise, with members of the group collecting data between the two sessions. The purpose of the second session is to finalize the selection of the enterprise(s) to be considered and define in detail the cost, income and other aspects for which additional information will be needed.

!

- The selection of the enterprise should be part of the FFS learning process. Do not advise which enterprise to select.
- The selection should be based on the merits of collective learning, and should not be for the benefit of the host farmer or opinion leaders.

ACTIVITY 4. Global situation assessment

Objective

To help identify what to emphasize during the FFS, what kind of poultry production system is practised, the reasons it is practised, and the outputs it produces.

Steps

1. With participants, discuss the characteristics of the four different family poultry production systems:

*See (about this manual): **Production systems (About this manual)***

2. In subgroups, ask participants to arrange 100 stones among sections in a table showing the various types of poultry production system according to how well each system reflects the participants' own situation – extensive or intensified.

[1] The focal activity or learning enterprise of the poultry FFS, such as egg production, poultry breeding, broiler production, chick raising, or feed production and management.

Example of a table that can be used to assess the situation

Production system	Eggs	Chicks	Growers	Layers	Broilers
Small extensive scavenging					
Extensive scavenging					
Semi-intensified					
Small-scale intensified					

3. Ask the subgroups to explain the results (including the reasons why such systems are practised, and their outputs) and to suggest what would be a feasible focus enterprise for the FFS.

ACTIVITY 5. Dream envisioning exercise – developing options for the future

Objective

To provide an in-depth review of enterprises from which to select.

Steps

1. Brainstorm a list of possible enterprises.
2. Review the enterprises, following the example outlined below.

Example

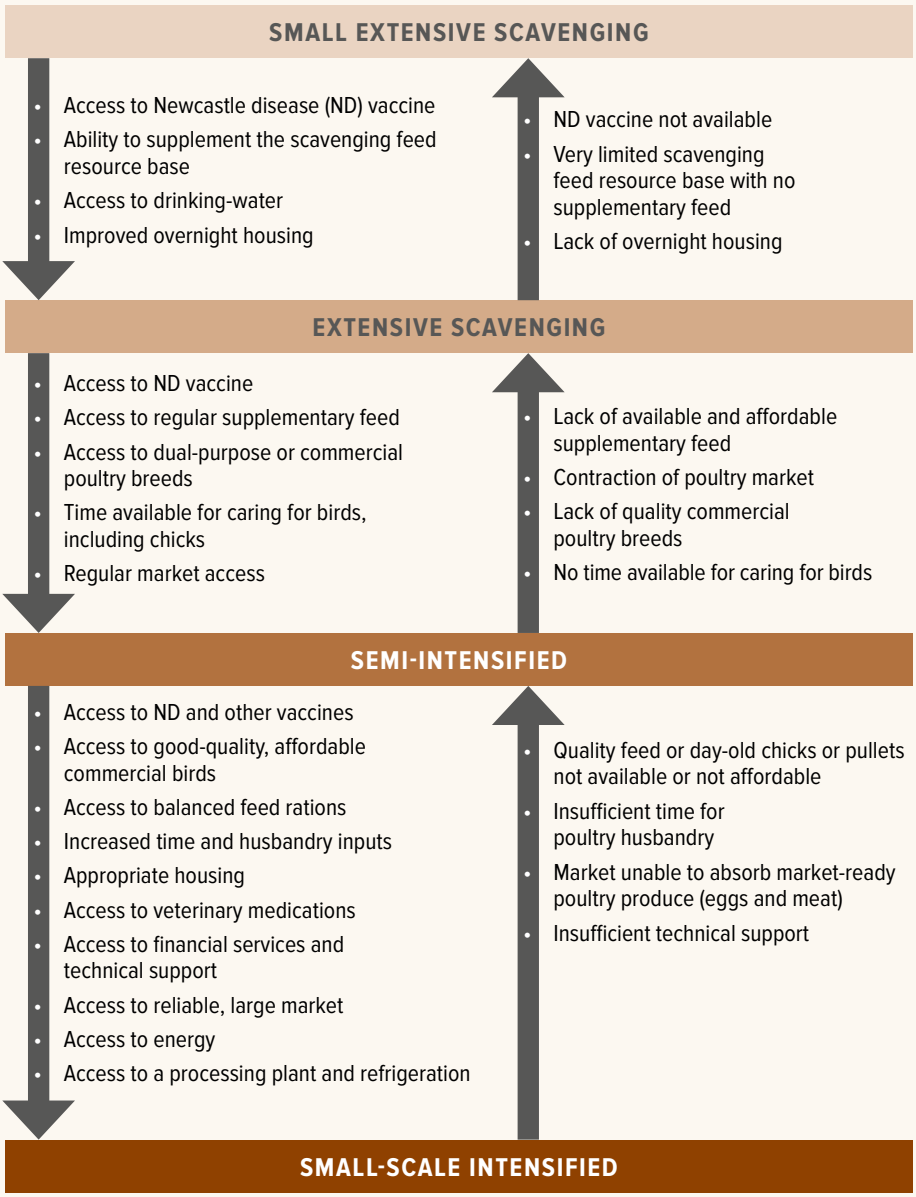
Our vision is to be...	Strategy	The challenge faced is that...	Possible entry point	Related topics
Egg producers	Increase number of laying hens	Feed is expensive	Locally produced feed for chickens	Feeding management of laying hens
Chick producers				
Broiler producers				
Feed millers				
Processors				
...				

3. Each subgroup is allocated an enterprise to discuss and for which to prepare a presentation that identifies the type of enterprise, the size of the investment needed, the availability of a suitable site, the budget, and the expected benefits.
4. During plenary, ask participants to make clarifications and suggestions for improving each of the listed enterprises.
5. Agree on expectations and on what makes one of the enterprises more feasible than the others.
6. Select that enterprise to be the focus of the group's learning enterprise.

Transformation of family poultry enterprises

The transformation of family poultry enterprise from one production system to another should take into consideration several key factors. Transformation will also require greater investments from the farmers in terms of time and financial investment. It will also require the development of knowledge and a set of skills.

Overview of key factors for farmers to take into account when considering transforming their poultry enterprise from one production system to another



Note: Arrows represent the transition from one production system to the other.

Source: Authors' elaboration.

1.1.4.3 Identification of the learning site/host farm

The poultry FFS group will select a poultry production site where FFS meetings will be held. A field may also be needed as a study plot/object (such as a kitchen garden).

The site can be hired or donated by one of the FFS participants or the community/ local authorities. It must be suitable and equipped for learning.

The host farm/learning site should

- be centrally located, accessible and safe;
- have adequate facilities/resources (including basic facilities for appropriate hygiene and biosecurity practices such as hand-washing);
- be a location that participants feel they can enter freely;
- be selected democratically;
- be spacious enough to hold the FFS group;
- possibly have indoor facilities in case of harsh weather;
- have facilities and poultry that are suitable for each cycle of the learning enterprise;
- be representative of poultry production sites (including their problems) in the area;
- if privately owned, the host farmer should be:
  - present most of the time (including between poultry FFS sessions so that non-FFS participants can visit);
  - friendly, reliable, accommodating and readily available;
- have at least one field suitable for cropping (for example, for setting up a kitchen garden).

- Ideally, FFS participants should provide the necessary inputs and equipment. When provided by the project, the costs of the items should be communicated so that participants know what is needed to replicate the enterprise.
- To avoid conflicts of interest once the enterprise has been established, it is recommended that verbal or written agreements be put in place on the sharing of inputs and outputs.

ACTIVITY 6. Resource mapping

Objectives

To gain a clear understanding of the resources and service providers that are available in a community, and of what can be used to implement the planned measures. Specifically, the map can:

- be used as a guide for identifying problems and opportunities;
- aid discussion on the location and type and quantities of resources needed;
- serve as a monitoring tool for demonstrating the situation before and after the intervention;
- remind participants of changes that have taken place, serving as a self-evaluation tool for individuals and groups;
- help check that the chosen poultry FFS enterprise is realistic and sustainable given the local resources available in the community;
- form part of a proposal when sourcing external funds.

Steps

1. Ask participants to discuss and list the natural resources in their village.
2. Ask participants to draw a map of the natural resources in their community (natural vegetation, water sources, insects, animals, etc.). From this map, have the group discuss how these resources help to support livelihoods.

The materials used to develop the map include large sheets of paper, marker pens and local materials such as sticks, pebbles and leaves.

3. Discuss the condition of these natural resources, and how they can be used to support poultry-related activities; resources to be looked at include natural vegetation, insects and animals.
4. Focus on crop farming. Discuss which crops the participants can plant and show the location of different types of farm, such as sorghum farms and kitchen gardens. These can be potential sources of feed for poultry or a cause of conflict, particularly in extensive production systems.
5. Ask the group to locate the host farm/learning site and have them explain why they picked that location.
6. Summarize the problems:
   a. List the problems in the village as presented by farmers.
   b. Separate the problems according to whether they are technical or social.
   c. Draw a symbol for each problem.
7. Reflect on what service and input providers the group may need (such as vaccinators and agrovet agents) and where they can be found in the community.

1.1.5 Developing the farmer field school group action plan

Once the FFS participants, learning site and enterprise have been selected, the next critical step is the joint development of a feasible group action plan.

! Five half-day sessions spread over two weeks are generally required for developing a group action plan. Where appropriate, you can help participants to finish formalizing their group during this period, for example, by helping them to open a bank account.

ACTIVITY 7. Estimating the performance of poultry production parameters

Objective

To estimate the current and desirable performance of the FFS poultry enterprise.

Steps

1. Discuss each of the parameters of poultry production.
2. Guide the farmers in estimating the current and the desirable performance of the poultry production system of interest to the FFS.

Example

Parameter category	Parameter	What is the baseline – current estimates	Estimated performance with improved management through the FFS cycle
Flock structure	Flock size		
	Hens: cocks		
	Growers: flock		
Hen performance	Age at first egg		
	Body weight at first egg		
	Laying rate		
	Laying period		
	Number of clutches/year		
	Number of eggs/clutch		
	Clutch formation		
	Incubation period		
	Hatchability		
	Brooding period/clutch		
	Inter-clutch period		
Flock formation	Mortality (survivability)		
	Pullets/hen/year		
Chicks	Number of chicks Chick survival rates		
Economics	Income status of flock owner		
	Percentage of family income derived from poultry		

3. Discuss and reflect on the findings with the group.

ACTIVITY 8. Collaborative inquiry

Objective

Participants see the issues discussed during **Activity 7 (Estimating the performance of poultry production parameters)** from a positive perspective.

Steps

1. Ask participants to discuss the successes they have achieved for each parameter.
2. Ask participants to describe what the ideal situation should be.
3. Ask participants to share information on their constraints (gaps).
4. Invite participants to explain their strategies and plans for achieving their ideal situation.

Example of summary table

Parameter	Ideal situation (completed by a livestock specialist in the area)	Success (past situation, farmers' experiences)	Gaps/ constraints	Plans for achieving ideal situation
Flock size (adult birds)				
Hen to cock ratio				
Growers/flock				
Age at first egg				
Body weight at first egg				
Number of clutches/year				
Number of eggs/clutch				
Clutch formation				
Incubation period				
Hatchability				
Fertility				
Brooding period				
Inter-clutch period				
Poultry breeds				
Source of new chicks				
Mortality (survivability)				
Pullets/hen/year				
Feed source				
Daily amount of main feed type required				

Parameter	Ideal situation (completed by a livestock specialist in the area)	Success (past situation, farmers' experiences)	Gaps/ constraints	Plans for achieving ideal situation
Source of protein in supplements				
Poultry housing				
Access to veterinary services and veterinary pharmaceuticals				
Mortality				
Time devoted to poultry management each day				
Percentage of family income derived from poultry				

5. In subgroups, help participants to discuss their vision of an FFS.
   Ask questions such as:
   - What do we want to see when we visit a poultry FFS group?
   - What does an effective FFS look like?
6. Using cards to capture the points made, ask each subgroup to summarize the outcome of their discussions.
7. Have all groups present their cards (with writing, or drawings for groups of low literacy) and attach them to a board.
8. In subgroups analyse:
   a. innovations/adaptations possible for the production systems of subgroup members;
   b. experiences and lessons learned from elsewhere;
   c. characteristics of the strategies and plans that distinguish the FFS.
9. Summarize the state of production, knowledge and skills.

1.1.5.1 Identification of key problems and possible solutions

Before designing the curriculum and comparative experiments for the poultry FFS, the key problems and potential solutions should be identified with the group.

Identify problems

Involving FFS participants in problem identification will help to ensure that the solutions tested in the comparative experiments and activities planned for the FFS are relevant to the farmers' circumstances.

ACTIVITY 9. Seasonal calendar

Objectives

By compiling a seasonal calendar the facilitator and FFS participants will improve their understanding of:

- seasonal variations in feed, markets, disease incidence, labour needs, parasite occurrence, poultry demand, etc. – a seasonal calendar is a useful tool for planning activities that ensure peak farm production to match periods of high demand (such as cultural or religious festivals or other events);
- the key activities carried out by women and men in each season, clearly outlining tasks and workloads;
- the extent of problems such as feed shortages or outbreaks of the most common diseases, and when they occur;
- trends in crop production and economic upturns and downturns – for example, in an area where farmers produce maize or another staple or cash crop, consideration should be given to adjusting the FFS activity plans during periods of peak labour demand in the planting and harvesting seasons so as to ensure high participation in FFS activities without compromising essential on-farm activities.

Steps

1. Construct a one-year calendar.
2. Ask how many seasons are recognized in the area and mark them along the horizontal axis of the calendar.
3. On the vertical axis, add the patterns of the main events and major household activities in each season, such as:
   a. expected rainfall patterns (this should be the first element mapped);
   b. periods of high risk for major diseases;
   c. household consumption patterns, such as the number of meals consumed each day in the different seasons, and the type(s) of food consumed;
   d. composition of the scavenging feed resource base;
   e. main community or household celebrations;
   f. planting times for core crops;
   g. harvesting times for core crops.

!

- As you will probably be working with low-literacy groups, add simple illustrations for each event/activity so that the whole group can understand.
- You might consider forming subgroups of only men or only women to better understand gender roles and responsibilities.

Example of a seasonal calendar with guiding questions

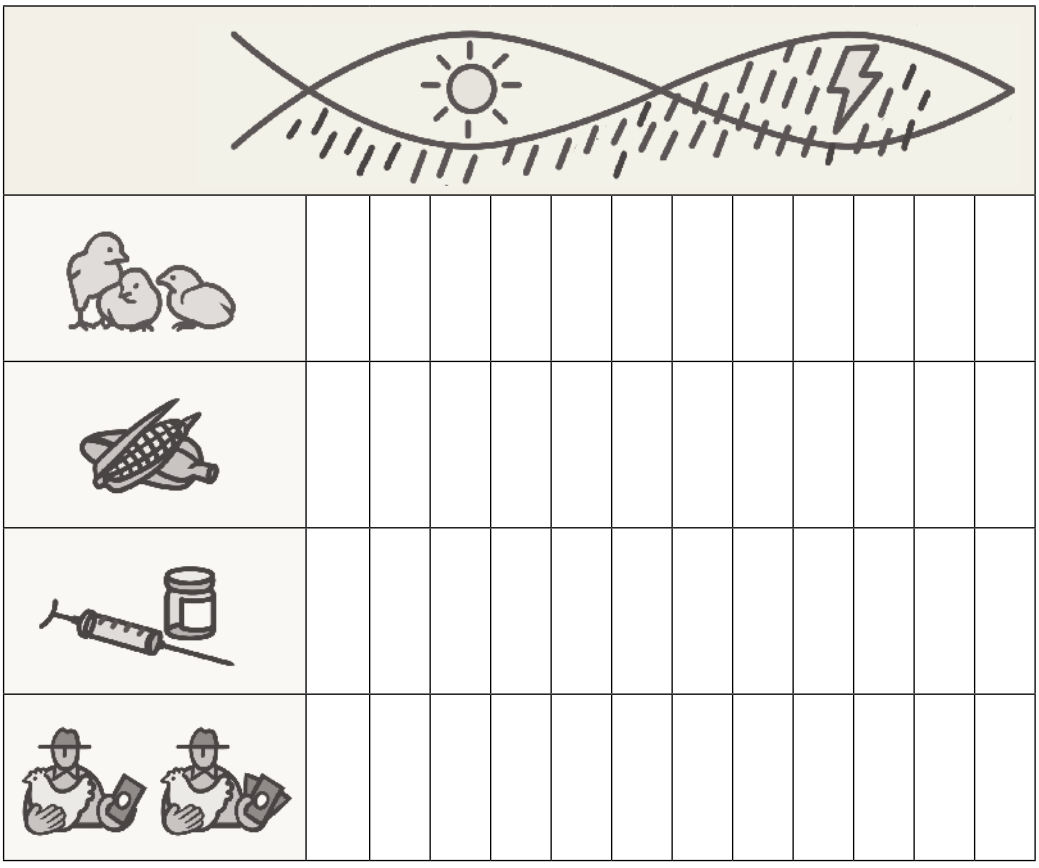
Main events/ household activities	J	F	M	A	M	J	J	A	S	O	N	D	Sample questions for stimulating discussion
Symbols of months													What
Rain													… are the busiest periods for women and for men?
More chicks die of parasite XX													… are the periods of disease?
Disease outbreak YY													… are the key linkages among the different items in the calendar?
Disease outbreak ZZ													
Land preparation													When
Sowing													…is the period of highest poultry mortality?
Weeding													
Harvest of grain crop AA													How
Harvest of grain crop BB													…does income vary over the year?
Few chickens													… do women's calendars compare with men's?
Income shortages													…does food availability change over the year?
Many chickens													… does feed availability vary over the year?
More chickens eaten													When could attendance at weekly FFS sessions be a challenge?
High price for chickens													
Low price for chickens													

Note. This sample calendar starts in January, but the first month of the calendar will vary depending on the time of year when farmers start their poultry production cycle.

Examples of questions to ask for improving understanding of the events and activities included in the seasonal calendar:

- Poultry disease challenges:
  - You have shown me that disease YY is seen mainly in the wet season:
    - Why does disease YY occur mainly in the wet season?
    - When is the best time to prevent this disease?
    - What is being done to control the disease, and if nothing, why?
  - Why do you see disease ZZ in the dry season?
- Household poultry consumption and income:
  - Are the patterns of income shortage related to the number of poultry? If so, why?
  - When is the best time for consumption and sale of surplus birds? Is this when you actually consume and sell surplus birds? What can we change to improve poultry income?

Participatory methods such as seasonal calendars can be conducted using no written material in order to reach and involve people with low levels of literacy.



ACTIVITY 10. Pairwise ranking

Objective

To enable the group to prioritize problems (including diseases) and identify which are the most relevant to group members.

Steps

1. List all the problems identified in previous exercises. If the group can think of any additional problems, add them to the list.

!

- Pairwise ranking works better when there are no more than five problems to be ranked.
- Look only at existing problems, and not those that do not yet affect the group.
- Focus on problems that are relevant to most/all members of the group.
- In order to carry out pairwise ranking effectively and collect the appropriate information, it is critical that you first review and gain a good understanding of **Activity 11. Problem tree or causal diagram.**

Examples of questions for stimulating discussion:

- What problems are missing from the list?
- Which problems on the list are closely related or can be considered similar?
- Which problems are specific to a certain area or group of farmers (such as intensified poultry producers)?
- Does the final list of priority problems reflect what the group would like to learn about and plan experiments for?
- Do the group members agree about the final list of priorities?
- Which problems are relevant to everyone in the group, and which are relevant to different farmers?

2. Conduct pairwise comparisons:

   a. Draw the problems in a table. Write the problems along the top row of the table and down the left-hand column. (Block out cells to avoid duplication.)

   b. Starting with the top row, ask the group to compare each of the problems with each of the other problems:
      - Which is more important of each pair?
      - The group can vote by raising their hands. Write the more important problem in the appropriate place in the matrix.

   c. When you have finished the first row, go to the second row, then the third and fourth, until you reach the bottom.

d. Add up the number of times the group thought each problem was more important. The most important problem overall will have the highest score.

e. The problem that appears most frequently as "more important" in pairwise comparisons is the most important problem.

f. List the problems in order of importance on a new sheet of paper.

! When there are high numbers of people with low levels of literacy, ask the group to indicate the main problems and select a symbol for each one. Draw the symbols on a flipchart and give an equal number of locally available materials (such as sticks, leaves, stones or pebbles) to each group member. Ask the group members to distribute their materials in the table according to how important each problem is to them, then prioritize the problems based on the amount of material they put in each cell of the table.

Example of pairwise ranking

Symbol	Key problems
F	Inadequate quality of feed
B	Inappropriate breed of chickens
D	Diseases
DM	Difficulties in getting good sale prices in the market
LS	Labour shortage

	F	B	D	DM	LS	Score	Rank
F		F	F	F	F	4	1
B			B	DM	LS	1	4
D				DM	LS	0	5
DM					DM	3	2
LS						2	3

Analyse the production problems

Once key problems have been identified, discuss with the FFS participants what they think is causing them. Encourage the participants to think broadly and identify a wide range of issues that contribute to the problems that they are facing.

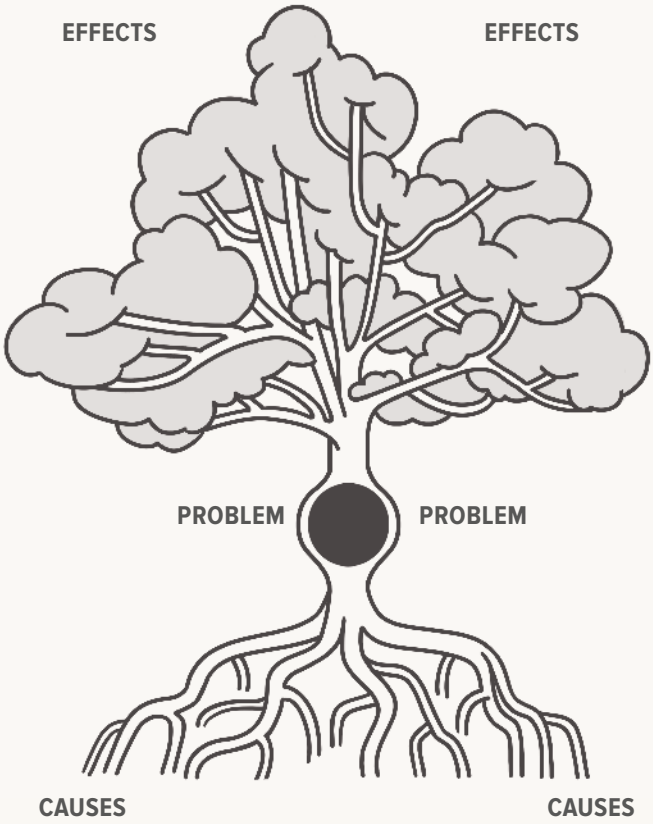
ACTIVITY 11. Problem tree or causal diagram

Objectives

- To learn to relate problems to their underlying causes.
- To identify topics for the learning programme. Facilitators should identify knowledge gaps that when addressed will improve family poultry production.

Steps

1. Ask a participant to draw a tree (with roots, a trunk and branches) on a flipchart or on the ground. Each production problem should be thought of as a trunk.
2. Guide the participants in identifying the direct causes of their production problems and the impacts/effects of each cause. Factors causing the problem should be thought of as the roots of the tree, and the effects as the branches.
3. Review the problem tree and make any necessary changes.
4. Ask the participants to consider what can be done to address the causes of each problem.



Identify potential solutions

Once key problems have been identified by the FFS participants, ask them to identify which problems they can address practically on their farms and in their areas. Once again, encourage participants to think broadly and be innovative in relation to suggesting potential solutions.

ACTIVITY 12. Problem/solution analysis

Objectives

- To help the group decide the most appropriate solutions to their problems.
- To reveal whether people have a specific strategy (coping) for solving a particular problem, and the extent of the strategy's success in their view.

Steps

1. List three or four common problems faced by poultry producers in a table.
2. Ask the participants to add the indicators of each problem. What are the signs that show it is a problem?
3. Ask the group to indicate the root cause of each problem.
4. Ask the group to identify what they are currently able to do to cope with problems and to list these coping strategies in the relevant column of the table.
5. Guide discussions on possible long-term solutions (i.e. what can be done) that address each problem.

Example

Problem	Cause	Usual solutions	Possible solutions
High bird mortality	Disease	Occasional vaccination	• Establishment of a vaccination programme • Supplementary feeding • Improved breeding

ACTIVITY 13. Option assessment

Objective

- To rank and choose the solutions/options that can be tested and evaluated through comparative experimentation.

Steps

1. Develop an options assessment table for each of the key problems.
2. Write all of the solutions identified in the previous exercise (Problem/solution analysis) in the first column.
3. Read out each criterion (e.g. sustainable, productive, culturally appropriate) and have the participants agree or disagree to it. Using a predetermined scale (such as 1–5 where 1 is "strongly disagree" and 5 is "strongly agree", or of 1–3 where 1 is "disagree", 2 is "not sure" and 3 is "agree"), guide the participants in deciding on the value of each solution.
4. For each solution (including the experiences of the farmers and the solutions that are generally promoted by extension workers in the area – the latter is added by the facilitator), calculate the total score to see how acceptable it is to the group of poultry producers.
5. Repeat this exercise for each of the key problems.
6. List the solutions with the highest scores. These will form the basis of the learning programme and will be pursued in the poultry FFS.

Example

Problem: Low number of chicks per household attaining grower stage (the problem is identified through the pairwise ranking exercise)

Solution	**Criteria**					
	Sustainable	*Productive*	*Time*	*Equitable*	*Cost*	*Total*
	Easy to sustain over time	Improves productivity	Does not require a lot of time	Benefits everyone (women, men and the wider community)	Not expensive	
Chicken run with improved scavenging	●●●●●	●●●	●	●	●●●	13
Chick rearing at the group level with commercial incubators	●●●●	●●●●●	●●	●●●	●●●	17
Chick rearing without incubators	●●	●●●	●●		●●	9

1.1.5.2 Develop an FFS learning programme

As a facilitator, you should develop a farmer field school learning programme that lasts throughout the production cycle and is season-based (the FFS curriculum) together with the group, based on the learning enterprise selected and the gaps identified.

The FFS curriculum should reflect existing gaps in the community's knowledge and skills and show what aspects to improve. The knowledge that poultry producers requires differs from place to place and is becoming more complex because of issues such as climate change, (re-)emerging infectious diseases and changing customer needs. Enabling producers to take charge of their learning process will help them to adjust better to these changing situations.

The group's learning programme should be flexible and inclusive. If necessary, topics may be added or changed during an FFS cycle according to changing environmental conditions and other factors (such as disease outbreaks) that affect the poultry or plants being studied.

The curriculum should cover the full duration of the FFS, with a period that allows testing of new technologies/practices and successful activities for marketing the product/poultry.

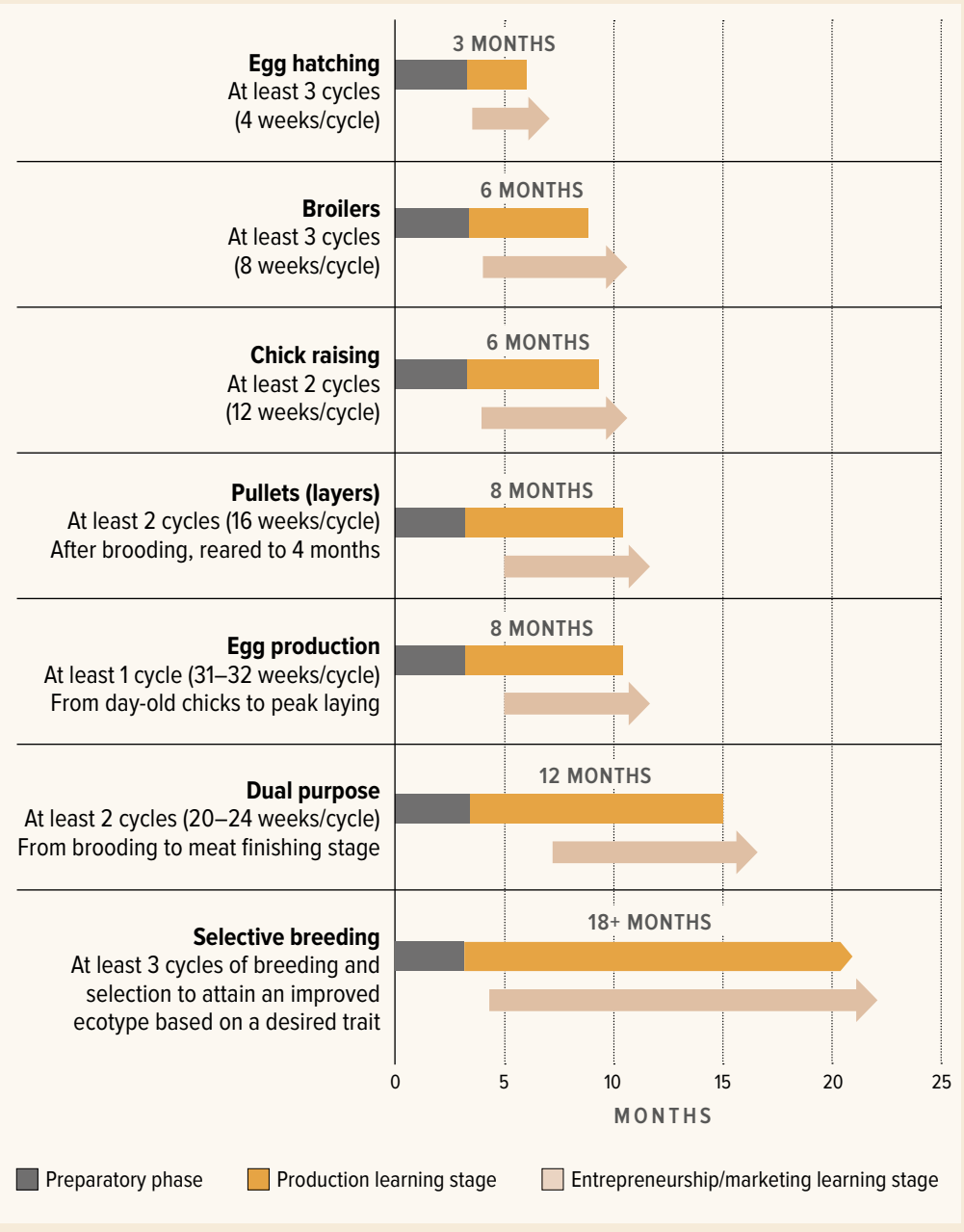
!

- If you do not have past experience, you should seek the help of an experienced master trainer for developing the FFS curriculum.
- Poultry FFS should have at least 12 to 15 meetings. In general, the longer the production cycle, the longer the time between meetings.
- Although some poultry enterprises allow an FFS of a few months, in most cases it is advisable to run the FFS learning phase for at least a year. Learning how to anticipate changes in weather and peaks in demand during the farming calendar requires meetings throughout the different seasons in order to discover how to adapt.

Duration of the FFS learning phase

As shown in the figure below, the duration of a poultry FFS is mainly driven by the type of enterprise being undertaken as the FFS should run throughout the production cycle. Two key factors affecting duration are poultry species and the problems to be solved: topics such as breeding require more time to yield significant results. The average knowledge/skill levels of participants and the group's gender composition might also affect duration.

Minimum duration of a poultry FFS enterprise cycle



Source: Adapted from FAO, 2018.

ACTIVITY 14. Curriculum development

Objective

To structure, with the poultry FFS participants, the activities for FFS meetings throughout the FFS cycle, and to define the external assistance needed.

Steps

1. Ask participants to list priority problems in a seasonal calendar.
2. Encourage discussion of each problem in the order of the seasons/calendar. The FFS group, in collaboration with the facilitator, decides which activities need to be undertaken for further exploring the problem and testing the solutions.

Example: turning problems into topics to be covered during the FFS cycle

Problem	Most appropriate learning entry point for addressing the problem	Related topics
Few birds to sell	Improved flock planning and management	• Market research • Sources of chicks • Chick rearing • Vaccination calendar • Protection of birds (from theft, predators, etc.) • Feed formulation

3. Each core activity is discussed and the group decides in which FFS sessions to cover a particular poultry topic (as a technical special topic) and topic of socioeconomic interest (as a socioeconomic special topic). Field days, exchange visits, invitations to farmers/experts, etc. should also be planned.
4. To develop the learning programme further, the dates of FFS sessions and the topics to be addressed then need to be written on a flip chart and made accessible to all (see the example below). The programme should indicate when the FFS will start and when the graduation will take place; when (in which production period/season) an experiment or practical exercise will begin and end; the dates of sessions (weekly sessions are recommended); and when each host team will be on duty.

Example of an FFS curriculum template that can be used for developing a workplan and core activities

Calendar month	Season	Problem to tackle	Objective and option to be tested	What to do – activity	Materials	When to begin	Who to follow up

Poultry/management needs according to the stage of the birds' life cycle and market demand

Poultry needs and management of housing, feeding, animal health, etc. will vary greatly depending on the stage of the birds' life cycle and on market demand (see table). These aspects should be duly considered during FFS preparation (particularly curriculum development) and implementation.

Poultry/management needs in extensive and intensified systems (scale 1–5)

	TECHNICAL DOMAIN				
	Housing	**Animal health and biosecurity**	**Feeding**	**Marketing**	**Breeding**
Extensive systems					
Chicks (1–21 days)	••••• (coops or baskets)	••••• (vaccination)	•••• (appropriate feed)	•	N/A
Growers	•• (night housing)	•••	•• (supplementary feed)	••• (cockerels not suitable for breeding)	N/A
Laying hens	•••• (nests)	••••	••• (calcium supplement)	•••••	•••••
Breeding hens and cocks	••••	••••	••• (protein and vitamin supplements for proper chick development and hatching)	•• (mature hens and cocks unsuitable for breeding)	•••
Intensified systems					
Chicks (1–21 days)	••••• (brooders)	••••• (vaccination)	••••• (appropriate feed)	•	N/A
Growers – broilers	••••	•••	•••••	•••••	N/A
Growers – pullets	••••	•••	•••••	•••• (pullets for restocking)	N/A
Breeding hens and cocks	••••	••••	••• (layer feeds with slightly more protein and extra vitamins for proper chick development and hatching)	•• (culled breeding hens and cocks)	•••
Laying chickens	••••	•••	•••••	•••	•••••
Eggs	•••• (safe and quiet nests)	•• (safe storage)	N/A	••••• (safe storage and transport for fertile eggs, sale of infertile eggs)	••• (fertile eggs)

Note: The information provided in this table is indicative and for illustrative purposes only.

*See (module): **Poultry production and health (Module 2.1)***

1.1.5.3 Design safe and effective comparative experiments

Experimentation is a follow-up process to the problem diagnosis stage in an FFS process, with the main objective being to address the constraints selected by poultry producers. The poultry FFS can now frame a clear problem statement and a title for each experiment, in close consultation with local researchers/extension workers.

!

- It is advisable to agree on some guiding principles for the success of experiments; for example, the poultry included in the experiments should not be sold prior to the completion of the trial (unless necessary).
- At the end of the learning phase, the FFS participants should summarize and analyse the financial costs and benefits of the options tested. The cost–benefit analysis is critical in helping FFS participants to:
  - be aware of the cost implications and profit of an enterprise;
  - understand the importance of analysing expenditure and profit;
  - appreciate the reasons for following a business strategy;
  - list and analyse any other (positive or negative) changes observed.
- The financial cost–benefit analysis should be integrated with analysis that accounts for other (environmental, social, etc.) costs and benefits related to the different options tested. Choices are made based on not only economic aspects, but also other criteria, such as being easy to manage, culturally appropriate and safe for the household members involved.

Comparative experiments can be used, for example, to improve poultry management by comparing poultry yields in different housing systems.

Basic principles of experimentation

It is important to follow the basic principles of experimentation in order to avoid making wrong conclusions or decisions from this activity and to ensure that solutions can be widely shared in the future. The principles include:

- The experiment is justified by the background work done by the group.
- The experiment can be managed by the FFS participants and facilitators in close coordination and in consultation with extension workers and researchers providing technical backstopping.
- The key factors are standardized.
- The experiment is designed to give reliable and tangible results.
- All appropriate biosecurity measures are implemented.
- The rules/factors agreed to prior to implementation are not changed during the experiment.
- The experiment has been repeated, if possible. Replication reduces the effects of uncontrollable factors in the environment and helps to ensure that the results obtained can be repeated in the future.
- If different groups are involved in the experiment, birds are allocated to each group randomly.
- Emerging innovations/solutions are promoted widely in the community, for example, by including field days once experimental results have been obtained.
- All birds should be vaccinated against key endemic diseases (which will vary by production system).

Types of comparative experiment

In poultry FFS, field comparative experiments involving test and control groups can only be used for low-risk and ethically acceptable experiments that can yield tangible results within the FFS cycle, such as measuring the impact of supplementary feeding on poultry in extensive systems. The use of such experiments in poultry FFS is limited by factors that include: i) possible irreversible loss of productivity; ii) risk implications for poultry health and welfare; iii) cost and availability of inputs; and iv) availability of birds.

Examples of safe and risky experimentation practices/units of observation

Safe practices	Risky practices
• Chickens in full confinement provided with *ad libitum* commercial feed and water • Scavenging chickens provided with *ad libitum* cafeteria feeding and water or locally available feed supplements	Growers in full confinement provided with the same daily amount of feed and water for an extended period*

* This practice subjects chickens to hunger and suffering because feed and water requirements increase as birds grow.

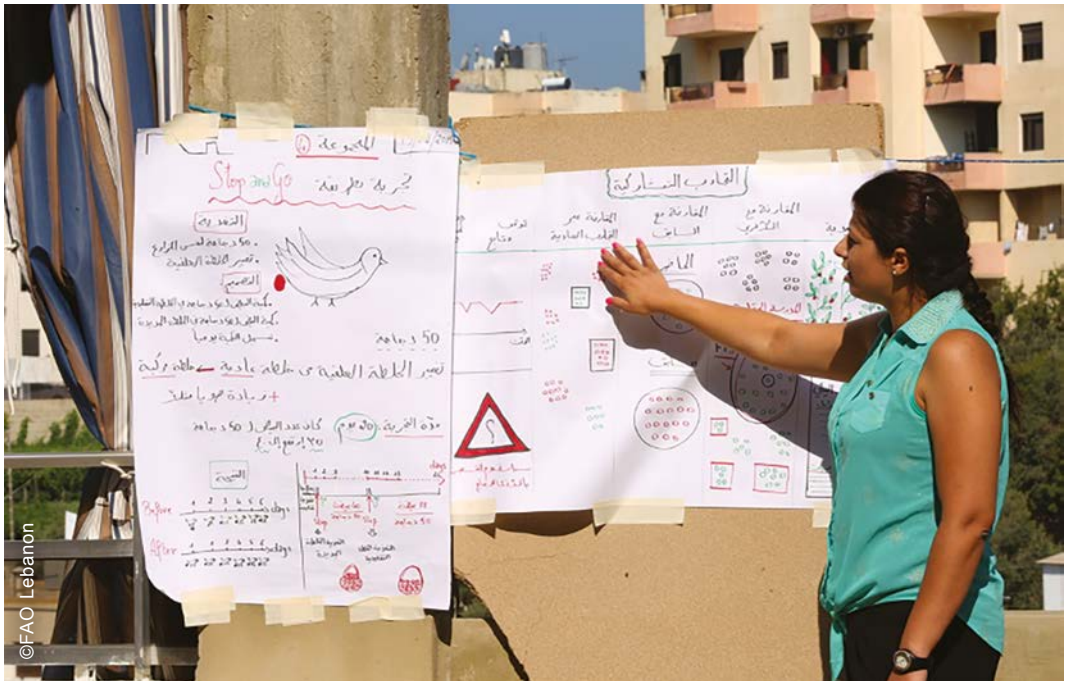
All experiments in a poultry FFS should be simple so that they can be managed and evaluated by the poultry producers themselves and yield reliable results. Any type of risk should be avoided. The following are considerations to be taken into account in order to ensure producers' ownership of the experiment and to minimize risk:

- The birds involved in the experiments should at no time be under any health risk. This precludes the use of control groups if control conditions will put animals at risk.
- Always consult with a local veterinarian, researcher or colleague on the design of an experiment. Any animal health treatment should be carried out only after diagnosis by a professional.
- Tasks and any benefits accrued from the experiment should be shared among all FFS participants.
- Only one specific question/local problem at a time should be addressed during trials.
- Producers should mobilize most of the inputs themselves. This fosters ownership of the process and results.

In poultry FFS, novel types of comparative experiment have been developed in order to avoid causing risks to animal production and health and to reduce costs (Groeneweg *et al.*, 2006). These novel types of experiment include:

1. *Comparison of ongoing practices in the same production unit*. This type of comparative experiment is used when adapting and adopting a new practice implies high risks to poultry health or productivity, or high costs. It can also be used in situations where misconceptions have been held for a long time.
2. *Comparison with past experience or the practices of non-FFS participants*. FFS participants' birds are given a beneficial treatment (such as vaccination) and results are compared with past experience or with the results for non-FFS poultry producers in the same area who are not using the same treatment.
3. *"Stop-and-go" trials*. The poultry under study receive a beneficial treatment that is interrupted several times, meaning that the birds themselves provide their own control group. The experiment can be used to demonstrate the effect of a single treatment that does not affect the health of the birds.

See (annex): ***Annex 5. Examples of comparative experiments and agro-ecosystem analysis sheets***



At the end of any trial, poultry FFS participants should analyse the results and draw their conclusions and recommendations

Example of a stop-and-go trial

Feeding chickens with or without access to free range scavenged feed		
No beneficial treatment – standard conditions (common practice in the area)	**Beneficial treatment introduced**	**Beneficial treatment stopped**
For a given period the chickens are fed in full confinement without access to scavenging resources in a yard.	For a given period the chickens have access to a yard that is well covered with grass and sites rich in insects.	For a given period the chickens are fed in full confinement without access to scavenging resources.
Records of bird health and weight are made throughout the trial during the agro-ecosystem analysis (*see* ***section 1.2.1.1.***). The effect of the beneficial treatment (access to scavenging feed resources) will be noticed when the treatment is stopped.		
Replication: 2–3 times.		

Steps in designing a comparative experiment

1 IDENTIFY THE KEY ISSUE THAT CONSTRAINS IMPROVED PRODUCTION AND PRODUCTIVITY:

- What:
  - ...is the problem we want to solve?
  - ...is the most/least important result we desire?

*See (module): Identify problems (**1.1.5.1.**)*

2 DEFINE AN OBJECTIVE FOR THE EXPERIMENT:

- What is the objective of the experiment?
- Why:
  - ...should poultry producers know about this?
  - ...has it been this way for so long?
  - ...have we allowed this to happen?
  - ...is there a need for this today?

*See (module): Analyse the production problems (**1.1.5.1.**)*

3 LIST POSSIBLE SOLUTIONS TO THE PROBLEM AND IDENTIFY THE MOST FEASIBLE OPTION (IN TERMS OF THE SIMPLICITY, PRACTICABILITY, COSTS, QUICK RESULTS, CULTURAL ACCEPTABILITY AND SUSTAINABILITY OF THE PRACTICE):

- What opportunities are there for addressing the problem?
- When is the best time to act?
- What practice/technology do we want to test?
- Where do we implement the experiment?
- What:
  - ... are the strengths and weaknesses?
  - ... is another perspective?
  - ... is an alternative?
- Where:
  - ... can we get more information?
  - ... do we go for help with this?
  - ... will this idea take us?
  - ... are the areas for improvement?
  - ... are the inputs and benefits going to be the same for men and women?

*See (module): Identify potential solutions (**1.1.5.1.**)*

4 DEFINE WHAT TYPE OF COMPARATIVE EXPERIMENT COULD BE USED.

*See (module): Types of comparative experiments (**1.1.5.3.**)*

5 DEFINE THE TRIAL'S DESIGN AND ACTIVITIES:

- Discuss the number of times the experiment should be repeated to remove biases (replications).
- Be clear on what conditions must remain constant (experimentation constant/uniform situation).
- List inputs/materials needed, including what FFS participants will contribute.
- Outline the experiment's curriculum/programme and duration.

*See (annex): Template for comparative experiments (**Annex 4**)*

6 DEVELOP THE AGRO-ECOSYSTEM ANALYSIS (AESA) FORMAT FOR MONITORING THE EXPERIMENT.

*See (annex): Template for the agro-ecosystem analysis sheet (**Annex 4**) and **Annex 5.** Examples of comparative experiments and agro-ecosystem analysis sheets*

7 PREPARE A BUDGET AND INCLUDE ESTIMATES OF FFS PARTICIPANTS' CONTRIBUTIONS.

*See (module): Develop a budget (**1.1.5.4.**)*

ACTIVITY 15. Introducing and developing the agro-ecosystem analysis format

Objective

- To make participants understand the agro-ecosystem analysis (AESA) format and decide the parameters to be observed.

Steps

1. Ask the poultry FFS participants what needs to be observed and what information needs to be collected for measuring performance and comparing the various technologies/practices tested in the comparative experiment with each other.
2. Based on this discussion, the AESA format is developed by asking participants what they need to know to enable them to make appropriate management decisions.
3. The parameters should be categorized according to the AESA template in Annex 4.
4. Ask the FFS participants to develop the AESA format on a flipchart, including the parameters defined earlier in this activity and a drawing that represents the topic under study.

! AESA records should suffice for interpreting the results of the comparative experiments. When fully discussed, the findings give insights into ecological interactions and the ranking of technologies according to how promising they are for adoption. New problems can be noted for consideration in successive experiments.

1.1.5.4 Develop a budget

As soon as the curriculum and experiments of the FFS are determined, it is important to identify the main budget needs for running the poultry FFS learning programme.

Various options for grants, loans (including from the private sector) and/or self-financing should always be considered. As a facilitator, you should explain the advantages and disadvantages of each option.

!
- The FFS should use locally available materials as much as possible, to reduce costs and increase sustainability.
- Self-financing mechanisms should be put in place from the start of the FFS. Income-generating activities such as selling some of the eggs produced are a good example. Contributions from individual FFS participants are also useful for self-financing activities.

Examples of items for budget allocation

FFS expenditure	Cost/unit	Source		
		External grants	Farmers' contributions, including of skilled labour	Revenue from study plot
Flock and field inputs chicks, feed, seeds, chicken wire, other construction materials, etc.				
Stationery flip charts, pens, markers, etc.				
Materials for disseminating good practices pamphlets, photographs, etc.				
Management tools weighing scale, torch, candle, tape measure, etc. used for cleaning, treatments, heating, catching birds, marking, constructing feeders, nests, perches, brooders, packaging, carrying crates and other management routines				
Comparative field experiments and learning activities with specific inputs birds, home-grown or commercial feed, drugs, vaccines, etc.				
Field days hosting the community at the FFS production site, etc.				
Exchange visits arranging for a few participants to visit nearby FFS, research institutions, etc.				
Facilitation allowance and expenses transportation costs, etc. for the facilitator and any visiting technical specialists				
Graduation ceremony certificates, transport, invitations, refreshments, etc.				
Participatory M&E				
Disease control vaccination, biosecurity, footbaths, disinfectants, etc.				

Grants and loans

A grant or loan is often made available by the funding agency to enable the FFS group to test alternative solutions and to cover the risks of experimenting with new poultry production practices/technologies. Through this strategy, FFS may develop financial empowerment, group cohesion and understanding of the costs of the technologies that FFS participants find suitable.

As an FFS facilitator you should:

- arrange a meeting for open and participatory planning of how to use the grants;
- observe the requirements for ensuring access to funds at the right time;
- lead the group in thinking about ways of sustaining learning and the challenges faced after donor-funded projects end.

If available, grant funds can be allocated as follows:

- Experimentation 30–40 percent.
- Income-generating activities 20 percent (when undertaken), for establishing the group's income-generating enterprises/self-financing activities.
- Facilitation expenses 40–50 percent, for transport, mobile communication and meal allowances.

The first instalment of 80 percent could be released on receipt of a comprehensive proposal, and the last 20 percent on receipt of a progress report, holding of a field day or on planning for the next learning cycle.

See (module): ***Funding mechanisms for farmer field school activities (2.2.4)***

> **!** Even when a grant is received through the FFS project or programme, the FFS should look for additional sources of funding.

Dimitra Clubs: a community engagement approach for people's empowerment and gender equality

Dimitra Clubs are informal groups of rural women and men who come together on a voluntary basis to discuss and implement solutions to community problems by using local and collective efforts and resources. To facilitate communication and access to information, Dimitra Clubs partner with rural community radios and are equipped with wind-up and solar-powered radios, and sometimes with mobile phones.

In several sub-Saharan African countries, including the Democratic Republic of the Congo, Mali, the Niger and Senegal, FFS and Dimitra Clubs have joined forces and developed a methodological alliance, mainly in the framework of adaptation agriculture for climate change and resilience projects. This alliance has led to promising results in improved access to information and knowledge, dissemination of adapted agricultural practices and innovations, and enhanced leadership from and empowerment of rural women.

Depending on the context, the establishment of the Dimitra Clubs might start before the creation of an FFS or vice versa. In both cases the alliance is promoted through at least four elements:

- **Sharing knowledge in an inclusive way:** Dimitra Clubs discuss the themes that emerge in the FFS, thereby facilitating access to information and the adoption of improved practices by a larger audience, particularly rural women, young people and the most marginalized groups in the community.

>>

- **Advancing gender equality:** In Dimitra Clubs, rural women improve their capacities to speak up in public, analyse problems and identify solutions. As the gender dimension is inherent to the Dimitra Clubs' approach, the methodological alliance with FFS enables rural women farmers to enhance their capacities and knowledge on improved agricultural techniques, including in poultry production, so that they can become better farmers and entrepreneurs while also enhancing their leadership and organizational capacities, which are crucial to their influence in decision-making.
- **Capitalizing on experiences:** The clubs ensure not only greater access to information and knowledge, but also the possibility of adopting, adapting and owning the practices of the FFS. As both groups share their members, there is cross-fertilization throughout the process.
- **Partnering with rural community radio stations:** Dimitra Clubs share their experiences with the clubs of other villages through community radio broadcasts. In this way the benefits of the learning-by-doing exercises of the FFS are replicated in other villages and communities.

1.1.6 Creating a participatory monitoring and evaluation plan

Monitoring and evaluation (M&E) is needed to ensure that the objectives of the FFS group are met and progress is tracked. As a facilitator, you will be reporting on your group's performance to supervisors, colleagues, donors and community leaders.

What makes M&E participatory?

- Objectives are set jointly.
- Beneficiaries and facilitators are fully involved.
- The activities and tools to be used are selected and planned together.
- The delivery plan, in terms of where and when M&E will be conducted, is agreed and targets are set together.

How can we monitor?

- by setting performance standards;
- by selecting specific, measurable, achievable/attainable, relevant and time-bound (SMART) indicators;
- through roll calls/registers;
- from available records;
- through personal/group interviews;
- by using questionnaires.

It is important to set key indicators for regular/weekly monitoring that identifies changes that could negatively affect the enterprise. These could be indicators of:

- *health* – chicken mortality, responsible use of antibiotics and anthelminthics, implementation of individual and community-based biosecurity plans;
- *incomes* – sales of poultry and poultry products;
- *collective action* – group cohesion, cooperatives and farmer associations, access to finance.

What can we evaluate?

- adoption of good practices – performance;
- progress towards objectives and targets;
- stage in implementation and tasks remaining;
- resource utilization versus implementation stage;
- finances.

!

- Record the data generated in the problem analysis carefully as it will provide baseline information for the evaluation.
- Always include a question related to mortality such as "What mortality rate is reported today and what does it mean?"
- Assess progress in entrepreneurship with appropriate questions such as "Which aspect of entrepreneurship should we learn about next?"

ACTIVITY 16. Selecting indicators (what to monitor)

Objective

To select what to monitor during FFS implementation.

Steps

1. In plenary, ask participants to discuss one or more of the following questions with the participant sitting next to them:
   - What aspects need to be considered when assessing the performance of the tested practice/technology? How can these aspects be measured or monitored? When can they be monitored (throughout the production cycle or at a specific time/the end)?
   - What other factors are likely to influence the outcome of the experiment?
2. Ask a few of the pairs to share their responses with the larger group. Write or draw the responses on a flip chart.
3. Summarize the exercise and explain the results, and the purpose and use of the indicators.

*See (annex): **Annex 3. Sample tools and templates for monitoring and evaluating the poultry farmer field school***

See (external): FFS guidance document (FAO, 2016a)

1.2 Farmer field school learning phase

Chapter objectives

- To provide guidance on how to hold successful poultry FFS meetings and learning activities.
- To provide practical information for adaptation and use in the field.

Once all the preparatory activities described in the previous section have been successfully completed, the learning phase with FFS meetings and comparative experiments can start.

Main activities of the FFS learning phase (production and entrepreneurship/marketing learning stages)

- Running farmer field school meetings (***1.2.1.***)
- Strengthening entrepreneurship/marketing (***1.2.2.***)
- Undertaking awareness-raising activities (***1.2.3.***)
- Planning for post-farmer field school learning: evaluation and action plan (***1.2.4.***)

1.2.1 Running farmer field school meetings

In poultry FFS meetings, core activities (AESA, special topics, group dynamics, and participatory monitoring and evaluation) are generally carried out in the order shown in Table 2.

Table 2. A typical FFS meeting schedule

Duration (minutes)	Activity	Responsible person(s)
30	Opening: roll call and brief recap	Host team*
30	Assemble at the experimental unit for AESA	All, in subgroups
90	Presentation of AESA, discussion, and decision-making	Facilitator
30	Group dynamics	Host team
30	Special topic	Facilitator or subject matter specialist
30	Participatory M&E	Facilitator in plenary

* The team of FFS participants responsible for implementing the day's activities.

1.2.1.1 Agro-ecosystem analysis

This section includes practical information on how to run AESA in poultry FFS. As a facilitator, you will have to work with members to identify the various enabling and constraining factors that make up their poultry ecosystem.

See (annex): ***Annex 4. Templates for the agro-ecosystem analysis sheet and comparative experiments*** *and* ***Annex 5. Examples of comparative experiments and agro-ecosystem analysis sheets***

The AESA can be used to observe how animals/crops and other biotic and abiotic factors interact

Tagging and examining the study poultry

At the start of FFS activities, as a facilitator you should help the group identify which birds will be monitored regularly.

At least two or three birds in a cage, unit or treatment group are selected to be measured and observed. The birds to be examined should be selected randomly. Regular monitoring and recording of the required information should be carried out until the end of the FFS. If the selected study birds are lost or injured, sample others using the same methods.

Random sampling

There are several methods of sampling, including the following:

- Selection based on a predetermined number: Randomly pick a number and count the birds in the flock. If the number randomly selected is "4", for example, select every fourth bird.
- Selective sampling from high-, medium- and low-performing populations: for example, pick one bird that is growing well, one that is growing poorly and one that is between these two extremes.

Steps

During the early stages of the FFS, demonstrate how to facilitate AESA in a subgroup. Then hand over the facilitator role to a literate member of one of the subgroups. This lead role should be rotated among the participants to encourage everyone to get involved, including any members of the group with low literacy levels.

AESA is a four-step process with distinct activities carried out in subgroups:

1. Recording observations on the flock/field and the poultry/crop ecosystem:
   a. Ask the host team to assign (or directly assign) to each subgroup a study unit based on the design of the experimentation activities. Poultry producers make observations based on agreed monitoring indicators and the AESA table.

Emphasis is on observing (not judging) the study unit, noting its interaction with various factors in the ecosystem

b. Each subgroup then records measurements, field observations and changes. The subgroup should carry a notebook to the field for recording the data. Every week, the facilitator should assign each group a different study unit to observe. In this way, all FFS participants will be exposed to the various study units in the experimentation.

2. Processing information:

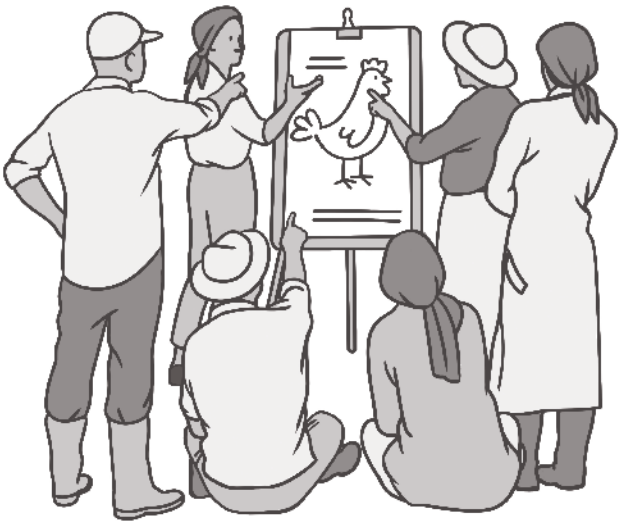
All subgroup members should sit together to reflect on their findings and opinions regarding the AESA. Together they should review their observations and write down the results of their analysis. They should also make a drawing of the field situation on the AESA flipchart for later presentation.

The best AESA charts are visual, with few words. Attach specimens to the chart wherever possible. AESAs with too much writing can discourage participants with low literacy levels from participating in the AESA process

3. Presenting AESA and receiving feedback:

In a plenary meeting, each subgroup presents its observations, monitoring results and recommendations and the other FFS members are invited to give honest reviews of the work presented.

! Every week, the presenter role should be rotated among the members of the subgroup to ensure the participation of all members, particularly women and people with low literacy levels, as they tend to be more timid than other members.



Criteria for judging a good presentation:

- How well are all sections of the AESA format addressed?
- Was the presentation understood by all members?
- Was the main message of this particular AESA stated clearly?
- How colourful is the presentation?
- How legible is the writing?
- What links have been made between the observations and indicators and the recommendations?
- To what extent does the drawing represent the true situation?
- How did the presenter behave?
- To what extent does the activity involve all subgroup members?
- How involved in the question and answer session were subgroup members?

4. Discussing action (synthesis):
   a. After subgroup presentations are over, you should guide a final discussion to decide on the actions to be taken.
   b. Wrap up the session by highlighting the lessons learned and the immediate actions that will improve the management of the enterprise.
   c. The main poultry/farm management lesson is part of the recap session in the following meetings.

! All the AESA charts should be stored securely. The information will be used when sharing lessons with the community during field days or graduation ceremonies.

1.2.1.2 Special topics

This section outlines some of the key themes that form the basis of successful poultry enterprises and how they can be addressed as special topics. Special topics can be classified as follows:

Technical. During most meetings, discussions of special topics focus on core technical subjects related to the poultry enterprise at a particular phase of production. They will touch on aspects such as animal health (disease recognition, prevention and control), breeds and breeding, feed resources, feeding and nutrition, water and poultry watering, housing and environment, poultry enterprises and marketing, and cooperative management.

Socioeconomic. At some point during the FFS, poultry producers will benefit from knowledge about issues of socioeconomic interest. For example, during a malaria outbreak within the community of the FFS, the FFS participants might want to know

the reasons for the upsurge of malaria and how they could control its spread, avoiding misdiagnosis or the incorrect use of drugs. Special topics of socioeconomic interest are linked to, for instance, public health, family planning, human nutrition, gender dimensions, water resource management, responsible antibiotic use and antimicrobial resistance, disaster preparedness and management, and conflict resolution.

See (module): ***Facilitation techniques for participatory learning (2.2.1)***

Coverage of special topics can include demonstrations, group work and discussions

- You can deliver sessions on special topics directly or ask a technical specialist (such as a public health officer, animal scientist or animal health officer). However, as with other FFS activities, they should be undertaken in a participatory, interactive and inclusive way.
- You can lead dialogue by asking three or four questions to be explored in subgroup discussions with outcomes shared in a plenary presentation. Examples of well-framed questions include:
  a. What types of equipment are used to clean a poultry house?
  b. Explain the daily activities that maintain good hygiene.
  c. How do you store your cleaning detergents?
  d. Explain the reasons for all of the answers to the previous questions; for example, why does the farm owner use a foot bath at the entrance of the poultry unit?
- Discuss one subject at a time.
- Answer farmers questions with more than yes/no replies.
- Use sentences that begin with what, where, how, why or when.
- Ask some participants to explain, summarize, define and generalize the messages from the session and to plan how to test and possibly illustrate them.

Poultry production

This section covers some key special topics related to poultry production, including housing, husbandry, manure management and the environment.

SPECIAL TOPIC 1 (TECHNICAL)
Feed, feeding, water and drinkers using locally available resources

Background

For poultry to grow well and remain healthy, access to nutritious feed appropriate to the birds' age, sex and reproductive status (laying hen, brooding hen, adult rooster) is essential. In intensified production systems, feed costs are the largest component of input costs and if the feed is not appropriately balanced or contains toxins, it will prevent your enterprise from being successful.

Extensive production systems enable poultry to scavenge for their own feed from the local environment. The nutrient content of the environmental vegetation varies throughout the seasons. Providing supplementary feed to enable birds to consume nutrients that are lacking in their environment will help them to grow well and be healthy.

See (exercise): ***Handout 15. How to provide supplementary feed (Annex 1)*** *and* ***Handout 16. How to provide supplementary feed via the cafeteria approach (Annex 1)***

See (modules): ***Poultry diets (2.1.4)*** *and* ***Feed and water (2.1.8.1)***

Objectives

- To understand local feed and water availability across the seasons.
- To discuss how to match bird numbers with available feed and water resources.
- To understand the specific feed and water requirements of different categories of birds.
- To discuss how best to provide birds with feed and water to improve their consumption and reduce waste.

Facilitation techniques

- Demonstrations.

Questions for discussion

- What are the best feeds and which ingredients are used to make a complete feed?
- How can differences in the performance of available feed and feed delivery methods be measured?
- How do you measure bird efficiency?
- How do you recognize birds that are better at scavenging? What do you do with birds that do not scavenge well?

- Have you ever heard of cafeteria feeding?
- What can you use as a protein source? a carbohydrate source? a source of minerals, especially calcium?
- What, how much and when should you feed indigenous birds?
- Do birds have nutrient deficiencies? How can they be recognized? How can they be managed?

Next steps/reflection for action

- If the scavenging feed resource base is limited and the cost (in financial or labour terms) of supplementary feeding is too high, producers should discuss options for reducing their flock size. This may involve selling male growers and/or eggs instead of hatching new chicks.
- Discuss efficient marketing options for sales of excess male growers or eggs.

SPECIAL TOPIC 2 (TECHNICAL)
Management of cross-contaminants in poultry production

Background

Poultry interacts with the natural and household environments in various ways, some good and some potentially harmful. In extensive poultry systems, birds can help by eating plant and animal pests, so reducing pest numbers. On the other hand, poultry manure may contaminate the environment with harmful bacteria and viruses if not properly inactivated by composting. Excessive manure from intensified poultry systems can also contaminate water sources.

*See (module): **Composting of poultry manure (2.1.5)***

Objectives

- To discuss how poultry contribute to pest control.
- To discuss how composting can contribute to crop production and farm income.
- To discuss any possible negative impacts of raising poultry in extensive systems.
- To discuss possible groundwater contaminants.

Facilitation techniques

- Question and answer sessions.
- Brainstorming.

Questions for discussion

- Have you observed any benefits to your local environment when you raise chickens?
- Have you observed any negative effects on your local environment when you raise chickens?
- What do you do with your poultry manure?

Next steps/reflection for action

After your initial discussions, you may wish to seek more detailed information from your local poultry extension officer or local government authorities, including public health clinics and veterinary services.

SPECIAL TOPIC 3 (TECHNICAL)
Matching access to affordable inputs (materials and services) with beneficial household utilization of production

Background

Successful poultry production depends on access to appropriate, good-quality material and service inputs including vaccinations, feed, housing, and marketing and technical advice.

*See (module): **Marketing and value chains (2.1.7)***

Objectives

- To optimize the financial, labour and material resource inputs appropriate to your poultry production systems such that you achieve a positive return on investment.
- To establish relationships with reliable suppliers.
- To link investments in resources to efficient household utilization, including through sales, home consumption and other activities.

Facilitation techniques

- Guest lectures (including from private operators such as feed millers, processors and retailers).
- Question and answer sessions.
- Demonstrations.
- Feasibility exercises for the proposed enterprises, led by the facilitator.

Questions for discussion

- What inputs are required for your proposed production system and how do you assign value to them in terms of money, time or other criteria (such as need for assets)?
- What is your understanding of good-quality inputs and the characteristics of a reliable supplier?
- What value would you expect from the various forms of utilization of your poultry production (for sale, consumption, gift giving, ceremonies, barter/exchange, etc.)?

Next steps/reflection for action

- Select FFS representatives to visit and profile possible input suppliers.
- Consider entering contractual relationships with reliable suppliers of good-quality, affordable inputs.
- Share experience of improved management techniques such as local ration formulation, group approaches to marketing when key markets are remote from the area of production, etc.

SPECIAL TOPIC 4 (SOCIOECONOMIC)
Conservation of environmental resources – water harvesting (rain and groundwater)

Background

In poultry FFS, sessions on this topic often focus on rainwater harvesting because groundwater harvesting usually requires high capital expenditure and can be difficult to sustain over the long term.

Objectives

- To discuss options for sustainable rainwater harvesting.
- To understand the best means of conserving and protecting harvested water for use by households and livestock (including poultry) in the long term.
- To explore options for involving young people in generating income by constructing rainwater harvesting systems.

Facilitation techniques

- Guest lectures.
- Demonstrations.

Questions

- How do you obtain water? Do you have water harvesting structures in place?
- Do you have separate points for collecting water for household use versus watering livestock, including poultry, and cleaning livestock facilities?
- How can water be used responsibly in households and the community?
- How can we involve young people in constructing and maintaining water harvesting systems?

Next steps/reflection for action

- FFS participants may wish to consider contributing funds for establishing improved community water harvesting and/or storage facilities.
- Establish a water users' association to manage responsible water use and maintenance.

Animal and public health

This section includes special topics related to ensuring the health of poultry and people, including producers and consumers.

SPECIAL TOPIC 5 (TECHNICAL)
Disease prevention, detection and response

Background

Successful poultry enterprises require cost-efficient prevention and control of diseases. Prevention of disease is much more cost-effective than control after a disease occurs. Prevention can be achieved through effective biosecurity (good sanitation and hygiene) and effective vaccination. Vaccination can prevent infectious diseases, including viral diseases such as Newcastle disease and bacterial diseases such as fowl cholera.

See (module): ***Keys to achieving good poultry health (2.1.3)*** *and* ***Flock management (2.1.8.3)***

See (annex): ***Handout 18. How to prevent the entry of infectious disease into extensive systems (Annex 1)*** *and* ***Handout 20. How to prevent the entry of infectious disease into intensified production units (Annex 1)***

Objectives

- To prevent the entry of infectious diseases into the village.
- To detect disease and develop village-level biosecurity plans for preventing and controlling disease spread.
- To ensure that infectious disease events are reported to the relevant authorities.
- To control and recover from infectious diseases.

Facilitation techniques

- Brainstorming.
- Question and answer sessions.
- Guest lectures.
- Visits to local market to observe sanitation and discuss disease spread and control with traders (early warning for predictive action).

Questions for discussion

- How do you confirm that your flock is experiencing an infectious disease outbreak?
- Have you previously observed a disease outbreak at a household in your village? How does it spread? What do you do?

- Are there times during the year when infectious disease is more likely to be introduced from outside the village or market? How do you manage this situation?
- What do you do when a bird dies of disease? What are the consequences of the actions you take? What could be done differently?

Next steps/reflection for action

Agree acceptable and feasible village-level biosecurity and vaccination plans with households.

SPECIAL TOPIC 6 (TECHNICAL)
Causes of disease

Background

Learning on this topic will be effective if it promotes a preventive approach to managing the health of poultry. Disease can be defined as any change or impairment of normal body function that affects the birds' ability to survive, grow or reproduce. Many diseases – called infectious diseases – are caused by organisms that can be transmitted from one bird to another. Some of these organisms are too small to be seen without the assistance of special equipment. Such organisms include viruses (such as ND virus), bacteria (such as salmonella), mycoplasmas, fungi and small parasites called protozoans (such as coccidia). Other infectious organisms such as parasites – which can be external (lice, fleas and ticks) or internal (roundworms, tapeworms, flukes) – are easier to see.

Other diseases can be caused by poor nutrition or husbandry practices, or they are inherited. These diseases do not spread from one bird to another and affect only single birds or flocks.

In many cases, disease results from a combination of factors. Husbandry, nutrition, environmental factors and flock management all have a direct and important influence on the health and productivity of chickens. A well-nourished chicken kept under good husbandry conditions can fight diseases better and is less likely to suffer from many infectious diseases.

*See (module): **Keys to achieving good poultry health (2.1.3)** and **Flock management (2.1.8.3)***

*See (annex): **Handout 10. Factors influencing the health status of birds (Annex 1)***

Objective

To limit the occurrence of a disease by increasing consideration of all the various components of poultry management and focusing more on disease prevention than cure.

Facilitation techniques

- Guest lectures.
- Question and answer sessions.

- Focus group discussions.
- Brainstorming.

Questions for discussion

Handout 10. Factors influencing the health status of birds (Annex 1) illustrates how various elements are interlinked. Using the interlinking circles, you can ask questions that encourage critical observation and analysis of the condition of the animals and their environment.

Examples of questions you can ask are:

- What is the effect of weather?
- What are the main enemies/pathogens/pests/vectors observed?
- Where are pests originating from in the environment of this animal?
- What is the condition of other animals (in this area, on this farm)?
- What is the effect of feed management on the body condition and health of birds?
- What is the likelihood of disease attacking these birds?
- Discuss immediate actions.

Next steps/reflection for action

- What are the most important endemic poultry diseases in the area?
- Which of these diseases can be prevented by vaccination and where can the vaccines be sourced?
- What biosecurity measures need to be implemented to stop the introduction of disease? Can these be implemented effectively by individual poultry producers or is a community-wide biosecurity plan required?

SPECIAL TOPIC 7 (SOCIOECONOMIC)
Antimicrobial resistance: matching diseases with cost-effective, safe prevention and control practices

Background

Disease occurs when the environment facilitates the entry of a pathogen (a virulent virus, bacteria, protozoa or a parasite) into a susceptible host. The cost-effective methods for preventing and treating disease vary depending on the type of pathogen, the type of animal or bird and the production system under which the animals/birds are raised.

The first antibiotic was developed in the late 1940s and since then, antibiotics have been used to treat, prevent and control bacterial diseases and to promote the growth of animals for many decades. For these antibiotics to work well, the bacteria concerned must be susceptible to the active ingredient in the antibiotic and the antibiotic must be handled properly in terms of storage and indications for use and administered only when really needed. Viral and protozoal diseases cannot be controlled by antibiotics.

The widespread and inadequate (e.g. without expert oversight or prescription, incorrect storage, use beyond expiry date) use of antibiotics and limited and/or inappropriate biosecurity and production practices have enabled bacteria to survive in the presence of various types of antibiotics, becoming resistant to these medicines. These antibiotic-resistant bacteria are now infecting people, animals and birds and causing serious, untreatable illness that can result in death.

People and animals have lived for many centuries without using antibiotics and FFS facilitators and participants can also consider whether the earlier, inexpensive practices used by livestock producers in the past can still help to reduce disease risks. These older practices include regular cleaning of living quarters and use of non-commercial disinfectants such as sunlight and wood ash. Traditional animal health care (also known as ethnoveterinary medicine) encompasses the knowledge, skills, methods, practices, and beliefs about animal health care found among community members (McCorkle, 1986). It plays an important role in health management of family poultry as shown by a high percentage of producers that use it, especially in resource-limited settings. Many traditional remedies widely used by producers to control diseases and parasites of poultry have not been formerly tested. FFS groups may wish to compare the impact of traditional remedies in some flocks with other flocks that do not receive the remedy. Ensuring that other management practices are similar across all flocks would be important to help interpret the results.

*See (module): **Keys to achieving good poultry health (2.1.3)***

*See (annex): **Handout 9. Key actions that farmers can take to ensure that antimicrobials continue to function and that animals and the community remain healthy (Annex 1)***

See (external): How to reduce the use of antibiotics in poultry production (FAO, 2021)

Objectives

- To understand the correct use of antibiotics in animals and the appropriate time between use and sale/utilization of animals.
- To discuss experiences with the changing effectiveness/power of medicines used to treat people when they are sick.
- To identify and profile diseases that drive antimicrobial resistance and discuss how they can be prevented and/or controlled.

Facilitation techniques

- Visits to observe agro-veterinary shops, which should be inspected by government officials to assess standards and certify accordingly.
- Focus group discussions.
- Demonstrations (such as of appropriate and safe use of drugs).
- Guest lectures.

Questions for discussion

- How can you clean and disinfect your farm? How do disinfectants work?
- What are the different types of cleaning? What dry and wet cleaning techniques are available in your community?
- What practices were used to control diseases prior to the development of antibiotics?
- Where do you get your antibiotics? Where do you store them at home? Identify suppliers. Agree a list of reliable service providers.
- What is the cost of incorrect use of antibiotics?

!

- In the week before the session on the use of antibiotics, it would be helpful to speak with key individuals at the local human health clinic and the community radio station to encourage them to share information about antimicrobial/antibiotic resistance so that the topic will not be completely new to FFS participants.
- When speaking with farmers about medicines used in the care of animals, use terms that accurately describe specific products. So instead of referring to "medicine" or "injection" talk about "antibiotics", "vitamin supplements", "deworming products" and "vaccines". Ensuring that farmers understand which medicines to use to prevent and treat specific diseases will help them to make informed decisions and save them wasting money on inappropriate medicines.

Next steps/reflection for action

Seek inputs from local public health and veterinary services for answering any questions that remain uncertain after your discussions.

SPECIAL TOPIC 8 (TECHNICAL)
Differences in flock health management in extensive versus intensified production systems

Background

Selecting a poultry production system that is based on the inputs available from the local environment or at an affordable price is key to establishing and running an economically viable poultry enterprise.

*See (annex): **Handout 6. Differences in flock health management between extensive and intensified chicken production systems (Annex 1)***

Facilitation techniques

- Brainstorming.
- Question and answer sessions.

Questions for discussion

- In your experience, what are the advantages and disadvantages of extensive and intensified production systems? The facilitator should mention any points missed during this discussion.
- What are the risks involved with each type of production and which risks can be easily managed under your conditions?

SPECIAL TOPIC 9 (SOCIOECONOMIC)
Food safety issues arising from poultry

Background

There are risks of human exposure to pathogens originating from poultry slaughtering, processing, storage, handling and preparation practices. Poultry can be contaminated with harmful infectious agents, and raw poultry products can cause human food poisoning.

Objective

To know what practices can reduce the food safety issues associated with poultry slaughtering, handling and consumption.

Facilitation techniques

- Brainstorming.
- Question and answer sessions.
- Guest lectures.

Questions for discussion

- What do you do if your animals become sick and show unusual symptoms?
- What precautions should you take when slaughtering your birds?
- How can we make sure that meat and eggs are safe to eat?

See (annex): ***Handout 11. Safe disposal of sick birds or birds that died of disease (Annex 1)***; ***Handout 12. Safe poultry slaughtering and cooking practices (Annex 1)***; *and* ***Handout 13. Signs that poultry meat and eggs are safe to eat (Annex 1)***

SPECIAL TOPIC 10 (SOCIOECONOMIC)
Consuming poultry meat and eggs for better household nutrition

Background

Raising poultry is a good way to generate income and it also improves access to high-quality nutrition that can contribute to the health of families and communities.

Objective

To improve knowledge about the benefits of consuming eggs and poultry meat for different household members and the options for cooking various poultry products.

Facilitation techniques

- Brainstorming.
- Question and answer sessions.
- Guest lectures.

Questions for discussion

- What are the health benefits of eating poultry meat and eggs?
- What parts of the poultry carcass are most nutritious?
- Who in your household would benefit most from eating poultry meat and eggs?

See (annex): ***Handout 14. Nutritional benefits of consuming poultry meat and eggs (Annex 1)***

Entrepreneurship/marketing

Special topics on entrepreneurship and marketing are key for helping poultry producers become more successful in the way they run their farms.

*See (module): **Strengthening entrepreneurship/marketing (1.2.2)***

SPECIAL TOPIC 11 (TECHNICAL)
The importance of record keeping for economic analysis and decision-making

Background

Poultry producers rarely record how much money they spend and earn. This is often owing to a lack of knowledge about how good records can help farmers to take better management decisions. No matter what type of production system is practised, record keeping is central to success.

*See (annex): **Annex 2. Sample tools and templates for record-keeping***

Objectives

- To enable poultry producers to be aware of how much money they spend and earn and of whether the family poultry enterprise activity is being conducted at a profit or a loss.
- To understand which practices bring about losses or profits and to facilitate comparisons among practices.

Facilitation techniques

- Brainstorming.
- Focus group discussions.

Questions for discussion

- Why is record-keeping important?
- What problems can you have without proper record-keeping?
- How do you calculate whether you are making a profit or a loss?
- Who keeps the records in your household? For how long do you retain your records?
- Could young people help their parents to keep and make sense of records?

Record-keeping should be carried out daily or weekly for each activity, from input sourcing to selling.

In poultry enterprises, two types of records need to be kept. The records required for:

- financial management, for business and taxation purposes;
- efficient management of the enterprise.

If records are to be of use in the management of an enterprise, they must be complete, current and accurate, be reviewed and analysed, and be used in decision-making processes. When records are not used, the effort of gathering the information will have been wasted and performance will not be monitored. As a result, many problems that could have been resolved before causing major harm, will not be identified until it is too late.

SPECIAL TOPIC 12 (TECHNICAL)
Advantages and disadvantages of extensive and intensified family poultry production systems

Background

For producers to run a successful poultry enterprise, the production costs must be significantly lower than the income from sales and the value of any poultry products consumed within the households. It is important for producers to consider which poultry production system is likely to be most economically and environmentally sustainable under their local conditions. The choice should be based largely on the local situation and access to markets and services, including vaccination, health and credit.

There are a range of advantages and disadvantages for each poultry production system. Producers need to think carefully regarding which system best suits their current circumstances.

*See (annex): **Family poultry production systems (Annex 1)***

*See (about this manual): **Production systems (About this manual)***

Facilitation techniques

- Brainstorming.
- Focus group discussions.

Questions for discussion

- Why would a farmer decide to specialize as an extensive or intensified family poultry farmer?
- What can we do to improve our system?
- Where can we find similar concepts/situations?
- Where does this idea lead?
- Where can we get more information and support?

! Any changes to extensive family poultry production that suddenly and drastically raise labour costs or financial risks should be generally discouraged.

SPECIAL TOPIC 13 (TECHNICAL)
Comparison of indigenous and commercial chicken breeds

Background

Indigenous and commercial breeds of poultry have different characteristics that make them appropriate for different production systems; for example, indigenous breeds perform efficiently in extensive production systems and commercial breeds perform better in intensified production systems. Although the output from extensively raised indigenous chickens is low in terms of weight gain and number of eggs per hen per year, it is obtained with minimal labour and other inputs. This factor of low inputs and, consequently, low risk is one of the major advantages of extensive poultry production.

*See (annex): **Handout 7. Differences between indigenous and commercial chicken breeds (Annex 1)***

Facilitation techniques

- Brainstorming.
- Focus group discussions.
- Question and answer sessions.

Questions for discussion

- What types of poultry have you raised in the past? What was your experience with these?
- If you are a farmer engaged with a range of on- and off-farm activities, how much time do you have to devote to your poultry raising activities?
- If you would like to increase your flock size, do you have ready access to affordable, good-quality inputs such as feed and vaccines?
- What prices are paid for various types of poultry in your local markets? Will these influence your thinking about your future poultry enterprise?
- What are the consumer preferences in your locality?

1.2.1.3 Group dynamics

Group dynamics create a pleasant learning environment, facilitate learning and make space in which to reflect and share.

- Be clear about what you want to achieve with the exercise.
- Be aware of the appropriate moment for an exercise; for example, use an exercise that energizes people when they are feeling tired, or an exercise that tackles conflict if you see it arising.
- Plan and prepare the exercises (reserve time for them in the FFS programme) and always add a "head" and a "tail" (an introduction and a follow-up analysis).
- Good exercises involve everyone in the group.
- Exercises should be adapted to local and cultural conditions and should not offend people or make them feel embarrassed.
- Vary the type and use of the exercises; for example, do not always do exercises that energize.
- Treat group dynamic exercises as a toolbox – do not get trapped in a fixed formula. Each FFS is unique and the exercises should be modified for each specific FFS.

Group dynamics can include a variety of exercises in the form of games, quizzes, dances, plays, drama, proverbs, storytelling and songs

Entrepreneurship/marketing

Some group dynamic exercises can be used specifically to improve the entrepreneurial and marketing skills of poultry producers.

*See (module): **Strengthening entrepreneurship/marketing (1.2.2)***

GROUP DYNAMICS
A knotty problem

Objectives

- To demonstrate that groups that are empowered to solve their own problems are much more successful than those instructed by outsiders.
- To strengthen participants' confidence in their abilities to solve problems themselves.

Steps

1. Select one, two or three participants to act as facilitators. Ask them to leave the room.
2. Ask the remaining participants to hold hands in a circle and to form themselves into an entangled knot by changing positions in the circle without letting go of each other's hands.
3. Once the knot is complete, the facilitators who left the room return and are asked to unravel this knotty problem within three minutes, using verbal instructions only. They should hold their hands behind their backs, so that they are not tempted to touch the others.
4. The participants entangled in the knot are asked to follow the facilitators' instructions literally and not to make it easier for the facilitators by doing anything that they have not been told to do.
5. The attempt is generally not very successful and sometimes even produces a more complex knot. Now repeat the exercise with the facilitators participating in the knot. When the knot is ready, simply ask the participants to get out of the knot themselves. This untying process is usually much quicker.
6. Ask the participants to comment on the differences between the first and the second time that the knot was unravelled and why these differences occurred.

Questions to ask during the debriefing session

- What does the game tell you about the role of outsiders/facilitators and insiders (in the knot and in other problems in general)?
- What does the exercise tell you about the effectiveness of outsiders and managers in organizing people?
- Who were most successful in solving problems and why?
- Taking the example of looking for a community-based sustainable plan for the control of Newcastle disease, ask participants what aspects of the plan they consider to be knotty issues.
- What lessons can participants draw from this game to find lasting solutions to problems?

GROUP DYNAMICS
Business management simulation game

Background

The facilitator explains that without reflection on experiences, people do not learn from them and cannot glean lessons from their actions for informing their future efforts.

Simulation games in poultry FFS are useful for this purpose. A simulation is an abstraction or simplification of a real-life situation or process. In simulations, participants usually play roles that involve them in interactions with other people and/or with elements of the simulated environment.

Objectives

- To help participants understand the effects of their behaviour on other people and the effects of other people's behaviour on them.
- To increase participants' knowledge of how and why people at work behave as they do.
- To increase participants' skills in working with other people and getting work done through other people.

Steps

1. In plenary, the facilitator and the group review their commitments, investments and indicators of success as they report on their experiences of:
   - production levels;
   - amounts of offtake;
   - consumption;
   - sales;
   - post-harvest activities;
   - total current costs;
   - total current income.
2. The facilitator explains what "contract renegotiation" means.
3. A subgroup takes up the role of production manager for the poultry FFS host farm. The subgroup members prepare for the session by collecting the production data recorded during AESA. This information includes elements that show the high value of the farm products, the type of birds and the costs of feeding.

   A second subgroup acts as the supermarket sales team.

   The production manager team reflects on current business conditions and convincingly negotiates a new market price contract with the supermarket sales team. A member of each team is chosen to lead the negotiation.

   The supermarket sales team should try to find a compromise rather than accepting the price first requested by the farm manager team.

4. Ask for feedback in a plenary session. The feedback may be oral or written, but it should promote reflection. Summarize the lessons that came out through the game.

   Debrief by asking: looking at the following parameters, what hidden theories, misconceptions and oversimplifications did you discover that could limit the group's business negotiation skills?

   - Core values of the business, for example, safe food from healthy birds.
   - Time/season of production, for example, off-season.
   - Contract conditions, for example, produce 200 birds every month.
   - Group/individual enterprise, for example, group enterprise.
   - Medium- to long-term plan, for example, construct a slaughter slab and install cold storage.
   - Target and size of production, for example, 30 birds per month.
   - Buyer base, for example, restaurants.
   - Resources available for investment, for example, grain crops from the group garden.
   - Costs of the machinery owned, for example, grain crusher and mixer.
   - Costs of borrowed/hired machinery, for example, incubator.
   - Government taxes and licences.
   - Location and infrastructure.
   - Transportation.
   - Source of market information, for example, individual survey, radio, text message.
   - Finances to be used, for example, group savings.
   - Source of funds.
   - Amount of funds received.

5. Identify the topics for the following FFS meetings based on the outcomes of this exercise.

1.2.2 Strengthening entrepreneurship/ marketing

When embarking on entrepreneurship and marketing activities for enhancing market-oriented poultry production, the facilitator should consider several factors that reduce the risks for poultry producers and increase the chances of success of poultry FFS activities:

- ***A reliable market:*** Is there a shortage of a certain product in the community but a strong demand for it? For example, if only one person in the community sells eggs and frequently runs out, there is room for egg production.
- ***Profitability:*** Can the product be sold at profitable prices?
- ***Capital requirements:*** Is starting the enterprise too expensive? If start-up costs are high, a group can run out of money midway through implementation. Such an enterprise would have to be part of a longer-term plan.
- ***Availability of resources:*** Does the group have the resources it needs to run the enterprise properly? If not, are these resources easy to attain?
- ***Location:*** Is the area suitable for the selected poultry enterprise?
- ***Risks:*** What are the risks involved? Is the group comfortable with taking these risks?
- ***Sustainability:*** Is there long-term potential for the product?
- ***Duration:*** How long will the enterprise have to operate before it accrues returns?
- ***Productivity:*** Because most FFS participants will be starting with a small flock, they should choose enterprises that show tangible results.

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Strengthening commercial poultry enterprises – what to think about in the FFS

- Group action and marketing groups
- Identifying the need for access to microfinance institutions
- Time management
- Management by microfinance institution committees and the full group
- Record-keeping formats
- Accounting documents
- Report writing
- Deposit and withdrawal procedures
- Role of savings in agriculture
- Types of savings
- Interest rates
- Guidelines for operating savings and credit schemes
- Calculation of interest rates
- Sources of funds
- Methods of raising funds
- Borrowing
- Agricultural marketing
- Modes of credit
- Uses of credit

1.2.2.1 Transitioning from subsistence to market-oriented production

In an FFS that supports family poultry producers in transitioning from subsistence to market-oriented production, the aspects to be emphasized include:

- discussing access to capital, inputs and services before embarking on the transition;
- planning for surplus production and predetermined offtake;
- monitoring of entrepreneurship competencies and social changes;
- establishing and/or strengthening saving activities;
- forming partnerships for support;
- undertaking a market survey and risk assessment based on the enterprise;
- selecting the FFS income-generating activity to be a group business;
- common parameters for monitoring poultry farming as a business, such as:
  - reducing the mortality rate from 80–100 percent to 20–30 percent;
  - increasing brooding cycles from two to three per year to five to seven per year by weaning the chicks at two to eight weeks;
  - increasing egg production from 60 to 120 eggs per head per year by increasing the number of clutches per year.
- Cost–benefit analysis. Without frequent cost–benefit analyses, there is a risk that farmers spend too much money on feed for producing and maintaining their birds. In some cases, cost–benefit analysis can lead to the conclusion that poultry production is not viable in the area or that production cannot pay for inputs, so extensive production is the only option.

It is advisable always to start small when gaining experience. Once a small business is successful, it can be expanded into a larger one. If farmers need to obtain a loan to start their enterprise, they will likely appreciate assistance in preparing a realistic business plan that shows all the costs, including loan repayments and a reasonable salary for the owner/manager.

*See (module): **Marketing and value chains (2.1.7)***

1.2.2.2 Core values

As the facilitator, you should help the poultry producer/entrepreneur to set standards based on core values. Such standards govern the relationship between the poultry business and its stakeholders, and the relationships within the poultry business itself. Applying these values will help the business to distinguish itself from others and will build customers' confidence. To sustain the business, all areas of work in a poultry farm must be guided by the following core values:

- ***Trustworthiness:*** Worthy of trust and confidence. Includes values such as integrity, keeping promises, loyalty, dependability and reliability. Actions are consistent with words.
- ***Truthfulness:*** Honest in all business dealings.
- ***Open-mindedness:*** Being disposed to accept and adopt new ideas and proposals from others.
- ***Respect:*** Regard for the dignity, worth, independence and essential equality of all people. Treating people with courtesy, politeness and kindness. Tolerance of others.
- ***Responsibility:*** Acknowledging and performing duties to others and to one's self. Being self-disciplined and accountable for one's actions.
- ***Fairness:*** Being impartial and avoiding conflicts of interest. Being reasonable and consistent. Acting fairly.
- ***Caring:*** Having regard for the well-being of others. Being kind, compassionate, considerate, unselfish and charitable.
- ***Social responsibility:*** Recognizing and living up to community and social obligations. Being law abiding. Doing one's share. Contributing to a better society.

Adapting the FFS approach: Training and knowledge sharing in the Green Innovet Cam (GIC)/IFAD rural poultry model in Cambodia

by Narin Oum (GIC) and Antonio Rota (IFAD)

To improve and scale up sustainable poultry production in Cambodia, the International Fund for Agricultural Development (IFAD), together with the national non-governmental organization (NGO) Green Innovet Cam (GIC), promoted the intensification of family poultry production through a modular model that enables the poorest and landless households to enhance production and productivity through sustainable, good farming practices.

The model promotes a specific training and knowledge-sharing programme on improved poultry husbandry practices and techniques (including on preventive health practices, such as vaccination and biosecurity measures, and feed formulas that use locally produced ingredients) and the development of integrated market clusters in village communities. Establishing such clusters involves: i) setting up small hatcheries for the production of 21-day-old vaccinated chicks by using electric and/or solar incubator systems; ii) setting up demonstration farms and chicken producer groups; iii) facilitating links between small hatcheries and chicken producer groups; iv) building the capacity of poultry entrepreneurs to become extension/farmer promoters for new village chicken producer groups; v) conducting regular close monitoring exercises, coaching farmers and providing advice aimed at improving technical aspects and record-keeping, including of daily expenditure, income, business plans and visitors; vi) developing market linkages between chicken producers and market intermediaries or wholesalers; and viii) establishing poultry input supply chains that support chicken producers.

The main feature of the GIC training and knowledge-sharing programme is the farmer-to-farmer knowledge-sharing approach. GIC staff and farmers come together at monthly meetings in order to facilitate the sharing of concerns and updates regarding their respective poultry farms. Well-performing poultry producers are encouraged to share their experiences in meetings and to display the good practices, management and communication techniques that contribute the most to the profitability of their business. They also illustrate the tangible improvements to their livelihoods and businesses. At the end of each session, there is a question and answer session that enables participants to raise questions and concerns.

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A second feature is the facilitation of smallholder farmers' participatory action research aimed at developing each farmer's innovative capacity and new techniques for all participants. For this purpose, selected poultry producers make their farms available as demonstration farms. To ensure the quality of the demonstration farms and to collect reliable data, the GIC technical specialists conduct regular supportive field visits. They provide the demonstration farmers with technical advice on how to conduct field demonstrations, monitor and assist farmers in analysing data, and report on the demonstration farms. Poultry producers are encouraged to visit other farms in the village to identify practices that they can use and to pass on the knowledge that they have learned from training sessions and meetings. It is interesting to note that GIC often facilitates participation in monthly meetings of local microfinance institutions, which provide clarifications and support for farmers who need access to credit to establish or expand their businesses.

Another distinctive feature of the model is the hands-on training and support that GIC offers to farmers in the field as technical follow-up training. Technical specialists and village animal health workers make regular visits to poultry farms to ensure that the model is functioning well. In the case of any issues, the health workers are available to provide advice and support.

1.2.3 Undertaking awareness-raising activities

It is your role as facilitator to encourage the dissemination of FFS innovations and knowledge among farmers. Information from FFS should be shared among participants and disseminated to other poultry producers in the local community.

During the learning phase, you should organize exchange visits, field days, "open-house" days, exhibitions and/or share fairs.

1.2.3.1 Exchange visits

What are they?

Educational tours to other FFS, farmer innovators, research centres and poultry fairs.

Objectives

- To enhance participants' motivation to adopt and adapt practices or technologies that they have seen elsewhere.
- To enable the poultry FFS participants to compare the activities of other FFS groups with those of their own group.

When should they be held?

At appropriate times during the learning process.

How many times?

At least once or twice per FFS, depending on the poultry enterprise and the budget.

! If not all poultry FFS participants can take part in the exchange visit, ask those who have taken part to describe what they have learned at the next FFS meeting.

1.2.3.2 Field days

What are they?

Non-FFS participants are invited to the FFS and involved in its activities.

Objectives

- To provide an opportunity for non-participants to be exposed to poultry FFS activities.
- To share lessons, skills and knowledge gained in the FFS process.

Features to be highlighted during a field day

- The history of the poultry FFS.
- What is being done well and what can be improved.
- Practices/technologies that are being adapted to local needs.

! Where appropriate, you can encourage participants to use song and drama as a way of sharing their experiences.

When are field days held?

If FFS participants are almost ready for graduation or time and funding are limited, field days can be combined with the FFS graduation event.

How many times?

Once or twice per FFS, depending on the budget.

1.2.4 Planning for post-farmer field school learning: Evaluation and action plan

Graduation marks the end of the FFS learning phase. However, an FFS is a continuous learning process that does not have a definite end. After graduation, poultry producers should implement what they have learned and try to find new ways of learning as a group. Groups can either continue working on the same enterprise or select a different one.

In your role as facilitator, you should help the group to evaluate the FFS and develop an action plan based on the evaluation of what has been learned and the gaps that remain. Additional meetings (on different topics or for more in-depth learning on topics already covered), implementation of commercial enterprises, and the development of linkages to researchers, extension workers and other FFS are also planned. One of the farmers often takes on the role of facilitator.

For this to be successful, the facilitator should begin fostering post-FFS activities during the learning phase, for example, by sharing the success stories of other FFS. As a facilitator, you should also start "working your way out of the job" by identifying FFS members who are enthusiastic and have the potential to become community facilitators. The farmers selected will start by assisting you so that they can learn the basics of facilitation. When they are ready, they can conduct an FFS on their own. Ideally, you can train several participants to spread the FFS approach more widely.

1.3 Post-farmer field school learning phase

Chapter objective

- To provide an overview of the activities to be carried out by the facilitator after the poultry FFS meetings stop.

During this phase, poultry producers should implement what they have learned during the learning phase and try to find new ways of learning as a group.

Main activities in the post-FFS learning phase

- Ensure continued learning (for example, set up a second-generation FFS and enhanced producer organizations).
- Share findings, lessons learned and knowledge.

Groups that decide to continue with the learning process can either continue working on the same enterprise or select a different one. To facilitate the process, you can help FFS participants to develop a new action plan based on what they have learned and what knowledge or skills they still lack. The new activities could be financed by developing or continuing the group's income-generating activity. You might also advise the group to contact microfinance institutions for funding support.

You should provide initial regular backstopping and technical support to FFS groups continuing their own activities.

During this phase, it is critical that you help the group to strengthen further its linkages to researchers, extension workers and other FFS. Researchers and extension workers can keep the group informed about new technologies and innovations that could suit their local circumstances. In addition, developing networks of FFS can help to address common problems that cannot be solved effectively by a single group, and can create economies of scale. By forming a network, FFS can share information and knowledge more effectively, have better access to services and markets, pool their resources, use local experts from other FFS, etc.

It is also important that you encourage the dissemination of FFS innovations and knowledge among poultry producers. Information on FFS learning should be shared among members and disseminated to other producers in the local community. Field days (involving non-FFS participants in FFS activities), exhibitions and share fairs should be encouraged.

See (external): FFS guidance document (FAO, 2016a).

MODULE 2

"Need-to-know" information on poultry production and health and on the facilitation of farmer field schools

2.1 Poultry production and health

Chapter objective

- To provide relevant information for providing facilitators with a grounding in relevant technical knowledge.

As a facilitator, you may or may not have extensive direct knowledge and experience of poultry production and health, but good understanding is essential. Your participation in poultry training prior to FFS preparation and implementation will ensure that your technical knowledge and skills are adequately reinforced. As you begin to interact with new groups of farmers, you may also be able to draw on their experiences.

2.1.1 Glossary of technical terms

Abiotic	Characterized by the absence of life or living organisms.
Agroecology	The integrated study of the ecology of the entire food system, encompassing ecological, economic and social dimensions.
Animal welfare	Refers to how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare if (as indicated by scientific evidence) it is healthy, comfortable, well nourished, safe, able to express innate behaviour, and not suffering from unpleasant states such as pain, fear, and distress.
Antibiotic	A drug used to treat bacterial infections. Antibiotics have no effect on viral infections.
Antimicrobial resistance	A phenomena that occurs when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render ineffective the medications used to cure the infections they cause.
Balanced ration	In poultry production, a commercial or homemade feed ration containing all the nutrients required by intensively raised birds. The ration composition must be appropriate for the age and type of bird being fed.
Bioavailability	The ability of a drug or other substance such as a vitamin or mineral to be absorbed and used by the body.

Biosecurity	A set of preventive measures designed to reduce the risk of transmission of infectious diseases in crops and livestock, quarantined pests, invasive alien species and living modified organisms.
Biotic	Pertaining to life – something that is alive.
Body condition	In poultry production, associated with the amounts of fat and muscle covering the bones of a bird, regardless of body size.
Brooding	Incubating eggs by sitting on them.
Candling	A method used to study the growth and development of an embryo inside an egg. A source of bright light is shone behind the egg to show details through the shell. It is called "candling" because candles were the original sources of light used.
Climate change	Refers to significant changes in global temperatures, precipitation, wind patterns and other measures of climate that occur over several decades or longer.
Clutch	The set of eggs that a hen produces at one time prior to going broody.
Control group	In a scientific experiment, a control group is separated from the rest of the experiment and does not receive the intervention being tested. This helps to identify the effects of the intervention and to rule out alternative explanations of the experimental results.
Cost–benefit analysis	A process used to analyse business decisions. The business analyst calculates the benefits of a situation or action and then subtracts the costs associated with that situation or action.
Disease outbreak	The occurrence of disease cases in excess of normal expectations.
Ecosystem	A community of organisms living in conjunction with the non-living components of their environment and interacting as a system. The biotic and abiotic components are linked together through nutrient cycles and energy flows.
Ecosystem services	The benefits that people derive from ecosystems. In addition to providing services or goods such as food, wood and other raw materials, ecological components such as plants, animals, fungi and microorganisms provide essential regulating services such as pollination of crops, prevention of soil erosion, water purification, and a vast array of cultural services such as recreation and a "sense of place".
Ectoparasite	A parasite that lives on the exterior of its host.
Ecotype	A population of a species that survives as a distinct group through environmental selection and isolation and that is comparable to a "subspecies".
Emerging infectious disease	An infectious disease that has appeared recently in a population or that has been known for some time but is rapidly increasing in incidence or geographic range.

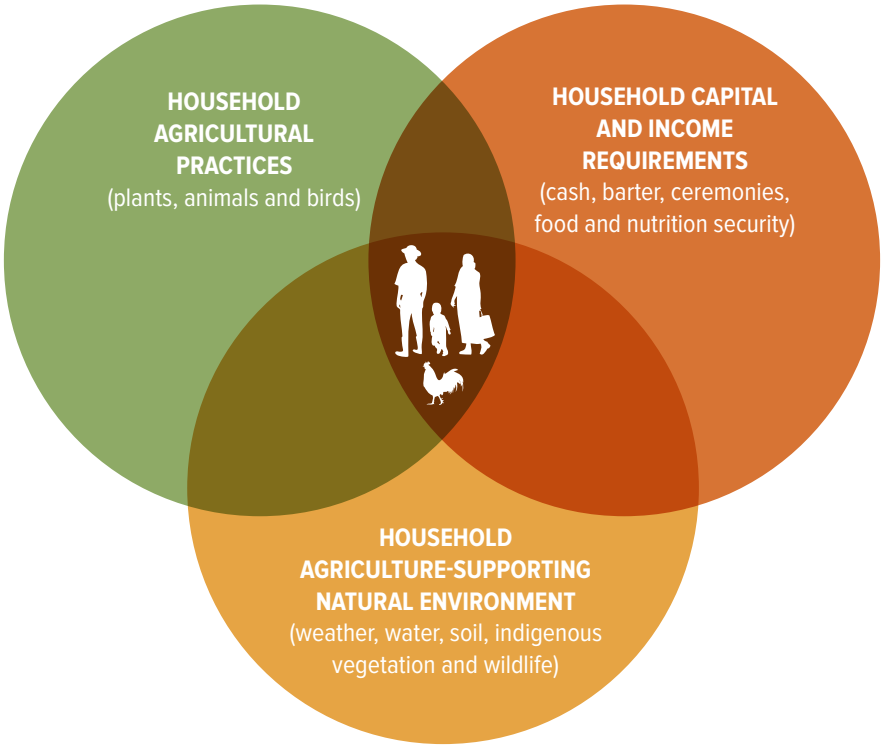
Endemic	Refers to a disease that is constantly present in a given population or geographical area; usually applies to a disease that is present throughout an entire country.
Epidemic	Refers to a disease that affects or tends to affect a disproportionately large number of individuals in a population, community or region at the same time.
Fertility	The percentage of incubated eggs that are fertile.
Food safety	The handling, preparation and storage of food in ways that prevent food-borne illness.
Gender equity	"Fairness of treatment for women and men, according to their respective needs. This may include equal treatment or treatment that is different, but which is considered equivalent in terms of rights, benefits, obligations and opportunities" (ILO, 2000).
Germ theory of disease	The currently accepted scientific theory regarding the causes of infectious diseases. It states that microorganisms known as "pathogens" or "germs" can lead to disease. These organisms, which are too small to see without magnification, invade humans, other animals and other living hosts. Their growth and reproduction in susceptible hosts can cause disease.
Laying	The production of eggs by the females of poultry species.
Hatchability	A measure of the likelihood of an egg hatching. It refers to the percentage of fertile eggs that hatch.
Hazard	An agent with the potential to cause harm to a vulnerable target. Hazards can be both natural or human-induced.
Hybrid	A plant or animal that has been produced from two different types of plant or animal specifically to obtain better characteristics. Hybrid chickens are cross-bred from pure breeds and are therefore not a poultry breed. Hybrid chickens should not be used for breeding as their offspring will not retain the positive traits of their parents.
Incubation	The act or process of incubating an egg. It can be natural (via a brooding hen) or artificial (via a mechanical incubator).
Inter-clutch period	The period between one clutch of eggs and the next.
Metabolizable energy	The net energy remaining after manure and urinary energy loss. It represents the energy available for growth or reproduction and for supporting metabolic processes such as work (locomotion) and respiration (thermoregulation, maintenance metabolism).
Parent stock	The breeders used to produce the layers or broilers used in commercial, intensified production. The parent stock consists of a male line and a female line. There are also grandparent stock breeders that produce the hybrid male and female parent lines. The layers and broilers produced by the parent stock are the final product and should not be used for breeding because hybrid lines do not breed true.

Personal protective equipment	Protective clothing, helmets, goggles and other garments or equipment designed to protect the wearer from injury or infection.
Protein	A macronutrient that is essential to building muscle mass. It is commonly found in animal products, but is also present in other sources such as nuts and legumes.
Public health	The science and art of preventing disease, prolonging life and promoting human health through organized efforts and informed choices made by society, organizations, public and private entities, communities and individuals.
Pullet	A hen of a domestic chicken breed that is less than a year old.
Replication	The performance of an experiment or procedure more than once.
Scavenging feed resource base	Feed in the environment available to scavenging animals and birds.
Sustainable Development Goals	The 17 Sustainable Development Goals (SDGs) constitute an urgent call for action by all countries – developed and developing – in a global partnership. They recognize that efforts to end poverty and other forms of deprivation must go hand-in-hand with strategies that improve health and education, reduce inequality and spur economic growth, while also tackling climate change and working to preserve oceans and forests.
Tontine	A group of people who agree to make periodic payments into a savings fund. The funds raised are allocated as a loan to a different member of the group at each round of collection. This rotation continues until all the members of the group have received loans.
Value chain	The full range of activities needed to create a product or service.
Vent	Opening of the cloaca, which is the chamber in the body of a bird through which manure and urine pass to the outside.
Withholding period	The minimum period that needs to elapse between: the last use of an agricultural or veterinary chemical product in relation to a crop, pasture or animal; and the harvesting or cutting of, or the grazing of animals on, the crop or pasture, the shearing or slaughtering of the animal, or collection of milk or eggs from the animal for human consumption. The purpose is to ensure that residues from the product fall to or below the approved maximum limit.

2.1.2 Socioeconomic aspects of family poultry production

Family poultry production can contribute significantly to a range of socioeconomic benefits with contributions varying among production systems. Overarching socioeconomic issues include gender equity and social inclusion, empowerment of young people, animal welfare, and variable and frequently inadequate farmgate prices for poultry products (Figure 1).

Figure 1. Key role of family poultry production systems in household livelihoods and its agriculture-supporting natural environment



Source: Authors' elaboration.

2.1.2.1 Gender equity

Gender equity is the process of allocating resources, programmes and decision-making fairly between men and women. In many low- and middle-income countries, extensively raised poultry is frequently the livestock species to which women have most access and over which they have some degree of control. Extensively raised chickens often belong almost exclusively to women, who are responsible for the care of the birds and for selling chickens and eggs. Men are often involved in the construction of shelters for the chickens, or in their treatment or slaughter. However, even in male-headed households, women are often responsible for decision-making on issues related to chicken production. Income from the sale of poultry products is often the main source of income for female-headed households, whereas male-headed households usually have multiple income sources.

Before starting an FFS, you should always carry out a "gender analysis" to evaluate how poultry ownership, husbandry and marketing are divided between men and women in households in the area.

See (exercise): ***Activity 2. Gender analysis (1.1.4.1)***

Women's income often contributes more to improvements in household health, education and nutrition status than men's income, and has a positive impact on household food security. Extensive poultry production systems are a particularly important income-generating activity for women as they place little demand on women's time. For example, poultry production allows mothers to dedicate adequate time to childcare, a crucial element in achieving good nutrition. In some settings, women are also active as poultry traders.

The inclusion of women in family poultry training programmes for farmers and/or community vaccinators increases the knowledge and standing of women in their households and the wider community. Interventions that target domestic animal species under the control of women, including family poultry, may have an enhanced impact on household food and nutrition security through the empowerment of women.

In most rural societies in Africa, Asia and Latin America, women are responsible for the day-to-day management of family poultry but are more frequently excluded from markets than men are

! As production systems become more intensified with higher financial investments and turnover, men tend to take over the ownership and management of poultry production and the resulting income. In the poultry FFS, facilitating discussions related to gender dynamics may help to mitigate this trend.

2.1.2.2 Empowerment of young people

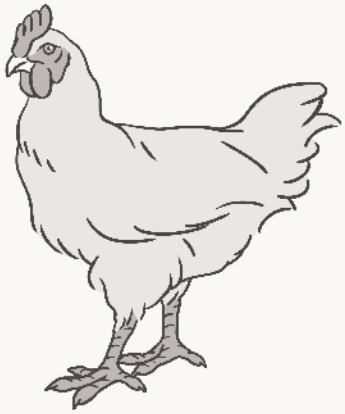
Poultry farming is considered a favourable agrifood business that can promote sustainable growth, contribute to poverty reduction and provide gainful employment for young people. However, young entrepreneurs often face challenges such as a lack of funding, assets, experience and knowledge appropriate to their situation.

! As a facilitator, it is your role to ensure that young poultry producers acquire appropriate and tailored agricultural, financial and entrepreneurial skills and are able to overcome the specific challenges that they face. Young people should be informed about existing support and opportunities for them and linked to key players.

2.1.3 Keys to achieving good poultry health

To achieve optimal production, it is important that birds are healthy (Table 3). Good health is achieved when birds have access to appropriate feed, water and shelter and when good biosecurity practices, vaccination programmes and treatments for disease are in place.

Table 3. Key characteristics of healthy and sick chickens and flocks of chickens

Healthy chickens	Sick chickens
	
Individual birds	
• Head raised • Straight neck • Clean and smooth feathers • Clean vent (posterior/backside) • Moving with ease • Bright eyes • Strong legs and feet • Crows (sings) well (especially roosters) and makes "contented" clucking sounds	• Drooping head • Closed eyes • Fluffed feathers • Dirty vent (posterior/backside) • Not moving • Dull or weeping eyes • Bent legs • Stops crowing (singing) (especially roosters) and makes "unhappy" sounds
Flocks of chickens	
• Consuming appropriate quantities of feed and water • Producing normally • Fewer than 2 in 100 birds becoming sick or dying • Making "contented" sounds • Evenly distributed throughout the available space	• Consuming less feed and water than normal • Producing less than normal • More than 2 in 100 birds becoming sick or dying • Making "unhappy" sounds • Huddled together

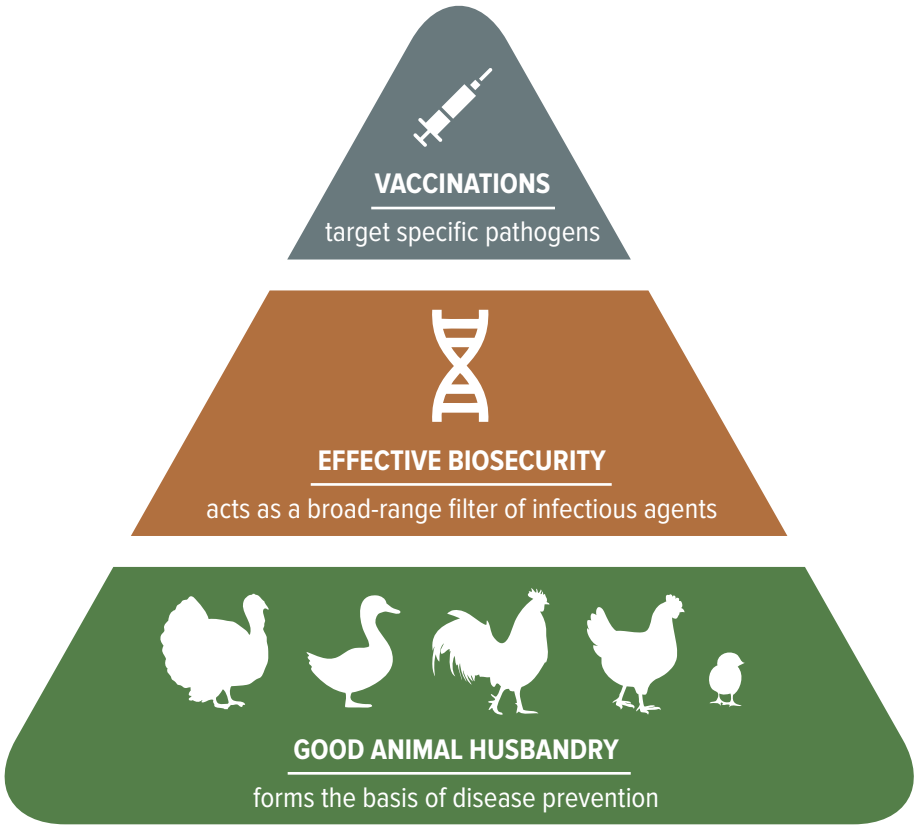
Source: Adapted from Alders *et al.*, 2002.

The presence of disease in the poultry flock is reflected in inferior performance. It is essential that the flock is in good health for it to achieve its performance potential. There are three elements of good health in the management of a poultry flock.

2.1.3.1 Prevention of disease

Preventing disease outbreaks is a much more economical way of managing health than waiting for the flock to become diseased before taking appropriate action. The application of a stringent farm quarantine programme and the use of good hygiene and husbandry practices are key factors in disease prevention.

Figure 2. The main measures for preventing infectious diseases on a farm



Source: Adapted from Magnusson *et al.*, 2019.

Vaccination

Disease prevention includes vaccination against vaccine-preventable diseases, and good biosecurity. Vaccines can protect animals from infectious diseases, but they cannot treat a disease. In addition, vaccines are disease-specific and protect animals against only a specific disease rather than all diseases. Vaccines work best on healthy, well-fed animals that are not suffering from parasites or other diseases. Do not vaccinate weak or sick birds. If a bird is already incubating Newcastle disease or another killer disease when it is vaccinated, it will die and the farmer may become angry or discouraged and lose confidence in the vaccine.

Help farmers to understand that vaccination with a particular vaccine protects their birds against only a specific disease and that their birds might suffer from other diseases despite successful vaccination. An example can be used to explain this: children vaccinated against polio or measles might still get malaria.

Some vaccines can be administered via eyedrops, drinking-water or spray. In most countries, these types of vaccine may be administered by non-professionals who have received appropriate training. In some countries, vaccines administered via injection can be given only by qualified professionals. If you are uncertain about the animal health regulations in your country, please consult your local veterinary services.

Organizing a vaccination campaign against Newcastle disease

- *Extensive production systems.* ND control may be most efficiently achieved by organizing regular vaccination campaigns as a joint venture between suppliers (which may be government veterinary services or agroveterinary supply shops) and community vaccinators.
- *Intensified production systems.* Farmers with large numbers of birds should develop relationships with reliable distributors of high-quality ND vaccine so that they are sure that the vaccine will be available at the right time to enable them to adhere to an appropriate vaccination schedule.

See (annex): ***Handout 8. What is Newcastle disease and what can be done to control it? (Annex 1)***

Parasite prevention and control

Parasite prevention and control varies depending on whether the parasite lives on or inside the animal. Commercial and traditional treatments are available for both categories of parasite.

Biosecurity

Disease agents and pests can be introduced to a poultry farm by the movement of eggs, birds, people, vehicles and equipment between farms, and via clothing, footwear, aerosols, water, feed, litter, wild birds, biting insects and vermin. Biosecurity refers to the hygiene and sanitation practices used to keep disease away from poultry (bioexclusion) and prevent the spread of disease if it occurs in a flock (biocontainment). The important thing to remember is that biosecurity is good for any type of poultry business.

! Most guidelines on poultry biosecurity are relevant for intensified production systems in which the birds are confined.

See (annex): ***Handout 18. How to prevent the entry of infectious disease into extensive systems (Annex 1)*** *and* ***Handout 20. How to prevent the entry of infectious disease into intensified production units (Annex 1)***

All new birds should be inspected on arrival at the farm

2.1.3.2 Early recognition of disease

Early recognition of disease is one of the first skills that should be learned by poultry flock managers. Frequent inspections of the flock to monitor for signs of sickness are required (Tables 4 and 5). Inspection of all the birds in the flock should be the first task performed each day in order to monitor for signs of ill health, injury or harassment. Feeders, drinkers and other equipment can be checked for serviceability at the same time. If a problem has developed since the last inspection, appropriate action can be taken in a timely manner.

Table 4. Overview of common poultry diseases of importance in different production systems, and typical clinical signs

Disease	Production system				Clinical signs (not all signs will appear in all individual birds)
	Extensive	Semi-intensified	Intensified broilers	Intensified layers	
Newcastle disease	✓	✓	✓	✓	Fluffed feathers, drooping wings, not eating, difficulty breathing, swollen head and neck, greenish diarrhoea, decreased egg production, twisted neck with tremors, sudden death with few clinical signs
Highly pathogenic avian influenza	✓	✓	✓	✓	Sudden death with few clinical signs, ruffled feathers, not eating, difficulty breathing, discharge from eyes and/or nose, swollen head, decreased egg production, soft-shelled eggs, diarrhoea, high mortality
Chronic respiratory disease					Discharge from nose and eyes, coughing or sneezing, swollen head, reduced egg production
Coccidiosis	✓	✓	✓	✓	Depression, diarrhoea (sometimes bloody), loss of weight, pale comb; usually most serious in young birds
Colisepticaemia					Weakness, diarrhoea, severe weight loss in growers, lameness in growers, heavy breathing
Egg drop syndrome				✓	Production of soft-shelled and shell-less eggs in apparently healthy birds, sudden drop (10–40%) in egg production or failure to achieve normal peak production
External parasites	✓	✓			Vary according to the parasite involved: irritation, pale skin, comb and wattles
Fowl cholera	✓	✓	✓	✓	Fatigue and weakness, ruffled feathers, not eating, bluish comb and wattles, swollen joints, difficulty breathing, discharge from eyes and beak, watery diarrhoea
Fowl pox	✓	✓			Yellowish to dark-brown wart-like lesions on the head, especially the comb, wattles and around the eyes; yellow-white, cheesy looking lesions inside the mouth and on the tongue

Disease	Production system				Clinical signs (not all signs will appear in all individual birds)
	Extensive	Semi-intensified	Intensified broilers	Intensified layers	
Fowl typhoid					Yellowish diarrhoea, restlessness, rough feathers and drooping wings
Infectious bursal disease (Gumboro disease)			✓	✓	Affects birds between 3 and 12 weeks of age only. Depression, birds huddling together, pale skin, diarrhoea, mortality of 30–90%;
Infectious bronchitis					Affects all age groups. Severe difficulty breathing, coughing and sneezing, drop in egg production, deformed eggs with wrinkled, rough shells
Infectious coryza	✓	✓	✓	✓	Affects all age groups. Difficulty breathing, sneezing, yellow discharge from the nose and eyes, sticky eyelids, swollen head
Infectious laryngotracheitis					Affects all age groups. Gasping with stretched neck and open beak, severe difficulties breathing, conjunctivitis, drop in egg production
Internal parasites	✓	✓			Not eating, weight loss, diarrhoea
Marek's disease				✓	Loss of feathers, paralysis of one leg or wing (up to 7 months of age), weight loss, lameness for a short period in adult birds
Pullorum disease (bacillary white diarrhoea)					Chalk-white diarrhoea, weakness, closed eyes, drooping wings

It is important to note that many poultry diseases share clinical signs and that definitive diagnoses can usually be obtained only via laboratory diagnosis.

A full review of key poultry diseases and their control is given in Ahlers *et al*., 2009.

Table 5. Diseases other than highly pathogenic avian influenza that cause sudden high mortality or swelling of combs and wattles in chickens, grouped by production system

Clinical sign	Production system	
	Extensive	Intensified
Sudden high mortality	• Newcastle disease • Infectious laryngotracheitis • Infectious bursal disease/Gumboro disease • Acute fowl cholera • Duck plague (duck virus enteritis) • Acute poisoning	• Newcastle disease • Acute fowl cholera • Duck plague (duck virus enteritis) • Acute poisoning
Swelling of combs and wattles	Acute/chronic fowl cholera and other septicaemic diseases Bacterial cellulitis of the comb and wattles	

Source: Ahlers *et al.*, 2009.

2.1.3.3 Early treatment of disease

If a disease infects a flock, early treatment may mean the difference between a mild outbreak and a more serious one. It is important that the correct treatment be used as soon as possible. This can only be achieved when the correct diagnosis has been made at an early stage. While there are occasions when appropriate treatment can be recommended as a result of field diagnosis – a clinical and/or post-mortem examination on the farm – it is best if all such diagnoses be supported by a laboratory examination for confirmation and to ensure that other conditions are not also involved.

! Remind poultry producers that medicines alone will not eradicate a disease. They should clean their chicken houses and remove infectious material. Always make sure that producers provide enough fresh water, feed and proper housing to sick birds to help them recover from a disease.

A variety of products for treatment of poultry diseases (antibiotics, insecticides, anthelmintics, etc.) may be available in local supply shops. When treating stock, it is important that the treatment be administered correctly and at the recommended concentration or dose rate. The instructions must always be read carefully and followed. Most treatments should be administered under the guidance of a qualified flock health service provider.

See (annex): ***Handout 19. How to control a disease outbreak in extensive systems (Annex 1)***

The use of antibiotics

Antibiotics have been used for many decades to control bacterial infections and to "promote growth" of birds fed cereal-based rations under intensive conditions. The misuse and incorrect storage of antibiotics have contributed to the emergence of bacteria that are no longer susceptible to the different classes of antibiotics. It is now recognized that antimicrobial resistance is a global health threat, and antimicrobial usage in animal production is one of its contributing sources. Antimicrobial-resistant poultry pathogens may result in treatment failure, leading to economic losses, and may also be a source of resistant bacteria/genes (including zoonotic bacteria) that may represent a risk to human health.

In most countries, the use of antibiotics as growth promoters in feed is now banned. Where antibiotics are used to treat sick birds, this should be done under the supervision of a trained poultry health specialist, and the birds should not be slaughtered and/or eaten until the "withholding period" (***see 2.1.1***) has been passed.

When used, antibiotics should always be administered at exactly the right dosage – neither too much nor too little – and always for as long as recommended. Do not stop the treatment as soon as animals improve.

*See (exercise): **Special topic 7 (socioeconomic). Antimicrobial resistance: matching diseases with cost-effective, safe prevention and control practices (1.2.1.2.)***

*See (annex): **Handout 9. Key actions that farmers can take to ensure that antimicrobials continue to function and that animals and the community remain healthy (Annex 1)***

See (external): How to reduce the use of antibiotics in poultry production (FAO, 2021)

2.1.4 Poultry diets

Poultry need adequate feed to maintain their condition (for moving around, renewing feathers and fighting diseases) and enable them to grow and to produce eggs. A diet may be formulated for each class of stock under various management, environment and production conditions. The diet specification for obtaining economic performance in any given situation will depend on factors such as:

- the cost of the diet;
- commodity prices – the income from poultry;
- the availability, prices and quality of the various ingredients.

! Just as people need fresh and healthy food to achieve good health, so do poultry. Such benefits can be demonstrated in a kitchen garden with "dual-purpose" vegetables (such as moringa) for poultry and human nutrition.

Maximizing production is not necessarily the most profitable strategy as the additional cost required to provide a diet for maximum production may be greater than the value of the increase in production gained. A lower-quality diet, while resulting in lower production may bring in greater profit in the long term because of the significantly lower feed costs. In addition, the food given to a flock must be appropriate for that class of stock – good-quality feed for one class of bird will quite likely be unsuitable for another.

The following are some of the key aspects to be taken into account when seeing to provide a good-quality diet:

- The ingredients from which the diet is made must be of good-quality.
- All of the ingredients must be accurately weighed or measured.
- All of the specified ingredients must be included; for example, if a particular grain is unavailable, the diet should be reformulated. One ingredient cannot usually be simply substituted for another without reformulation.
- The micro-ingredients used, such as the amino acids, vitamins, minerals and other similar materials, should not be too old and should be stored in cool storage. Many such ingredients lose their potency over time, particularly at high temperatures.
- Mouldy ingredients should be discarded and must not be used. Mould in poultry food may contain toxins that may affect the birds.
- Feed that is too old or has become mouldy must not be used. Storage facilities such as silos should be cleaned frequently to prevent the accumulation of mouldy material.
- Feed should be stored away from vermin and wild birds to prevent contamination by infectious agents transmitted by these animals and birds.
- Antibiotics should not be added to feed as growth promoters.

Nutrients

The diet of poultry – like the diet of humans – consists of different nutrients: carbohydrates, proteins, fats, vitamins, minerals, crude fibre and water. All of these nutrients are necessary to provide energy, grow muscles and produce eggs. Lack or shortage of a single nutrient may result in poor growth or egg production and increased disease problems. The daily feed ration of a chicken must therefore contain certain amounts of carbohydrates, proteins, fats, vitamins and minerals. To make a balanced diet, these nutrients need to be combined in the right ratio, according to the age and productivity of the bird. For example, to optimize egg production in layers, the birds' diet should be moderate in both energy and protein content, while a ration for broilers should contain higher levels of both energy and proteins to optimize the production of lean tissue. Because of their lower production rate, diets for village birds tend to have lower nutrient specifications.

Sources of nutrients

Nutrients and their sources include the following:

- ***Carbohydrate-rich feeds (energy feeds).*** These include maize, sorghum, rice, millets, cassava and cooked sweet potato.
- ***Cereal brans containing moderate levels of energy and fibre.*** These are a very useful, and often cheap, feedstuff for chickens, but because of their fibre content, they should not be fed to chickens in large quantities.
- ***Animal or vegetable proteins.*** Animal products usually have a higher protein content than vegetable products, as well as better-quality proteins. Examples of animal protein sources include fish, meat of various origins, blood, earthworms, termites and other larval and adult insects. Chickens will also eat the ticks off cattle

Free-ranging chickens eat a lot of green feed, so when they are enclosed their feed should include the leaves that they like (such as those of bean plants, sweet potato, pumpkin, cassava and certain wild herbs that people also use as salads and relishes)

lying in cattle corrals. Eggs are an excellent source of proteins. If available, a hard-boiled egg can be given to young chicks, with an egg a day being sufficient for six to seven chicks. Among the sources of vegetable proteins are various legumes (such as cowpea, pigeon pea, chickpea, mung bean, garden pea, groundnut, sunflower seeds, sesame seeds, pumpkin seeds [after removal of the outer shell] and coconut). Some legumes (including soybean) contain toxic chemicals that must be removed through some form of heat treatment before the feed can be consumed. The legumes mentioned above are known to have little or no toxicity when eaten raw. Certain fermentation processes may improve the protein quality of some beans. As vegetable proteins are of lower quality, as many different types as possible should be combined in the feed (for example, beans and sunflower seeds together provide proteins that are nearly as good as animal proteins). Leaf proteins, including those of grasses, are of better quality than those in seeds.

- ***Minerals including iron, zinc, copper, iodine and manganese.*** Chickens require very small amounts of a wide range of minerals, which they get from their feedstuffs and the soil. An important mineral required in greater amounts is calcium, which is present in sea and snail shells, limestone in the earth, and bones (burned and crushed). Eggshells also contain high levels of calcium but they should be roasted before being fed to chickens, otherwise the birds may acquire a taste for eggs and become egg eaters. Phosphorus, another essential mineral, is present in bones and certain rocks. People often forget the importance of salt, which can be sprinkled in small quantities over any feed. However, too much salt can cause diarrhoea.

- ***Vitamins.*** These too are required in very small quantities. There are many different vitamins, and feeds such as liver, fruits, vegetables and leaves are rich sources of them. Other feeds, such as grains and insects, also contain vitamins in varying amounts.

All of these nutrients are necessary for optimal production, but the proportions vary according to the age of the bird, the stage of production, the local climate, the season and other factors. For example, growing chicks need more proteins than adult birds. Energy-rich feeds usually form the largest part of the diet of chickens (about 60–70 percent), then come protein-rich feeds, while the various minerals and vitamins are needed only in very small amounts, except for calcium for laying hens; in layers, the formation of the eggshell requires higher levels of dietary calcium than those needed for non-laying birds.

2.1.5 Composting of poultry manure

Although chicken manure is too strong to be used raw on gardens, it can be composted and converted to high-quality fertilizer. If used without composting it can damage the roots of plants and possibly kill them, but when it is composted chicken manure is a good fertilizer with high concentrations of nitrogen, phosphorus and potassium.

Manure safety tips

Fresh chicken manure may contain disease organisms that could contaminate root crops (carrots, radishes, beets) and leaves (lettuce, spinach), so uncomposted manure should not be spread on the soil in vegetable gardens. Always encourage farmers to employ the following safety tips:

- Apply only aged or composted manure to your soil.
- Always wear gloves when handling manure.
- Thoroughly wash raw vegetables before eating.
- Do not use cat, dog or pig manure in compost heaps.
- People who are susceptible to food-borne illnesses should avoid eating uncooked vegetables from manured gardens. Those who face risks from food-borne illness include pregnant women, very young children and people with cancer, kidney failure, liver disease, diabetes or AIDS.

2.1.6 Animal welfare

The World Organisation for Animal Health states that perceptions of animal welfare differ from one region to another and between one culture and another, as do the ways in which animals contribute to human society. An increasing number of countries have both community-based animal welfare societies and government animal welfare legislation.

The main animal welfare issues under human control are:

1. freedom from hunger or thirst through ready access to freshwater and a diet that maintains full health and vigour;
2. freedom from discomfort through the provision of an appropriate environment including shelter and a comfortable resting area;
3. freedom from pain, injury or disease through the prevention or rapid diagnosis and treatment of these;
4. freedom to express (most) normal behaviour through the provision of sufficient space, proper facilities and company of the animal's own kind;
5. freedom from fear and distress through ensuring conditions and treatment that avoid mental suffering.

2.1.6.1 Routine practices for animal welfare

A successful poultry house must satisfy the welfare needs of the birds, which vary by the birds' class, age and housing system. Failure to satisfy these needs will, in many cases, result in lower performance from the birds and, consequently, lower income owing to inefficient production. These needs include:

- adequate floor space with enough headroom;
- good-quality food with adequate feeding space;
- good-quality water with adequate drinking space;
- the opportunity to associate with others in the flock;
- the elimination of anything that may cause injury;
- the elimination of all sources of unnecessary harassment.

! It is your responsibility as a facilitator to discuss animal welfare and agree with farmers the appropriate poultry welfare standards for local conditions.

2.1.7 Marketing and value chains

While some family poultry producers raise birds solely for home consumption, the majority raise birds as an income-generating activity. Live poultry, meat and eggs are sold or bartered as required to meet household needs. Family poultry can contribute to income generation only where appropriate value chains are present. Value chains are the sets of people and processes through which poultry products are supplied to the final consumer.

! As a facilitator, you can discuss existing local poultry value chains and seek to identify new opportunities that may be appropriate for farmers. You can help farmers to develop "productive alliances" with key participants in the value chain.

Linking production plans with marketing opportunities is key to success. Producing more birds than can be sold results in farmers losing money. Tailoring production so that farmers have more birds to sell ahead of important events such as national holidays and local celebrations will likely increase the sale price per bird. For intensified production, ensuring that birds reach market weight or start laying at the appropriate age is vital to financial success, as every extra day that a farmer has to provide feed for birds prior to sale will eat into profits.

Frequently only a few birds are ready for sale from a single-family poultry flock at any one time. Therefore, self-marketing of birds in urban centres by members of family poultry-producing households is often not profitable. In farming communities that are remote from significant markets, farmers may wish to enter into cooperative marketing arrangements to minimize the transport costs associated with getting their birds or eggs to market. Considerable transport costs result from the collection of birds from relatively small indigenous chicken flocks in rural areas. For farmers producing eggs, all transport costs, including the purchase of egg trays to minimize breakages, must all be taken into account.

! You should work with farmers to prepare working budgets that identify and assign realistic prices for all expenses and the expected income.

In an increasing number of settings, specialist markets are developing for indigenous poultry meat and eggs through larger distributors such as supermarkets. These markets are meeting urban consumer demand for indigenous poultry meat and eggs, certified safe "biosecure" poultry products and organic poultry products.

2.1.8 Extensive scavenging systems

The following subsections on different aspects of extensive poultry production provide a general introduction. For additional information, please consult *Improving village chicken production: a manual for field workers and trainers' manual* (Ahlers *et al.*, 2009), which is available online via free download.

2.1.8.1 Feed and water

Poultry in extensive scavenging systems can feed from scavenging alone or be provided with supplementary feeding. Fresh, clean water should be available at all times.

Scavenging feed only

Making the best use of the scavenging feed resource base is a major characteristic of extensive poultry systems. The scavenging feed resource base includes various types of green feed, seeds and fruits, insects, worms, minerals in the soil, gleanings from cultivated fields, bran from cereal processing and household food scraps and leftovers.

Sometimes, the scavenging feed resource base is deficient in protein-rich feeds or energy-rich feeds. The quantity and quality of the feed base is usually the main factor limiting chicken production and it is essential to take the particular scavenging feed resource base into account when exploring possible management improvements.

Supplementary feeding

Supplementary feeding can be used to increase the productivity of scavenging village chickens and to assist the chickens when the scavenging feed resource base is insufficient to allow the whole flock to thrive. Supplementary feed is an addition, not a replacement, and must therefore not distract the chickens from scavenging. In general, it is best to offer supplementary feed in the late afternoon before the chickens are penned overnight.

Poorer farmers might find it difficult to supplement their chickens' feed regularly. In such cases, supplementary feed might be provided to only selected birds or age groups, such as young chicks or laying or brooding hens. When this is the case, a way of separating the selected chickens from the rest of the flock must be devised, so that only they have access to the supplementary feed.

What can be used for supplementary feeding?

In general, anything edible can be used for supplementary feeding of chickens, but the benefit will be higher when the nutrition needs of the chickens are considered.

Chickens that obtain all their nutrients from scavenging may eat an excess of proteins and therefore benefit most from supplementary feeding of carbohydrates (for example,

a few handfuls of maize, sorghum or millet). Hens in lay can be provided with a diet rich in proteins with some extra crushed mollusc or egg shells, which contain the calcium that is necessary for producing the eggshell.

Chickens can be provided with leftovers from household food, and green feed such as grass, weeds and leaves from garden plants. Bran (the seed coat but not the husk), derived from grains such as rice, maize and wheat after polishing, is a useful feed ingredient for chickens, with moderate protein and energy content. The outer husks or hulls have little nutritional value.

If a farmer is unsure of which type of feed to provide to supplement the scavenging feed resource base (for example, whether to provide more proteins or more carbohydrates), then "cafeteria" feeding may be worthwhile.

See (annex). ***Handout 15. How to provide supplementary feed to your free-ranging bird (Annex 1)***; ***Handout 16. How to provide supplementary feed via the cafeteria approach (Annex 1)*** *and* ***Experiment 1. Supplementary feeding in extensive systems (Annex 5)***

Water

Scavenging chickens usually manage to find enough water to survive. However, chickens, especially young chicks and laying hens, will perform much better when provided with water. While clean, fresh water is best, when water is scarce, extensively raised chickens can be offered used water as long as it contains no detergents or other harmful substances.

See (annex): ***Handout 17. The characteristics of good waterers (Annex 1)***

2.1.8.2 Egg production and reproduction

While more intensified systems usually use parent stock (***see 2.1.1***) flocks and artificial incubation through hatcheries, in extensive scavenging systems multiplication through broody hens is the most common practice (Figure 3).

Egg laying

Hens start to lay eggs when they are about five to six months of age; malnutrition or poor health condition in growers will result in the birds coming into lay later and producing fewer eggs. Not all of the eggs laid are necessary for producing future generations. Some hens may lay 20 or more eggs in a clutch, but a small village hen cannot cover so many eggs and can properly care for a maximum of eight to ten chicks (especially in colder weather or when the scavenging feed resource base is poor). A hen may also abandon her nest with all the eggs in it. This is a waste of a very valuable food or income source for the family. In addition, eggs left in nests are heated and cooled repeatedly as hens leave and return daily to lay more eggs. This can cause early embryo mortality.

Figure 3. Egg and chick production cycle in uncontrolled conditions (with no active management)

Egg laying (2 weeks)

A hen lays about 10–15 eggs (called a "clutch"), usually on consecutive days over a two-week period.

Brooding (3 weeks)

The hen becomes broody and sits on the eggs to incubate them. After about 21 days, an average of 8–12 chicks will hatch.

Caring for chicks (up to about 12 weeks)

The hen will then take care of her chicks for about 8–12 weeks before she starts to lay eggs again.

If feed availability and predation are not a concern, chicks can be separated from hens at about 6 weeks of age to encourage the hen to come back into lay more quickly.

Note: Hens generally repeat this cycle an average of three or four times a year.

Laying hens can be identified in various ways:

- *Checking the width of the bones around the vent*. In non-laying birds, only one finger can be placed between the two pubic or "pin" bones and two between the pin and breast bones. Laying hens can have a space of two to three fingers between the pin bones and four to five fingers between the pin and breast bones, depending on the size of the chickens and size of the fingers.
- *Examining at the comb*. Adult hens with a very small and pale comb are not in lay and are probably either moulting or in poor health. If hens in poor health do not recover, they should be separated from the flock, because they are not productive and may transmit disease to the healthy birds. A small, pale comb is normal in moulting birds.
- *Examining the vent*. A non-laying hen has a puckered (tightly gathered or contracted into wrinkles or small folds) vent while a layer has a large, oval, moist and bleached vent.

Brooding and hatching

Once a clutch of eggs is laid, indigenous hens usually become broody. When hens are broody, they sit on their nests for most of the day and may even sleep there. They become aggressive and make a characteristic squawk when approached. A broody hen will incubate the eggs and then look after the chicks that hatch. The hen sits on the eggs for 21 days, leaving the nest for only short periods for feed and water.

A hen can lose a lot of weight while she is incubating the eggs. Ensure that water and some supplementary feed are nearby to minimize this effect. As the hen has depleted her calcium reserves to lay the clutch of eggs, it is important also to provide her with a good source of calcium during this period, to build up her bones and encourage her to commence laying as soon as possible after rearing her chicks. If the hen has to leave the nest for long periods to look for feed and water, the eggs may cool down excessively, resulting in poor hatchability and chick survival.

To test whether the hen is definitely broody and will not abandon the nest, the farmer can set two or three old eggs under her. If she stays on the nest for two or three days, it indicates that she is truly broody. The old eggs can then be taken away in the evening when it is dark and replaced with eight to twelve fresh, stored eggs. Very small or very large eggs should not be used; choose well-shaped, strong-shelled eggs. Do not set eggs from very young hens, as these usually do not hatch well.

The farmer should control the number of hens that are hatching eggs at any one time. The most favourable time is when there is more feed available for the hens and their chicks (harvest time or when the scavenging feed resource base is rich) and when the weather is not too hot or too cold. It should be remembered that in some areas hens lay eggs and go broody only at certain times of the year.

If the farmer does not want a broody hen to hatch eggs, she can be placed in a small, separate cage in a cool, shady place. Keep the cage off the ground and cover the floor with wire or small branches to allow good air circulation. Make sure the hen has water and feed. In a few days she will lose her broodiness and after a while will start laying again.

If possible, it is good practice to separate a broody hen from other birds so that she is not disturbed while incubating her eggs. However, if this means that the nest must be moved, it may well lead to the hen abandoning the nest. The move therefore needs to be done carefully and preferably at night.

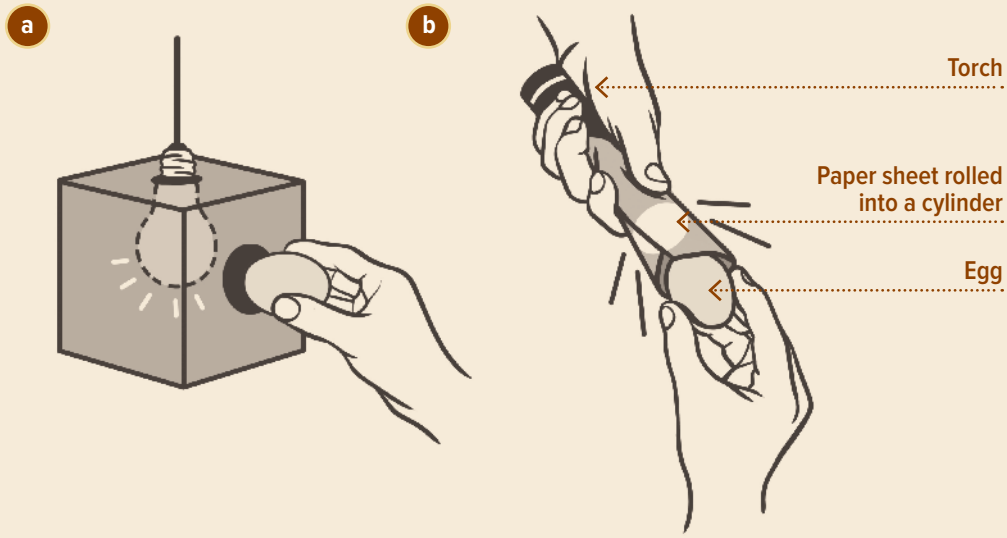
Candling eggs

Candling will provide information on whether or not an embryo is developing inside the fertilized egg and whether the embryo is alive. To check whether a chick is developing inside an egg you can hold the egg in front of a bright light, such as a paraffin lamp, a candle, a torch or a light bulb inside a dark room. Candling can be done around days 6, 7 or 8 after a hen has started brooding a clutch in order to determine fertility, and again around days 17 or 18 to identify viable eggs and those containing dead embryos or bacterial rot. Eggs containing bacterial rot or dead embryos should be discarded as they are a potential source of infection for the hatching chicks. White-shelled eggs are easier to examine than brown-shelled eggs.

At days 6–8, you can see the shadow of the embryo, which might move in response to the light, and a fine net of blood vessels. Eggs in which no embryo is developing are completely clear and may be removed and used for consumption. Place the eggs in water first to ensure that they are not bad – good eggs remain on the bottom of the container while bad eggs float.

In a fertile egg after nine or ten days of incubation, the clear air cell in the blunt end of the egg takes up about a quarter of the volume of the egg, and the embryo, its membranes and fluids fill the remainder, allowing almost no light to pass through. There is a clear line separating the embryo from the air cell.

Eggs can be candled using a lamp (a) or a torch with a paper funnel adjusted to give a tight fit around the egg (b)



Source: Ahlers *et al.*, 2009

2.1.8.3 Flock management

All chicken farmers aim to keep their chickens healthy and productive so that they can benefit from the flock in terms of meat and egg production. A major step towards increased productivity is vaccination against Newcastle disease (ND), the most devastating disease of chickens in many regions. Other diseases can be controlled or limited in their effects, and improved housing and nutrition will help keep the chickens in good condition. The benefits of these actions can be augmented by good flock management.

The aim of flock management is to maintain a healthy and productive chicken flock throughout the year by choosing an adequate flock size and taking off any surplus in the ways that are most beneficial to the poultry owner. Flock management includes control of breeding and egg production to increase the output of eggs and chicks per hen.

Indigenous chicken production is characterized by low inputs and outputs, with many farmers selling or eating their chickens only when the need arises. However, once ND vaccination is implemented and/or other killer diseases are controlled, more chickens will survive and the following possibilities emerge:

1. The breeder flock size can be allowed to increase.
2. Surplus surviving chicks can be marketed or consumed prior to maturity.
3. Fewer eggs can be set under the hens, allowing more eggs to be consumed or sold.
4. Various combinations of these options can be implemented.

The scavenging feed resource base will probably not support a significant increase in flock size in a village (options 1 and 2 above), which means that farmers will need to plan and manage their flocks more carefully. Good planning and management will help to maximize the benefits of increased chicken production and minimize any other problems that may arise once ND is controlled.

Farmers need to plan well in advance to get as much benefit as possible from their vaccinated flocks. Possible negative effects that may occur once ND and other killer diseases are controlled include the following:

- An increasing number of chickens might not find enough feed in the local environment.
- Other diseases (such as fowl pox) might become more prominent and important.
- The supply of chickens and eggs for local markets may increase, resulting in a decrease in the prices received.

Disease prevention and control

The saying that "prevention is better than cure" is very appropriate in poultry farming. To keep chickens in good health and support high productivity it is necessary to control the diseases that affect the birds. Effective disease control includes measures taken to cure or eradicate a disease as well as measures designed to prevent it.

Should the aim be eradication or control? It is not always possible to eradicate the cause of an infectious disease, especially if wild birds also carry the infectious agent or if the infectious agent is very widespread (endemic). However, it is possible and desirable to control the clinical diseases caused by many infectious agents. For example, ND virus is endemic in many regions and is therefore almost impossible to eradicate. Nevertheless, mortality to ND in individual flocks can be avoided through regular vaccination and good biosecurity.

The following are among the general measures required to ensure comprehensive disease control in extensive production systems:

- ***Husbandry, nutrition, flock management and environmental factors.*** These elements all have a direct and important influence on flock health and improvements in them should generally be part of the control of any disease (for example, ensuring good housing, nutrition and management).
- ***Hygiene (biosecurity).*** Biosecurity procedures help to prevent the entry and spread of infectious diseases and contribute to improved flock productivity and the production of better-quality eggs and meat. Although there are limited possibilities for improving chicken hygiene under extensive conditions, awareness of the need to maintain general cleanliness for the birds will certainly be helpful.
- ***Traditional remedies.*** In many countries, farmers use traditional remedies to treat diseases of village chickens. Some of these remedies may be effective, while others are less effective or even harmful. This manual does not cover the large range of traditional remedies that are used.

See (module): ***Keys to achieving good poultry health (2.1.3)***

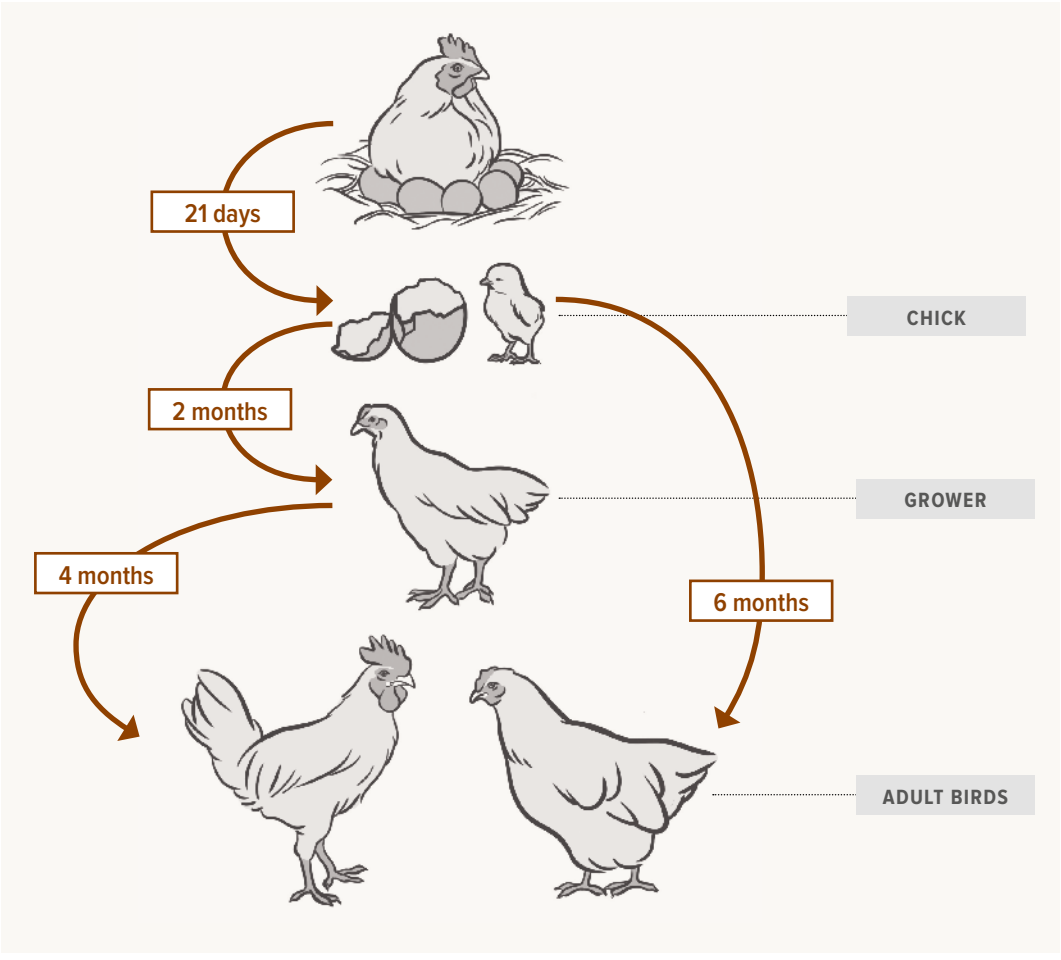
See (annex): ***Handout 18. How to prevent the entry of infectious disease into extensive systems (Annex 1)***

Breeding

Indigenous breeds are arguably the best option for conditions in rural villages and, in most situations, it is not advisable to introduce exotic breeds into extensive scavenging systems. Indigenous breeds have lower overall production because they often survive on limited feed resources and they use energy doing a range of activities such as scavenging for feed, escaping predators, brooding and raising chicks. The growth rate of an indigenous chicken is slower than that of a well-managed broiler chicken (Figure 4), but growth is usually achieved with very little investment, resulting in a very high cost–benefit ratio for individual birds compared with commercial breeds, which require multiple inputs for successful production. Indigenous chickens often command much higher prices in local markets.

See (annex): ***Handout 7. Differences between indigenous and commercial chicken breeds (Annex 1)***

Figure 4. Stages of development of indigenous chickens raised under extensive conditions



Source: Ahlers *et al.*, 2009.

The productivity of indigenous chickens can be significantly improved over time by selecting only the healthiest males and females with the best production and conformation for breeding purposes. Using existing chicken breeds and strains also means that the birds will retain their ability to survive under harsh conditions.

It is important to maintain the correct mating ratios and not to have too many or too few males for the number of hens. The general guide is to have one rooster for every ten hens, plus an extra rooster (in case one is injured or dies). If a farmer has ten hens, there should therefore be two males, and; if there are 20 hens, there should be three roosters.

Interbreeding between closely related birds can be avoided by obtaining chickens (especially males) by purchase or exchange from more distant villages about once every two years. After obtaining the chickens, the farmer should make sure that no disease is present in them and should keep them isolated from the rest of the flock for at least 7 to 14 days.

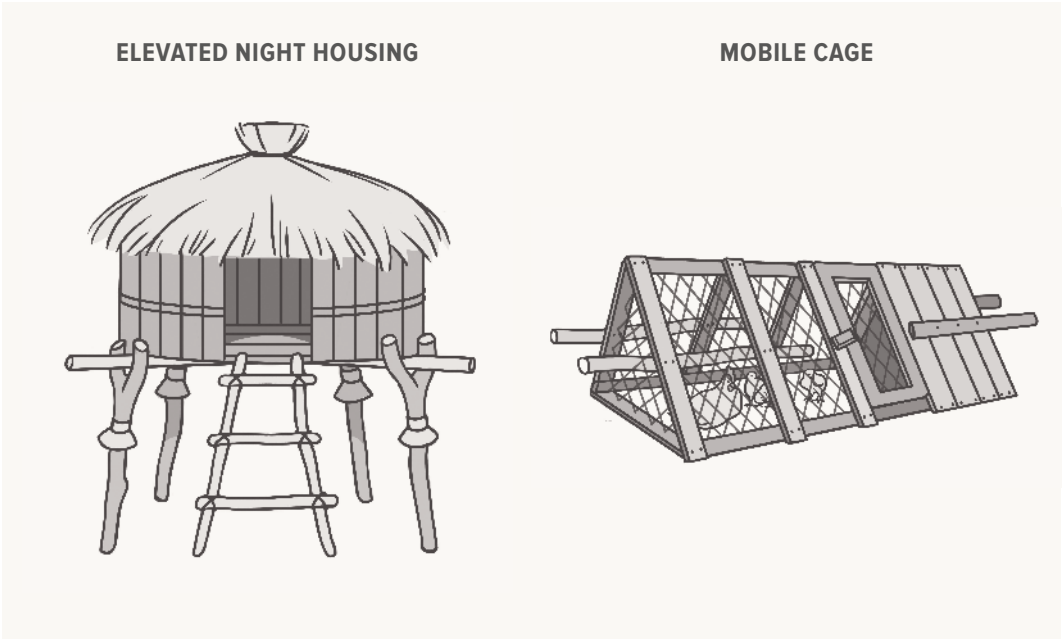
In some circumstances, farmers may consider crossbreeding indigenous hens with exotic purebred (not hybrid) cockerels. However, in general such activities have not yielded much success. Elements that need to be considered for increasing the likelihood of success include access to high-quality exotic cockerels, reliable markets for the easy sale of birds or eggs when ready, affordable supplementary feed, appropriate vaccines and mechanisms for ensuring that the indigenous poultry gene pool is not lost or significantly diluted.

Housing

Housing village chickens at night will protect them from rain and cold, predators such as rats, snakes, other wild animals and dogs, and theft. Housed birds are also easier to catch when inspecting for signs of illness or injury, or vaccinating against diseases. Exploitation of the scavenging feed resource base is one of the major advantages of low-input village chicken production systems, housing for adult and older growing birds should therefore be provided only at night with the chickens left free to range for feed during the day.

Adult birds and growers are often provided with elevated night housing. Chicken houses built close to the ground are suitable for hens with young chicks that cannot enter an elevated house. It may be necessary to dig a drain around such a house or to raise the floor, so that it will stay dry during the rainy season. Some cages do not have a floor and can be moved to a new site every day or two. Chickens can be housed in these cages overnight or confined in them for periods during the day. The chickens scratch the ground to find feed for themselves. A chicken house can be completely covered with wooden slats or be partly open with netting or woven bamboo. This type of house may also be suitable for holding a hen with her chicks for the first week or two after hatching. Housing hens and chicks in coops or baskets reduces chick mortality resulting from predators, thieves and adverse climatic conditions. It also allows separate feed and water supplementation.

Poultry houses can be built with local materials, including bamboo slats, sorghum stalks, mud, wooden slats and palm fronds



Source: Ahlers *et al.*, 2009.

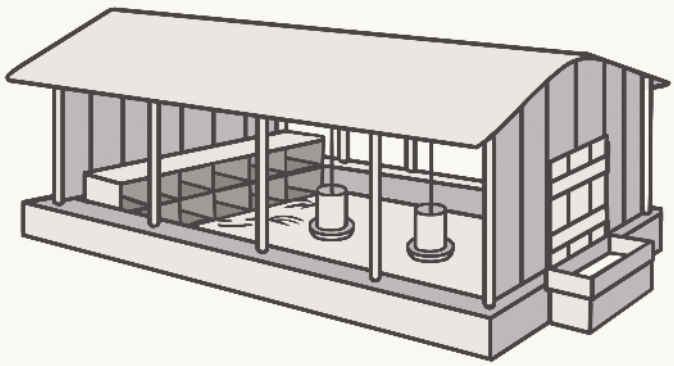
2.1.9 Intensified rearing systems

In semi-intensified and small-scale intensified systems, birds are kept in a poultry house for all or most of the time until they are ready to be sold.

2.1.9.1 Housing

Not only does housing protect birds from predators and rain, but an appropriate chicken house also provides steady temperatures and sufficient light and fresh air. Some large commercial sheds are very expensive to construct, so in this manual, only open-sided, naturally ventilated houses are considered. In tropical countries, houses must be designed to keep chickens cool.

OPEN-SIDED HOUSING



See (annex): ***Handout 21. Constructing a chicken house for intensified systems (Annex 1)***

2.1.9.2 Incubation and hatching

To hatch large numbers of eggs, farmers need an incubator. There are different types of incubator available, including solar-powered units for off-grid areas. Incubating eggs should be turned at least five times a day (the broody hen will do this herself) and farmers with a reliable source of electricity are recommended to get an incubator with an automatic turning mechanism.

Eggs to be incubated should be kept for no more than a week before setting, otherwise the hatch rate will diminish. Farmers should choose eggs that are clean, medium-sized and free from blemishes or odd shapes.

The incubator should be located in an area that is free from wide temperature fluctuations. The instructions for the incubator should be followed carefully and water added when required to maintain ideal humidity.

The incubation period for chicken eggs is 21 days; on day 19, farmers should stop turning the eggs. When the eggs start to hatch, some farmers can be tempted to help the chicks, but leaving this phase to nature is usually recommended.

Once the chicks are hatched, the farmer can leave them in the incubator for 24 hours to dry off before transferring them to a brooder.

2.1.9.3 Specializations in intensified systems

Chick production (0–21 days)

The care of young chicks is the same for broilers and layers. The first three or four weeks from day 1 is called the brooding period and extra skills are required for success during this period.

*See (annex): **Handout 22. Brooding in intensified systems (Annex 1)***

> ! In general, for good, profitable production it is recommended that commercial breed day-old chicks are obtained from well-managed parent stock. Small-scale producers involved with the selection and breeding of indigenous breeds may be able to supply day-old chicks.

Broilers

Broilers are chickens that have been bred to grow quickly into large, meaty birds. They are kept to produce chicken meat and should not be used to produce eggs. Modern broilers can reach an average live body weight of more than 2 kg per bird at six weeks of age. A live weight of around 1.7 to 1.8 kg at six weeks is usually an indication that production is going well. Broilers should weigh about 0.7 kg at three weeks, and 1.4 kg at five weeks.

Commercial broilers have a feed conversion of less than 2 kg of feed for every kilogram of live weight produced. Feed conversion is a measure of the efficiency of broiler growing, and the smaller the figure the better. It is calculated by dividing the total weight of feed eaten by the body weight of the bird. For example, if a broiler has eaten a total of 4 kg of feed by the time it is sold and weighs 2 kg, the feed conversion ratio is 2.

> For disease control purposes, it is advisable to have broilers of only one age on a farm. This is called the “all-in, all-out system” and means selling one batch of birds every eight weeks or so: with a six-week growing period followed by two weeks for cleaning and resting of the chicken house.

Layers

Pullet production (21 days to 3 months)

Layers are usually purebred chickens that are kept for producing eggs. Dual-purpose breeds (breeds that produce both meat and eggs, such as the Australorp and Rhode Island Red breeds) also produce eggs and they tend to do better than commercial breed layers under semi-intensified conditions.

Ensuring that the birds come from a reputable supplier is crucial to the success of the enterprise. If target markers have a preference for white- or brown-shelled eggs, the breed should be selected accordingly.

> ! Encourage farmers always to order their layers a long time before they are required on the farm.

The decision regarding whether to start a layer flock with day-old layer chicks or with point-of-lay pullets requires careful consideration. Day-old layers may be easier and cheaper to obtain, but require special skills and experience in caring for them throughout the brooding stage, and sufficient resources for ensuring that they receive all the necessary vaccinations and for providing them with feed for around five months before any income from the sale of eggs can be obtained. Point-of-lay pullets, on the other hand, may be less easy to obtain and more expensive, but they are ready to start laying and can start providing money from the sale of eggs in a relatively short time.

Laying hens

Laying hens are usually kept in lay for one year only after they have started laying, meaning that if they start laying at about 20 weeks of age, they will be sold when they are about 72 weeks old. When starting with day-old layer chicks, an average mortality of about 10 percent can be expected until the pullets reach point-of-lay. During the laying period, the expected mortality is about 1–2 percent per month, with one to two hens out of every 100 dying each month.

*See (annex): **Handout 23. Key aspects in the management of layers (Annex 1)***

2.2 Facilitation methods and non-formal education

Chapter objectives

- To provide an overview of FFS facilitation techniques.
- To illustrate the indicators of a successful FFS.

A precondition for starting a poultry FFS is that it can be facilitated by someone who has attended a training of facilitators course. This training is set to equip participants with non-formal adult education approaches for use in delivering participatory poultry training.

2.2.1 Facilitation techniques for participatory learning

Topics of interest to the farmers are learned about through various methods, including comparisons of alternatives. As a facilitator, you can decide the type of exercise or discussion (Table 6) that best delivers a specific lesson.

Table 6. Overview of facilitation methods used in FFS

Facilitation method	Strengths	Points to consider
Question and answer session	• Activates thinking • Creates opportunities to speak • Increases curiosity • Gives participants a sense of being considered important • Enhances thinking capacity • Helps identify new aspects of poultry production and other topics • Helps in making correct decisions	• Ask questions that start with what? why? when? where? with what? or how? • Ask questions with yes/no answers conditionally • Ask questions that will have short answers • Do not direct questions to the same participant again and again • Encourage non-participating trainees to take part
Focus group discussion	• Facilitates learning in small groups • Is more participatory; each participant in the group has a chance to contribute • Helps build consensus on what is right and wrong • Increases cohesion among group members	• Select predetermined and well-defined topics for discussion • Work in small learning groups • Provide logistic support • Guide groups in drawing conclusions

Facilitation method	Strengths	Points to consider
Role play	• Enhances creativity • Enables participants to express their feelings clearly • Is motivational and entertaining and breaks monotony • Focuses on a selected subject	• Prepare scripts in advance • Select subjects relevant to local conditions • Allow participants to rehearse before presenting their role plays
Demonstration	• Based on the principle of "seeing is believing" • Provides an easy way to show results • Arouses interest • Is time-bound	• Select suitable subjects for local conditions • Define clear objective-based community needs • Ensure the availability of all required materials in advance
Short lecture	• Provides an easy way of explaining the context • Is a useful approach for conveying messages to large groups/plenary sessions • Requires little time for preparation • Is time-bound	• Introduce the topics at the beginning of the lecture • Explain the contents • Ask relevant questions to check participants' understanding • Emphasize the points to be remembered
Interactive discussion	• Improves facilitation • Encourages participation • Keeps the session lively and active • Helps to draw out knowledge from the group • Can be carried out in plenary session	• Explain the topics and contents of the discussion clearly • Prepare well-structured open-ended questions in advance • Lead the group in drawing conclusions from the discussion
Brainstorming	• Activates participation • Stimulates thinking • Enforces creativity • Helps to draw out options from the group	• Introduce the topics clearly in a way that is easy to understand • Organize and classify the opinions expressed in a systematic manner
Learning game	• Is good for breaking monotony and setting the atmosphere for learning • Helps team building • Keeps participants active, including in group activities • Helps deliver messages through analogy • Is time-bound	• Plan in advance the subject or topic to be covered by the game • Use analogy to explain contents
Individual coaching	• Ensures that every participant gets attention from the facilitator • Is a good way of learning skills	• Use this method for the specific skills to be learned by each individual • Ensure the availability of learning materials in advance
Case study	• Allows problem to be viewed objectively free from the pressures of actual events • Provides opportunities for exchange of ideas and consideration of possible solutions to problems	• Use this method to examine the history of an event or a set of circumstances with relevant details.

2.2.2 Qualities of a successful farmer field school

Knowledge of the qualities of a successful poultry FFS (Table 7) will help the facilitator to run a successful FFS.

Table 7. Key indicators of a successful FFS

Group profile	Plans
• Group registered with relevant authority • Has 20–30 participants • Fairly homogeneous group with common interests • Group by-laws and constitution in place • Gender, age and literacy mix is locally appropriate	• Clear objectives and goals of the group • Stated/known "mission" and "vision" of the FFS • Availability of an activity plan and implementation of well-planned daily timetable
Facilitator	**Good management and discipline**
• Trained in poultry FFS methodology by qualified FFS master trainer • Trained in facilitation and participation skills • Facilitates rather than lectures • Available and accessible to farmers • Good at peer-to-peer interaction and treats farmers' opinions with respect • Creative and innovative • Technically capable • Resourceful • Accountable to farmers	• Good time-keeping • At least 70–80% of all participants attend each session • Learning and group norms are available and strictly followed • Equal treatment of women and men in the group • Transparency in financial management and decision-making • Timetable of sessions is followed • All members understand group rules
Equal rights and mutual respect	**Group experimentation**
• Roles of members, officials and facilitators are well understood • Good leadership and structure • Democratic practices during election of officials • Timeliness of special topics	• Has a learning site including for field trials • Demand-driven choice of enterprise • Agro-ecosystem analysis carried out regularly • Comparative studies rather than demonstrations
Learning process	**Signs of empowerment**
• Curriculum agreed by farmers based on their preferences • Curriculum includes cross-cutting issues and special topics • Curriculum fitted to real-life situations • Curriculum is all-inclusive and flexible • Health issues are included • Environmental concerns are addressed • Training on the costs of production and gross margins is included • Marketing training is included • Well-balanced group activities	• Farmers' confidence • Farmers' ownership of processes and participation in decision-making • Farmers seek and share information (within and outside the group) • Farmers understand FFS concepts and technical issues • Active, motivated and confident members • Active participation by all FFS members • Sense of innovation • Well-informed decision-making capacity

Sustainability	Signs of empowerment
• Ability to mobilize local resources • Group cost sharing • Linkages to other approaches/projects • Availability of income-generating activities • Have in-built participatory monitoring and evaluation system • Exit plan developed	• Good documentation of planned activities • Membership records • Enterprise records are well kept • Well-kept attendance records/register • Documented monitoring and evaluation • Well-kept minutes/records of each session • Documented observations and results are used in decision-making
Outcome trends	
• General improvement in members' households (housing, increased incomes, food, health, etc.) • Financial empowerment • Dynamic trend created in community or individuals • Adoption and adaptation of improved practices by members	

Source: FAO, 2016a.

2.2.3 Incremental levels of achievements of farmer field school groups

Table 8. Assessing the level of achievement of a poultry FFS group

Level of development towards market-oriented production	Duration, indicators and tools for monitoring learning outcomes
1st level When members: ...accept vaccination against Newcastle disease as non-negotiable by law ...complete the curriculum ... see a decrease in poultry mortality and an increase in poultry production ... are producing for household consumption and trade ... have a way forward for sustaining timely poultry vaccination activities	After about 12 months it is possible to assess changes in awareness and level of knowledge about the topics covered: selection of suitable ecotypes, ideal housing, chick management, early recognition of unhealthy chickens, disease prevention, etc. Ability to act with confidence and motivation noted in self-perceived confidence level; number of exchanges with other farmers; sense of purpose Measured after one full cycle of FFS through in-depth interviews looking for changes in critical thinking ability demonstrated by an unbiased interest in the causes of problems and in ways of solving them. Assessment can be via appraisal of the quality of AESA; observation of participants' changed skills – particularly improved analytical skills – and active participation in the FFS Consideration of the impact on nutrition through counting the number of meals consumed, food groups and household dietary diversity score

Level of development towards market-oriented production	Duration, indicators and tools for monitoring learning outcomes
2nd level When members: ... experience a decrease in poultry mortality and an increase in their poultry production ... start selling poultry and/or poultry products individually or pooled with the birds of other FFS members ... have introduced saving schemes ...include well-recognized chick raisers in the community ... sustain a poultry vaccination scheme ... belong to a cooperative or farmer cluster/ association and realize benefits such as economies of scale from purchasing inputs and trading	After about two full cycles of learning, questionnaire surveys, focus group discussions and monitoring reports identify changes in the number of problems solved; and the design and results of farmer studies show the quality of experimentation/innovation in, for instance, managing the costs of feeding and improving chick survival Case studies can indicate the extent to which capacity in problem-solving skills has been built by tracking numbers or examples of problems solved, and keeping records
3rd level When members: ... see a decrease in poultry mortality and an increase in poultry production associated with both increased sales and increased household consumption, especially in the most vulnerable households ... sustain vaccination activities with their own budgets, use anthelminthics and, if necessary, antibiotics responsibly, provide appropriate poultry housing and implement individual and community-based biosecurity plans ... consistently reach the targets set for marketing by selling birds or eggs swiftly without having to return unsold birds or eggs to the farm ... are members of a cooperative or farmer association; enter into contractual arrangements with service providers (such as feed mills) or aggregators/processors ... qualify for the microfinance services such as those offered by banks ... have access to credit facilities created by the FFS, and are contributing to corporate social responsibility by, for example, supporting the less fortunate such as orphans and sick and elderly people, or undertaking social enterprises that have a social benefit in the community	In-depth interviews reveal changes in quality of life (wellness, sense of belonging, time available for positive endeavours, access to health services, education, nutrition, children's education, etc.) Empowerment of farmers enables them to express their opinions through, for example, public speaking Members may develop an interest in complex subjects, such as selective breeding, which need a learning cycle of at least 24 months Human capital is developed. The group offers skilled labour in aspects such as construction of poultry housing, feed equipment and feed formulation, which private individuals can benefit from when they visit the FFS and learn about its successes in income generation and good biosecurity practices Members question existing norms/habits New norms and habits are adopted (such as new roles for women and new technology)

2.2.4 Funding mechanisms for farmer field school activities

Funds and materials can be channelled to FFS through: i) direct funding in which a project advance is paid into a bank account operated by the FFS and the funds are then managed by FFS members (as is the case mainly in eastern and southern Africa); and ii) delivery-based funding in which the project office procures all learning materials and pays allowances to the FFS facilitators.

! A delay between the grant application and fund allocation might discourage participants. If there is such a delay, as facilitator you could promote low-cost or income-generating activities to maintain unity within the group until the funds arrive (Groeneweg *et al.*, 2006).

Table 9. Advantages and disadvantages of FFS funding mechanisms

Direct funding	Delivery-based funding
Advantages	
Reduces project management costs. • Develops the capacity of each group member to manage a bank account and funds; skills that can be used for income generation activities after graduation • Improves the performance of the facilitator, who becomes directly accountable to the group rather than to project supervisors	Bulk procurement reduces overall costs and helps to ensure that procurement rules are followed
Disadvantages	
	• Requires sufficient administration, for management, planning and logistics • May result in delayed delivery of learning material, resulting in some FFS becoming idle

Note. In some projects, a hybrid mechanism is used: Some inputs are funded directly by the project (such as facilitation expenses) and a grant for inputs is provided to the group, depending on the problem identified and the activities to be undertaken.

Many projects have funds for only a limited number of FFS. When this is the case, facilitators should work with other stakeholders to try to get support from policy-makers, local authorities and donors. Such support can expand the FFS activities beyond the scope of the project:

- To sustain goodwill, make sure that funding partners are visible. Arrange for policy-makers to visit at key times.
- Involve politicians and the media to generate political interest.
- Write case studies and briefing notes about policy or technical issues, and document the FFS' achievements.

2.2.4.1 Self-financing

The current trend is for self-financing FFS. When groups are well-structured and well-facilitated, it is possible for the FFS to progress over time from being completely donor-financed, to partial donor-financing and on to self-financing. Examples of activities, elements and features that can help an FFS to achieve the goal of self-financing are:

- group savings;
- saving and loan schemes, which graduate into resilience funds once a degree of trust and cohesion has been developed;
- commercial group enterprises;
- volunteering and cooperation;
- borrowing from microfinance institutions;
- assessing risks;
- market-oriented farmer groups;
- negotiation (with service providers and the private sector) of better terms for inputs, better farmgate prices and advisory services.

Experiences from Uganda

From FFS grants to FFS revolving funds

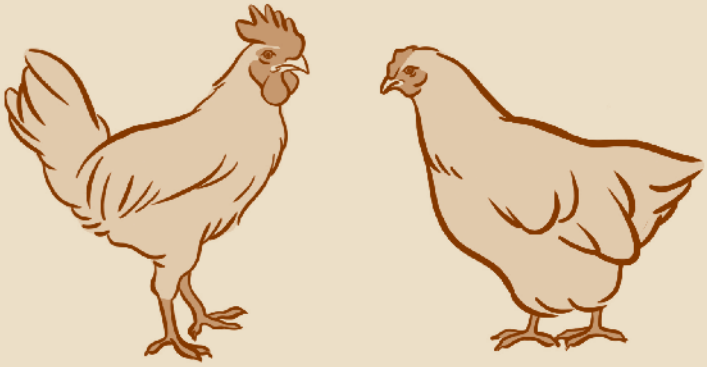
Initially a grant of USD 500–600 is provided to an FFS to cover running costs, including the logistics of training. At the end of the season, the FFS repays half of the grant to the FFS network, constituting a revolving fund. The revolving fund is used to establish and operate other semi-self-financed FFS. The FFS is thus placed in the hands of the farmers, leading to sustainability and farmer ownership of the approach. FFS have access to the revolving fund through application to the FFS network. Facilitators provide support – based on the network's guidelines – to ensure that the correct procedures are followed throughout the application process and the approval of funds. The facilitator is responsible for reviewing the proposals before funds are granted.

Resilience fund for agro-pastoral field schools

Each agro-pastoral field school that has been trained in group savings and loan schemes sets up a resilience fund. Using resilience funds, groups have been able to fund activities that reduce the vulnerability of their communities. A good example is seed/grain banks, which have been important in reducing hunger gaps, making grain readily available during lean periods, and allowing timely planting from seed banks. In cases of disease outbreak, the resilience funds have been used for stocking veterinary supplies, thus improving access to medicine.

ANNEX 1

Sample handouts for field adaptation and use



As a facilitator, you can adapt the following handouts for local use to enhance learning, particularly on special topics.

See (modules): ***Special topics (1.2.1.2.)***

Poultry farmer field schools

HANDOUT 1

The key objectives of poultry farmer field schools

- To foster the co-creation of knowledge by combining poultry producers' knowledge and experience with outside knowledge (such as scientific knowledge) that is appropriate to local conditions and the environment.
- To help poultry producers sharpen their ability to make important decisions and to learn how to make their enterprises profitable and responsive to market demand while respecting the environment.
- To help poultry producers gain knowledge, change attitudes and develop the skills needed for farming in the face of challenges such as emerging infectious diseases and climate change.
- To enable producers to increase their knowledge of the nutrition requirements of each member of their household and of how their produce can contribute to household nutrition directly (through home consumption of farm produce) and indirectly (through the sale of farm produce).

HANDOUT 2
The core principles of farmer field schools

Principle	Description
Farmer-driven	Participants develop their own curriculum; each FFS is unique in responding to local constraints with FFS practices that are adapted to the local setting. Poultry producers' local knowledge alongside science-based knowledge is used to create locally appropriate innovations
Knowledge is gained through hands-on learning	Fulfilment from ownership and confidence are developed
Focus is on developing skills and competencies rather than assimilating knowledge about new practices/technologies	Skills in and ability to observe, record, analyse and make informed decisions are developed
Animals and/or fields are the main learning tools	Animals and/or fields, viewed as a single system, are the main learning tools, rather than books, pictures or other extension materials. Learning materials are consistent with local conditions and inexpensive to develop
Facilitation is used rather than teaching	Learning is achieved through a guided process ("facilitation"), rather than teaching
Empowerment comes from collective action	Building trust and strengthening groups allows the development of critical analysis skills; feedback and evaluation skills; planning skills; and collective action in dealing with issues such as marketing access
Meetings are carried out regularly and frequently throughout a production cycle and follow a systematic training process	Training becomes a replicable process, with regular meetings that follow an organized training process, and activities guided by a timetable

When I hear it, I forget!

When I see it, I remember...

When I do it, I own it for life!

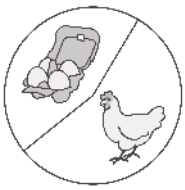
HANDOUT 3
The four principles of poultry farmer field schools

1. Raise healthy chickens

- The poultry raised should be healthy and provided with adequate health care.
- Birds should be suited to local conditions.
- If you are producing chickens, arrange for all the birds to be vaccinated against Newcastle disease; especially in intensified production systems, birds also have to be vaccinated against other diseases that are important in the area.
- Housing and feeding must be suited to the birds' needs.
- In semi-intensified and extensive systems, birds should have access to clean, dry runs with a wide range of natural food sources (plants, insects, animals), feed supplementation and fresh water.

2. Observe poultry regularly

Agro-ecosystem analysis (AESA) helps poultry producers to understand the relations among birds' growth, weight and yield, pests and diseases, and water and feed availability. This enables timely decisions for better health, production and consumption or sales of birds or eggs.



3. Assess local marketing opportunities and tailor the production system accordingly

Successful commercial enterprises operate in accordance with market demand. Producers should plan the timing, the type of produce (for example, eggs or meat from commercial or indigenous breeds) and the quantity of production that meet the needs of their target markets.

4. Poultry producers become experts in their own production system or field

As producers experiment and adapt, they become local experts on the subjects under study and are able to support and advise other farmers. They can become important actors in the family poultry value chain – as local feed mixers, egg suppliers, community vaccinators, etc.

HANDOUT 4
Why hold poultry farmer field schools?

The FFS approach is a valuable tool for building sustainable poultry production systems that contribute to rural and agricultural development. That is because poultry FFS:

- *empower participants to be ready to solve the challenges that threaten their livelihoods* – in FFS, family poultry producers learn to test, adapt and validate good agricultural and marketing practices;
- *help family poultry producers to gain the confidence needed to improve or upgrade their production systems* – in FFS, producers are enabled either to make changes that improve their knowledge and skills, and hence productivity and marketing in their production system, or to change their production system to one that better matches their circumstances and aspirations;
- *often require less time and resources than FFS with other livestock species* – poultry offers several benefits such as its high turnover rate, which allows rapid exposure of FFS members to the production and marketing process, providing valuable experience in financial management and learning processes;
- *facilitate changes in practices by combining hands-on learning and adaptation* – small-scale farmers frequently manage complex, integrated production systems and need to be sure that new practices are likely to be beneficial prior to committing time and resources to changing the way in which they farm;
- *are an opportunity for starting or strengthening associations and marketing groups* – learning in groups can lead to an environment of trust, and subsequently to the formation of successful stable groups that help to build and improve access to credit for farmers and to reduce transaction costs (through the organization of saving clubs, savings and credit unions, etc.);
- *serve as a platform for developing new or strengthened networks among producers, local institutions, service and input providers and researchers;*
- *strengthen links between producers and veterinary services, and facilitate access to treatment, advice and information on disease prevention and control* – the FFS makes this possible by serving as a platform where different actors can communicate and learn to trust each other; a poultry FFS can also act as a network for animal disease surveillance, early warning and response;
- *have shown themselves to be effective vehicles for women's empowerment and gender equity* – FFS activities can lead to beneficial improvements in household gender dynamics and decision-making;
- *promote diversification of livelihoods and can be used to introduce poultry in communities that do not yet keep poultry* – although poultry FFS are usually implemented to support established poultry producers, they can also help introduce poultry as a new income-generating activity for households with no previous experience of poultry husbandry.

Family poultry production systems

HANDOUT 5

Advantages and disadvantages of extensive and intensified family poultry production systems

There are advantages and disadvantages with all production systems: what is important is that farmers choose the system that works best for them under their circumstances.

ADVANTAGES	
Extensive	**Intensified**
• Low labour requirements • Low financial investment (for example, minimal feed requirements, low-cost shelter) • Birds consume mainly feed that is not suitable for human consumption, or household leftovers • Indigenous breeds are adapted to extensive conditions; readily available in rural areas; required for ceremonial purposes in many locations; more resistant to diseases; and capable of reproduction, reducing the need for external inputs of day-old chicks and pullets • Birds provide manure for composting • Birds assist with insect control • High benefit–cost ratio per bird • Low feed costs due to use of scavenging feed resource base • Fit well into mixed farming businesses • Indigenous birds and eggs frequently command higher market prices • Sales can be delayed in case of unfavourable market conditions • Women and children more likely to have some control over production benefits	• Higher productivity when operating adequately • Production cycles can be increased and timed to meet peak market demand • Biosecurity can be more easily enforced at the production unit level if adequately resourced • Higher income per bird at the flock level and higher return on investment when operating adequately

DISADVANTAGES	
Extensive	**Intensified**
• Lower egg and meat productivity under scavenging conditions • Losses linked to free-range conditions, such as predation, theft and disease • Higher-producing breeds cannot be used because of high mortality • Environmental contamination from manure may lead to diarrhoea, especially in infants • Biosecurity measures require community-level agreement and compliance	• High input and initial investment costs, for example for feed, medicines and shelter • Heavy reliance on high-quality external inputs (such as day-old chicks, pullets, feed and medicines), which can be difficult to obtain • Higher stocking density can be detrimental to birds' health and welfare • Varying feed costs and quality can affect the profitability of the business • High labour requirements • Need for waste disposal • Need to reduce air pollution (such as ammonia gas) in the micro-environment, especially with high stocking density and low ventilation • Women and children less likely to have control over production benefits • Frequently competes with humans for feed such as maize and soybeans • Vulnerable to price fluctuations and other shocks, especially in the absence of a well-developed value chain

Note. The information provided in this table is a guideline and may vary among locations.

Source: Adapted from Ahlers *et al.*, 2009.

HANDOUT 6

Differences in flock health management between extensive and intensified chicken production systems

The key management inputs for extensive and intensified poultry production systems and the potential advantages and disadvantages associated with each are outlined in the following table.

EXTENSIVE	INTENSIFIED
Advantages	
• Local breeds are adapted to harsh conditions. They resist disease and poor husbandry conditions much better than breeds used for intensified production • Scavenging chickens are free to choose their feed (if there is enough) and to escape difficult conditions. As a result, the consequences of poor husbandry and nutrition are not as severe as in intensified production systems • An extensive, indigenous chicken flock consists of birds of various age groups. As some diseases affect only certain age groups, the effect of these diseases will not be as devastating as in flocks where all birds are the same age • Few veterinary inputs are required	• All-in, all-out system (with all the birds in a flock bought and sold at the same time) allows thorough cleaning and disinfection before the introduction of new birds. Proper cleaning and disinfection guarantee good conditions for the new flock • Hygiene measures (such as limited contact with other birds, people, animals or equipment that might transmit an infectious disease) are relatively easy to implement • Veterinary interventions such as vaccination or application of commercial drugs are easier to conduct when birds are confined
Disadvantages	
• There are almost always birds in the flock that could transmit an infectious agent to newly introduced birds (unlike in the all-in, all-out system) • Under scavenging conditions, it is difficult to avoid chickens' contact with other birds, people, animals or equipment that might transmit an infectious disease • Free-range chickens without supplementary feeding will suffer when the scavenging feed resource base is low (because of the season or because there are too many chickens) and consequently can have poor health	• Commercial breeds with high productivity are less resistant to disease than indigenous breeds • Commercial flocks require comprehensive vaccination programmes and regular veterinary observation to ensure efficient production • Birds kept in intensified production systems rely completely on balanced nutrition, good housing conditions and veterinary care. If any mistake is made, the health of all the birds will suffer • As all the birds in the flock are the same age and should be in the same condition, any outbreak of disease will affect them all • Infectious diseases spread faster in large, dense flocks

Source: Ahlers *et al.*, 2009.

HANDOUT 7
Differences between indigenous and commercial chicken breeds

The key difference in production and management between commercial and indigenous breeds of chickens are outlined in the following.

FACTOR	INDIGENOUS CHICKENS	COMMERCIAL CHICKENS
Labour inputs	Minimal	Considerable
Housing	Trees; chicken houses of local materials; inexpensive	Chicken units using conventional materials; expensive
Nutrition	Scavenging feed resource base, leftover food, cereals; no supplements; inexpensive	Balanced commercial or locally produced ration; expensive
Water	Well water, used water, natural sources	Clean water supplies are essential
Production	Low: could improve with better nutrition, disease control and shelter	High, but requires high level of inputs
Meat quality	Little fat; pleasant flavour; tough texture	Broilers have more fat; less flavour; softer texture
Adaptability	Good: good flight skills; more likely to escape predators; can scavenge for feed	Limited: poor flight skills; easily caught by predators; less skilled at scavenging
Reproduction	Good hatching and mothering ability; hens lay, brood, hatch and look after young	Poor hatching and mothering ability; hens often do not go broody; new birds are bought to replace old birds
Veterinary inputs	Very limited: Newcastle disease vaccination	Control of many viral, bacterial and parasitic diseases essential for efficient production
Environmental impact	Minimal: can be positive through provision of organic fertilizer and pest control	Negative: intensified production of cereals for rations; occasional improper use of antibiotics; excess ammonia production

Source: Ahlers *et al.*, 2009.

Animal and human health

HANDOUT 8
What is Newcastle disease and what can be done to control it?

Cause and impact

Newcastle disease (ND) is caused by a virus that occurs in a range of types of widely variable strength. Some strains of the virus will cause very few deaths in chickens, while other strains may cause many deaths. For example, a farmer who has ten chickens may have variable bird mortality depending on the type of ND virus.

Strength of ND virus	Potential number of deaths
Weak	1 out of 10 chickens
Moderately strong	5 out of 10 chickens
Very strong	All the chickens

Source: Alders *et al.*, 2002.

Preventing ND is one of the most cost-effective management practices that can be implemented in countries where the disease is regularly found or endemic.

Transmission

ND is very contagious, meaning that it can spread very easily from one chicken to another. The ND virus is passed in the bird's droppings, breath and any discharge from its eyes or nose.

Although the ND virus can be destroyed quickly at temperatures above 8 °C, it may survive for several months inside clumps of bird droppings.

Species affected

As well as chickens, domestic poultry such as turkeys, guinea fowl and pigeons may be affected by ND. Ducks are usually resistant to the disease, but ducklings may occasionally be affected. Wild birds can also carry the ND virus.

Clinical signs

After contact with the ND virus, it usually takes three to five days for unprotected birds to show signs of illness. Sometimes, illness may occur within two days, while at other times it may take up to 15 days for clinical signs to appear.

Signs of ND vary considerably according to the type of ND virus involved, the species, age and immune status of the bird, and environmental conditions. As a result, no signs are unique to ND. Chickens infected with strong (virulent) ND virus strains may die before any signs of illness are seen.

Signs of illness may include one or more of the following:

- The chicken fluffs its feathers and appears to "have its coat dragging on the ground".
- The chicken looks sleepy and does not eat.
- The chicken has slight difficulty breathing.
- There is severe respiratory distress and gasping.
- Egg production decreases markedly. Sometimes deformed eggs are produced.
- When the disease is advanced, nervous signs such as shaking, torticollis, convulsions and paralysis of the wings and legs may be seen.
- Mortality may be very high, often reaching 50–100 percent.
- The head and neck are swollen.
- There is greenish diarrhoea.

Controlling Newcastle disease

There is no known cure for ND and it cannot be controlled without vaccination. Vaccination should be accompanied by good hygiene and other general husbandry measures.

ND control combined with improved husbandry is often the most cost-effective means of improving family poultry production.

Several different vaccines have been developed to prevent ND. It is advisable to research the types of ND vaccine available in your area. Key characteristics of the vaccine and its supplier on which farmers should focus include the following:

- How is the vaccine administered, for example, via water, eye drops, spray or injection?
- Is the expiry date on the vaccine still in the future?
- How should the vaccine be stored and transported? Most ND vaccines should be stored at between 2 and 8 °C. Some (thermo-tolerant vaccines) can be held at higher temperatures for short periods.
- Does the supplier have a reliable cold chain for storing the vaccine correctly?
- What age of chickens can the vaccine be administered to? Some vaccines can only be given to older birds or after the administration of a mild primary vaccine.

Key messages

- Ensure that the vaccine is *stored and transported correctly* and not exposed to direct sunlight.
- The vaccine will *protect against ND only*.
- Vaccinate only healthy chickens. *Do not vaccinate sick chickens.* The vaccine is meant for prevention not treatment.
- *Chickens can be eaten safely immediately after vaccination with live ND vaccine.*
- It takes at least *7 to 14 days for a chicken to develop adequate protection against ND after vaccination.*
- Chickens should be *re-vaccinated at the interval recommended by the vaccine manufacturer,* as the level of protection starts to fall after this period.
- Although rare, use of *live ND vaccines may cause transient mild conjunctivitis in humans* if the vaccine enters their eyes. Therefore, care must be taken when using this vaccine.

Problems after vaccination against Newcastle disease

- Most ND vaccines do not harm chickens but some strong vaccines (such as the M strain) can make chickens sick and some may die if they have not previously been vaccinated with a mild strain.
- Vaccines administered by injection can sometimes cause injury if the needle enters the wrong area.
- ND vaccine will not prevent mortality caused by diseases such as highly pathogenic avian influenza, fowl cholera or Gumboro disease. Significant mortality in vaccinated birds should always be reported to the local veterinary authority.

HANDOUT 9

Key actions that farmers can take to ensure that antimicrobials continue to function and that animals and the community remain healthy

Antimicrobial drugs play a critical role in the treatment of diseases, their use is essential in protecting both human and animal health. However, misuse of antimicrobials is leading to the development of resistant bacteria that are no longer susceptible to common antibiotics.

The following are the top ten actions that can be implemented by farmers to keep animals and people healthy and antimicrobials functioning.

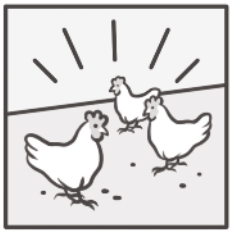
1 Clean frequently to get rid of the germs that make animals and people sick. Remember to *wash your hands, shoes, and clothing thoroughly* before and after contact with animals.

2 *Keep animal housing and the outside areas that animals use clean* by clearing away manure and litter frequently. Waste from animals that have been given antimicrobials needs to be handled particularly carefully.

3 *Reduce the risk of spreading germs.* Control who comes into contact with your animals and clean farm equipment regularly. When an animal becomes sick, separate it from the others to help prevent the infection from spreading.

4 *Practice the all-in, all-out system* when you are raising animals intensively, *or isolate new animals* for at least seven days when raising animals extensively. This will reduce the risk of new animals infecting the animals you already have. Clean, disinfect and rest animal housing before new animals are introduced. In intensified production, breed animals at the same time, wean animals at the same time, and keep these groups of animals together at all stages of production.

5 *Keep animal feed dry and store it safely* away from potential sources of germs such as rodents, birds, insects and other animals.



6 *Avoid stress for your animals.* Keep them comfortable and dry and make sure that they have enough space. If possible, let young animals feed from their mothers before weaning because this helps to prevent infections.

7 *Help your animals to stay healthy* and avoid becoming sick by ensuring that they have good nutrition. Keep animals healthy by making sure that their water is clean.

8 *Vaccinate!* Ask your veterinary expert to help you administer important vaccines at the right times because prevention is better than cure.

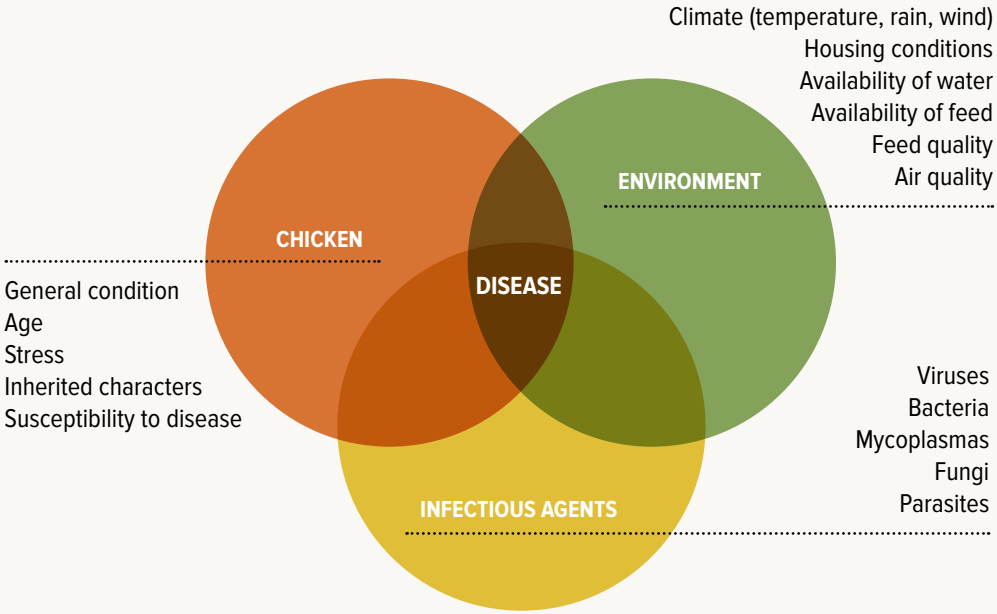
9 *Seek veterinary expert advice for correct diagnosis and treatment* because buying and using the wrong treatment puts the health of you, your animals and your family at risk. Using the wrong antimicrobials is a waste of time and money.

10 *Spread the word, not the germs!* Tell other farmers what you have learned because everyone needs to work together for cleaner farming that protects animal health, livelihoods and the health of all the people who depend on antimicrobials working when needed.

Source: Adapted from FAO, 2018.

HANDOUT 10
Factors influencing the health status of birds

The occurrence of disease is determined by the interactions among the environment, the animal and disease agents such as bacteria, viruses and parasites.



HANDOUT 11
Safe disposal of sick birds or birds that have died of disease

Diseases that cause illness and death in poultry can also cause illness and death in people.

If you have birds that have died of disease or are looking sick, it is important that they are not eaten. Sick birds should be slaughtered and disposed of, along with any dead birds.

Burying diseased carcasses is often the best option:

1. Select the burial site carefully taking care that surface and groundwater near wells and boreholes will not be contaminated.
2. Place the carcasses in a pit, cover with a thin layer of soil, then sprinkle lime or wood ash over them and cover completely with at least 1 m of soil or heavy stones, to discourage scavengers.
3. Once the pit has been covered with soil, wash your hands thoroughly with soap and water or rub them with wood ash.

If possible, wear gloves or plastic bags on your hands when handling the carcasses. The gloves or plastic bags should be disposed of after all the carcasses have been placed in the pit.

HANDOUT 12
Safe poultry slaughtering and cooking practices

If the FFS group plans to produce and slaughter a large number of birds, consideration should be given to constructing a small-scale abattoir.

This handout is relevant to the slaughtering of small numbers of birds.

Sick, dying or dead birds should *not* be consumed. They should be buried in a deep pit away from water sources and beyond the reach of predators. Consume only healthy birds from healthy flocks. As apparently healthy birds may be incubating a disease, and to improve food safety in general, the following precautions should also be taken.

See (annex). ***Handout 11. Safe disposal of sick birds or birds that died of disease (Annex 1)***

Slaughter procedure

- Remove food and water from the birds 8 to 12 hours prior to the expected time of slaughter.
- Slaughter the bird humanely in a well-ventilated area, preferably outside in a location that can be cleaned easily.
- The bird should be bled out between 30 seconds and 1 minute from when the main blood vessels in the neck are cut.
- Slaughtered birds should be placed in scalding water (70 °C – when steam is rising from the hot water but before it boils) for a minute before their feathers are plucked or burnt off in a fire. Scalding will kill germs on the outside of the bird and make it easier to remove (pluck) the feathers.

Keep clean when cooking

- Wash your hands with soap before handling food and again (frequently) during food preparation.
- Wash your hands thoroughly with soap after handling poultry meat.
- Wash and sanitize all work surfaces and instruments used to prepare meat for cooking.
- Protect kitchen areas and food from insects, pests and other animals.

Separate raw and cooked food

- Separate raw meat, poultry and seafood from other foods.
- Use separate equipment and utensils, such as knives and cutting boards, for handling raw foods.
- Store food in containers to avoid contact between raw and prepared foods.

Source: Adapted from Ahlers *et al.*, 2009.

HANDOUT 13
Signs that poultry meat and eggs are safe to eat

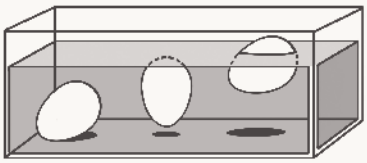
How to tell if an egg is suitable for cooking

Eggs with broken shells should be used immediately and consumed only after they have been cooked for some time (hard boiled, fried or well cooked as part of a meal).

How to distinguish fresh eggs from old, bad eggs

Whole eggs

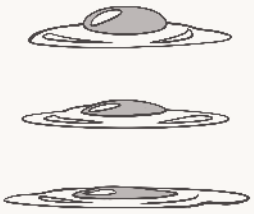
Place eggs in a container of water. Old eggs, which may be bad and which should not be eaten, will float in the water because a bubble-like chamber of air (the air cell) inside the egg becomes bigger as the egg ages. This air chamber is smaller in fresh eggs, which will therefore stay at the bottom of the container filled with water.



Fresh eggs sink lower (sometimes to the bottom of the container) in water (left of illustration), older eggs sit higher in the water (right of illustration)

Open eggs

Fresh eggs can also be distinguished from old ones by the height of the albumen (the white or clear part of the egg) when a raw egg is opened and put on a dish, the albumen of fresh eggs remains high (maybe half as high as the egg yolk). In older eggs the albumen becomes watery and lies flat on the plate; the egg yolk is also flatter.



Cook food thoroughly

- Cook poultry meat, eggs and blood thoroughly.
- Foods such as soups and stews should reach boiling point. For meat and poultry, make sure that juices run clear, not pink. Eggs should be hard boiled or cooked so that they are no longer liquid.

Source: Ahlers *et al.*, 2009.

HANDOUT 14
Nutritional benefits of consuming poultry meat and eggs

Good nutrition is important for good health. Eating good-quality and sufficient quantities of food is very important for the health of all family members. The food people eat is composed of substances called nutrients that help the body to function properly.

Eating a wide variety of foods, from both plants and animals, provides the best opportunity for children to grow and develop, pregnant and breastfeeding women to be healthy and support their child's growth, and people of all ages to be strong and healthy.

- ***Eggs*** are a very good food for children, especially when they first start to consume solid food. The egg is an almost perfect source of nutrients as it contains concentrated energy in the yolk, high-quality protein, vitamins and minerals.
- ***Poultry meat*** is a good source of protein, vitamins and minerals that help people to grow and be healthy and strong.
- ***Poultry offal*** such as liver is an excellent source of iron, zinc and vitamin A. It can help people suffering from anaemia.

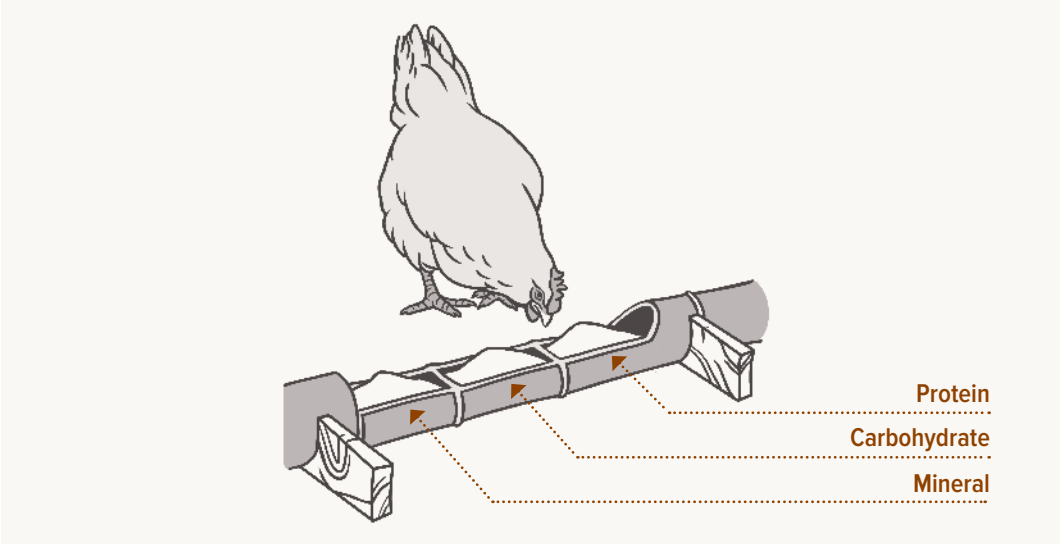
Extensive family poultry systems

HANDOUT 15
How to provide supplementary feed

- *Provide fresh feed daily* rather than in a big heap for the chickens to eat over several days.
- *Offer feed in troughs* to avoid mixing with soil, which spoils and contaminates valuable feed. The feeder should prevent the chickens from stepping into the feed.
- *Provide clean feeders.* Remove old feed daily and clean the feeder before refilling. Feed should never be allowed to become mouldy or rotten. Mouldy feeds can cause illness and death of chickens.
- *Avoid contamination of feedstuff with faeces* because many diseases are spread via droppings.
- *Always offer feed at the same location* so that the chickens get to know where it is. The feeding site should not be easily accessible to predators.
- *Roast and crush any eggshells provided to the birds,* so that they do not recognize them as part of an egg. Otherwise, they might start eating eggs from nests.
- *For chicks, grind feeds such as cereals and beans and some of the minerals provided.* Ensure that the pieces are small enough to be easily swallowed (but not so fine as to be powdery).
- *For chicks, leaves and hard-boiled eggs should be finely chopped.* Chicks have a very limited capacity to ingest and digest high-fibre feedstuffs.
- *Implement procedures that may improve the nutritional value and/or digestibility of certain feeds.* For example, beans or peas should be kept moist in a covered container and allowed to germinate before feeding them to chicks. Cereal grains can be soaked in water overnight to improve their digestibility. As such materials can become mouldy, it should be ensured that the chickens eat them as soon as they are offered.

HANDOUT 16
How to provide supplementary feed via the cafeteria approach

In the "cafeteria" approach, feeds that are sources of proteins, carbohydrates or minerals are provided in separate containers so that birds can choose the type of feed that they most need.



Bamboo can be used to make a feed container for providing proteins, carbohydrates and minerals in a cafeteria style

The nutrients available in the feed that birds can find in their environment while scavenging (plants, insects, animals) usually vary from season to season and the cafeteria system allows birds to choose the supplementary feed that they need to achieve a balanced diet.

It is desirable to provide the feedstuffs in the approximate proportions in which they are required. To optimize this approach, the approximate composition of the feed available in the environment needs to be known (for example, is it energy- or protein-deficient?) as do the composition and palatability of the feedstuffs provided. Examples of common sources of protein, carbohydrate and minerals suitable for consumption by poultry are listed in the following table.

Proteins	Carbohydrates	Minerals
Beans	Barley	Bones
Insects and insect larvae	Maize	Chicken eggshells (boiled and crushed)
Lupins	Millet	Fish
Sunflower seeds	Sorghum	Insects and insect larvae
Worms	Wheat	Snail shells

Where the protein supplement on offer is both reasonably palatable and well balanced in terms of amino acids, it should be sufficient to provide a grain (wheat or maize), the protein supplement and a source of calcium. Calcium is particularly important for laying hens and growing chicks.

HANDOUT 17
The characteristics of good waterers

Waterers should be:

- ***not too high***, so that all age groups can drink without risk of drowning;
- ***not too large***, to avoid contamination with droppings (and ducks bathing in it);
- ***not easy to tip over***, for example, it should have a flat bottom and vertical sides;
- ***cleaned and refilled daily,*** or more frequently if it becomes dirty during the day;
- ***always kept in the same place*** so that the chickens get used to it (helpful in case of the need to add medication via the water);
- ***placed where the chickens will be at least risk of attack from predators***.

Waterers for young chicks should have a lower lip of approximately the same height as the backs of the chick, so that the chicks can reach the water easily without making it dirty. *Stones should be placed on the floor of the waterer* so that the chicks will not drown if they step into it.

HANDOUT 18

How to prevent the entry of infectious disease into extensive systems

- *Clean* the chicken house, troughs and nests regularly.
- Provide *separate night housing for the various poultry species.*
- Encourage *separation among animal species and between animals and humans;* waterfowl should be separated from chickens and turkeys.
- *Clean out and dispose of manure regularly,* and preferably compost it for at least three weeks.
- *Dispose of sick and dead animals and infected materials correctly,* and clean and disinfect/decontaminate thoroughly (see below).
- *Avoid introducing into your flock new birds of unknown origin or from a sick flock.*
- *Always scrub cages, egg trays, etc. with disinfectant or detergent and allow them to dry before bringing them on to the farm.* Remember that manure, dirt, feathers, etc. prevent the disinfectant from working properly. If you do not have any disinfectant, put the items in a sealed, black plastic bag in direct sunlight for a day so that the high temperature inside the bag can inactivate disease agents.
- *Keep new birds separate from the flock for two weeks* to see whether they become sick.
- *Avoid contact between your flock and visitors, cages or animals from an area where there is a disease outbreak in poultry.*
- *Wash hands with soap* after handling birds from other flocks.
- *Vaccinate against specific diseases,* which is possible but not always practical in village conditions. Regular vaccination against Newcastle disease is the only effective way to control this disease.
- If possible and where necessary, *provide your chickens with supplementary feed to prevent diseases caused by nutrition deficiencies and to promote good health.* Well-nourished birds can better fight disease.
- *Do not buy chickens* from markets or neighbouring villages at times of the year *when outbreaks of disease such as Newcastle disease are more common.*
- *Slaughter healthy birds from healthy flocks for consumption only.* Immerse the bird carcass in boiling water for a minute before plucking the feathers. This will make the feathers easier to remove and inactivate any infectious agents on the outside of the bird.
- *If birds in your area are dying of disease, do not slaughter any birds* for consumption.

HANDOUT 19
How to control a disease outbreak in extensive systems

If you detect illness in your flock, you should take the following steps to control the spread of the disease:

- ***Separate chickens that are showing signs of illness from healthy birds.*** Sick chickens could be placed in a separate chicken house or cage as soon as you notice that they are sick and until at least seven days after they are healthy again. Always ensure that water and feed are available nearby should they wish to drink or eat. Similarly, place new stock in a cage or pen that isolates them from the main flock for at least two weeks, to ensure that they are not carrying any diseases that could be transmitted to the flock.
- ***Do not take sick chickens to another area that is free of the disease***.
- ***Slaughter very sick chickens.*** This is the best approach in such circumstances.
- ***Burn or bury dead chickens or the remains of slaughtered sick birds immediately.*** If, for any reason, the whole bird cannot be burned or buried, then all parts that remains (bones, feathers, etc.) should be burned or buried.
- ***If high losses occur in the flock, inform local livestock services.***
- ***Clean the chicken house frequently and thoroughly.*** Droppings should be removed as often as possible to avoid further spread of the disease. Wood ash or lime should be placed on the floor and walls.
- ***Do not introduce new birds into your flock if you suspect that the chickens in the flock are suffering from an infectious disease.*** Newly introduced birds may also become infected with the disease.
- ***If high losses occur in your chicken flock, slaughter all the birds and wait for some time before restocking.*** For example, if birds have died from Newcastle disease, wait 30 days after the last bird died before introducing new birds. Newcastle disease virus is inactivated after 30 days in most tropical conditions, but it can survive for up to six months in cool, damp locations. The minimum interval before restocking after an outbreak of highly pathogenic avian influenza is 21 days, provided that the poultry premises have been thoroughly cleaned and disinfected at least twice during this period. In most village conditions, however, it is advisable to wait 45–60 days.
- ***If high losses occur in the flock it is best to burn the chicken house and build a new one in a different location.*** Manure from the sick flock should also be buried in order to avoid further spread of disease.

Intensified family poultry systems

HANDOUT 20
How to prevent the entry of infectious disease into intensified production units

Disease agents and pests can be introduced to a poultry farm through the movement of eggs, birds, people, vehicles and equipment between farms, and from clothing, footwear, aerosols, water, feed, litter, wild birds, biting insects and vermin.

All small-scale intensified poultry producers should adhere to the following sanitary (biosecurity) rules, which together are a cheap and a very effective way of preventing infectious diseases:

- ***Ensure the good health status of replacement stock.*** Seek expert technical advice before purchasing birds. Birds of low or unknown health status can easily bring new diseases into a flock. Replacement stock should be sourced directly from reputable suppliers with flocks of a higher or comparable health status to your own. Farmers with flocks of high health status usually purchase certified stock from companies with quality assurance and vaccination programmes that are approved by farm management.
- ***Inspect incoming stock on arrival and place it in a shed that has been cleaned and disinfected before use.*** All-in, all-out systems are preferable for intensified production systems.
- ***Purchase litter and feed from reliable sources that implement quality assurance programmes that meet industry standards.*** Fresh litter should be used for each batch of intensively raised birds.
- ***Control access:***
  - *Visitors.* Only visitors essential to the farm's business should be permitted entry to the farm.
  - *Staff.* Employees should be aware of the risks arising from off-site contact with other birds. Unless approved by the farm owners, staff should have no contact with any other avian species and should not keep birds of any type at home.
  - *Company service personnel* who make multiple farm visits on a single day should plan visits carefully and move from sites of lower biosecurity risk (such as from their homes, from younger birds or from a healthy farm/shed) to sites of higher risk. Protective clothing must be worn (including headwear) and changed between each site/shed. Hands should be washed between sites/sheds and after handling sick birds, which – if possible – should be visited last.
  - *Traders.* There should be heightened awareness of disease control measures during the trading period.
  - *Vehicles*. All visitors should park their vehicles outside the farm. Vehicles that need to enter or come into close proximity of sheds should be cleaned and disinfected. Vehicles used to collect dead birds should not enter farms.

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- *Control the movement of staff and equipment around the farm.*
- *Provide the birds with water from sources that are known to be safe (such as deep boreholes) or are safe for human use (such as a reliably chlorinated municipal supply).* Mains supply or bore water has a relatively low risk of microbiological contamination. If such water is not available, water from rivers, reservoirs or streams may be used but should be chlorinated or treated by another water sanitation method. The addition of chlorine to the water in drinkers, at concentrations of 2–3 parts per million, or the installation of a chlorine dioxide sanitation unit are recommended. The efficiency of sanitation systems must be checked regularly.
- *Avoid contact between poultry and wild birds or any other animals, including vermin.* All housing should be designed and maintained to exclude wild birds (particularly waterfowl, pigeons and parrots) and rodents. A rodent and pest control programme must be in place. Feed and water distribution systems should be sealed to prevent contamination from wild birds, and feed spills should be cleaned up as they occur. Trees and shrubs should not be planted alongside sheds as they attract wild birds and vermin. Non-poultry bird species (ratites, pigeons, aviary birds, etc.) and pigs must not be kept on poultry farms.
- *All transport crates, containers, implements for vaccination or beak trimming, tools, sheds and shed equipment such as feeders, cages and drinkers should be cleaned and disinfected before use.* When a batch of poultry is sold, the internal surfaces of the vacated building and all equipment (including ducting, drains and fans) should be thoroughly cleaned. Damaged eggs, dead and culled birds, litter and manure should be disposed of promptly by approved methods, which will vary according to environmental compliance requirements.
- *Provide washing facilities for workers, essential visitors and vehicles prior to entry.*
- *Geographical separation of farms* can limit the risk of the spread of disease via aerosols but is not a substitute for good on-farm biosecurity. For instance, a biosecurity buffer will not protect a poorly managed flock where wild birds have free access to sheds.
- *Use a suitable vaccination programme and preventive medication programme.*
- *Place (and use) a disinfectant footbath at the entry to each shed.*
- *Use monitoring procedures* to keep a check on the disease organism status of the farm and the effectiveness of cleaning and sanitation procedures, and test the levels of immunity to selected diseases in the stock in order to assess the effectiveness of the vaccination programme.

Biosecurity is good for all poultry businesses!

Biosecurity refers to the hygiene, sanitation and management practices used to keep diseases away from poultry and to prevent the spread of disease if it occurs in a flock. Biosecurity is based on a multi-faceted health plan that includes isolation, traffic control, hygiene, mortality and manure management in addition to cleaning, disinfection and water sanitation.

HANDOUT 21
Constructing a chicken house for intensified systems

The following are some tips on how to design a relatively low-cost chicken house that is appropriate to most environments:

- *The roof should be about 3 m high at its highest point and should have a good slope to allow rain to run off.*
- *Include insulation material on the underside of the roof* to help keep the house cool during summer and warm in winter. Insulation will also lower heating costs in houses where young chicks are being brooded with artificial heat.
- *In cool climates (where average temperatures are under 22 °C) it is advisable to have a ceiling*, especially in brooder sheds, to prevent water condensation under the roof from dripping on to the floor and causing dampness that can contribute to disease.
- *The walls of the long side of the chicken house should be low (about 1 m) and topped with 13 mm chicken wire going up to the roof.* Wire netting with larger holes is cheaper but it is not as good at keeping out rats, snakes and small birds. The walls will need to be a little higher in cooler climates (1.3 m) and a little lower (0.7 m) in warmer areas. Where it is hot all year round, brick walls may not be needed at all.
- *The house should not be more than 8–10 m* wide otherwise the birds in the middle will not get sufficient fresh air.
- *A strong concrete floor is costly but it is the easiest type of floor to wash and disinfect.* If concrete is not possible, the earth floor should be compacted until it is very hard and smooth. It should also slope slightly to allow good drainage when cleaning.
- *The short sides of the house should face east and west* so that strong sunlight does not shine directly into the house.
- *Many kinds of material can be used for building poultry houses.* Visit other family poultry producers or poultry extension officers in your area to observe the materials that they have used and the types of shed that they have found successful.
- *Grass planted to about 6 m around the house helps to keep it cool in summer but must be kept short so that snakes and rats cannot hide in it*.
- *If there is more than one chicken house on the farm, it is important that the chickens in different houses are kept approximately 100 m apart* to reduce the risk of disease spreading between houses.
- *The floor should be evenly covered to a depth of 5 to 10 cm with bedding, referred to as "litter".* The litter acts as insulation from the cold floor and absorbs the moisture from manure so that the surface is always dry. The best material for litter is shavings or coarse sawdust from woods such as pine. Poisonous or treated wood should not be used. Chopped wheat straw, sunflower seed husks, chopped pine bark or river sand can also be used. Deep litter can be

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left on the floor throughout the period required to produce broilers, providing that it is dry. Wet litter should be removed and replaced with dry litter.

- ***The space available in the chicken houses determines the maximum number of birds that it should contain*** (see table).

Guidelines for the floor space required for different numbers and types of chicken raised intensively

Type of bird	Age	No. of birds per m^2
Broilers and layers	1–21 days	20–25 chicks
Broilers	4–6 weeks	10–12 birds
Layers	4–18 weeks	7–8 pullets
Layers on litter	> 18 weeks	5 hens


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HANDOUT 22
Brooding in intensified systems

A good brooding system should be able to provide the same care as a mother hen, with an appropriate amount of warmth when required, while providing chickens with the opportunity to move to cooler areas, and containing fresh water and feed formulated for young chicks. The following are some tips on raising chicks successfully:

Day-old chicks

- The person working with the chicks should not have contact with other, older chickens.
- Record-keeping is important. Record how many chicks are present at the start, how much feed they are given, when any sickness starts, whether any chicks die and what vaccinations and medications are used.
- Chicks get sick very easily, especially when stressed. They become stressed if they get wet, too hot or too cold, if they are frightened, if they do not get enough to eat or drink, or if there is any sudden change in their surroundings.
- A few chicks will die whatever you do. The loss of up to five chicks out of every 100 during the brooding period is considered acceptable. If more than six out of every 100 die in one day and other chicks are looking sick, there could be something wrong and the farmer should consult the local veterinarian or poultry adviser. Any weak or sick birds should be removed and euthanized so that they do not make other chicks sick.
- Always emphasize that farmers should purchase lively, healthy chicks of uniform size from a reliable supplier.

Days 1 and 2

- Before the chicks arrive, prepare the brooder area with a 30 cm wall and 5–10 cm of litter. The brooder area should be cleaned and disinfected between batches and rested for 30 days.
- It is best if the chicks arrive early so that they can be put in the brooder in the morning. When the chicks arrive in the brooder areas, their beaks should be put in water to encourage them to drink.
- If using electric light, keep the brooder lit for the first two days and nights. After that, it is advisable to have at least one hour of darkness every 24 hours as this prevents the chicks from crowding together if there is a sudden power failure.
- The chicks should not get too hot or too cold. When the temperature is ideal, they will be spread evenly around the brooder. If they are all close together, the brooder is too cold. If they are spread around the edge of the brooder, it is too hot.
- Make sure that there is always enough feed and water. The litter must always be kept dry to prevent the chicks from becoming wet and cold, which causes them to die.

Days 3 to 7

- Expand the brooder guard so that chicks are not too crowded. Continue to do this as the chicks grow. By days 7 to 10, the diameter of the brooder should be about 3 m for 200 chicks and about 5 m for 500 chicks.
- Slowly start making the brooder a little cooler. The chicks will need more heat at night. The temperature can be reduced by 2 to 4 °C each week as the chicks grow. The behaviour of the chicks will indicate whether the temperature is appropriate.

Weeks 2 to 3

- Remove the brooder guards after 7–10 days.
- Raise the level of feeders and drinkers and wash the drinkers daily.
- Adjust the windows or curtains according to external conditions so that the chicks get enough fresh air without becoming too hot or too cold.
- Start vaccinating according to the recommended programme.

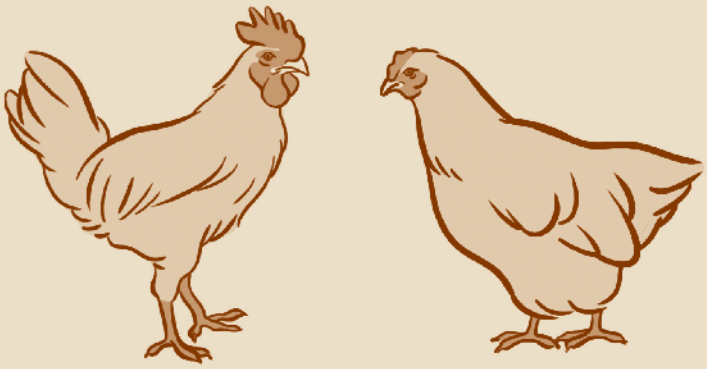
HANDOUT 23
Key aspects in the management of layers

- ***Nests should be in a dark, quiet part of the chicken house*** usually against a wall to encourage the timely laying of clean eggs.
- ***Material such as wood shavings, coarse sawdust, chopped straw or dried grass should be placed on the bottom of the nest*** to make the hen comfortable and prevent egg breakage. The nest material should be changed regularly to ensure clean eggs.
- ***Eggs should be collected at least twice a day when it is cool and at least four times a day in hot weather. They should then be kept in a cool room.***
- ***Eggs should not be stored for more than four to seven days before sale*** to ensure that customers are buying fresh, good-quality eggs.
- ***Hens should always have access to good-quality feed and clean water.*** Trying to save money by reducing the amount of feed and water provided usually leads to lower egg production.
- ***Try to avoid stress-causing factors.*** It is also advisable for farmers to identify a market where old hens can be sold quickly to ensure that the chicken house can be emptied and thoroughly cleaned before the next batch of pullets arrive.

Proper nests are an important element of egg production

ANNEX 2

Sample tools and templates for record-keeping



Income and operating costs per production cycle

Sales income

Item	Date	Units produced	Quantity used internally	Units sold	Unit sales price	Transport costs/unit	Total income
1.							
2.							
3.							
4.							
5.							
Total							

Input/material costs

Item	Date	Purchase unit	Units used	Quantity drawn from own resources	Quantity purchased	Unit cost	Transport cost	Total costs
1.								
2.								
3.								
4.								
5.								
Total								

Labour costs

Item	Date	Units used	Unit cost	Quantity drawn from own resources	Quantity purchased	Total costs
1.						
2.						
3.						
4.						
5.						
Total						

Income and operating costs per activity

To be completed for each product or activity of the poultry FFS.

Production/activity _____

Unit of production _____

Number of units of production _____

Duration of each cycle (in months) _____

Number of cycles per year _____

Income					
Item	**Unit of sale**	**Output/unit of production/cycle**	**Sale price**	**Transport cost**	**Total income per cycle**
1.					
2.					
3.					
Income per unit of production per cycle					
Income per unit of production per year					

Variable operating costs					
Input/ materials	**Unit**	**Quantity/unit of production/cycle**	**Cost per unit**	**Transport cost per unit**	**Total costs per cycle**
1.					
2.					
3.					
Costs of materials per unit of production					
Labour	**No. of people**	**Work period (day, month)**	**No. of periods per cycle**	**Cost per period**	**Total costs per cycle**
1.					
2.					
3.					
Labour cost per unit of production per cycle					
Variable cost per unit of production per cycle					
Variable cost per unit of production per year					
Income minus variable cost per unit of production per year					

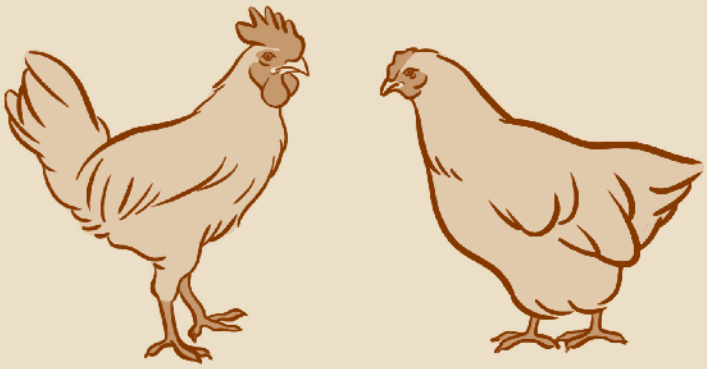
Total income and costs

Product or activity	No. of units of production	Income		Variable costs		Income minus variable costs	
		Per unit/year	Total	Per unit/year	Total	Per unit/year	Total
1.							
2.							
3.							
Total per year							

General costs	Unit (visits, months, etc.)	No. of units/year	Cost per unit	Total costs per year
1.				
2.				
3.				
Total general costs per year				

ANNEX 3

Sample tools and templates for monitoring and evaluating the poultry farmer field school



Many different methods and tools can be used for monitoring and evaluating a poultry FFS. The methods and tools should be adapted to the local context.

Monitoring the learning process

Baseline status records for individual FFS participants (extensive poultry production systems)

Name	Flock profile			Chickens sold per year	Chickens consumed per year	Chick mortality rate	Vaccination status	Estimated chicken care expenses
	Mature	Growers	Chicks					

Note: This table is useful in providing a baseline record for an FFS. When used regularly it can help in monitoring changes. This will give the FFS group a clear picture of where they are in the process of developing and improving their poultry enterprises.

Facilitators' workplan

Month	No. of days	Activity	Responsibilities	Expected output (report type)

FFS meeting checklists

Participants' attendance

	Name and surname	Attendance (mark attendance with an X)				Total
		.../... (date of the meeting)	.../...	.../...	.../...	
01						
02						
X						
Total						

Monitoring and evaluation of experiments

Comparative experiment
Title
Rationale
Objectives
Methodology
Materials
Special topics related to the experiment

Final evaluation of the comparative experiment			
Parameter	Treatment 1	Treatment 2	Treatment X
1.			
2.			
X.			
Conclusion			

Sessions on special topics

Date	Topic	Learning objectives	Facilitation method	Duration	Person responsible

Exchange visits

Date	Location	No of participants	Objective	What worked	What needs improvement

Field visits

Date	Experiment	No. of visitors			Type of participants	What worked	What needs improvement
		Total	Men	Women			

Graduation ceremony

Date	Location	No. of invitees	No. of men	No. of women

Attendees of the ceremony			
Authorities	Technical departments	Producer organizations	Communities/villages

What worked	What needs improvement

Visitors' list

Date	Name and surname	Organization	Objective of the visit	Comments on the FFS	Contact	Signature

Plan for post-FFS activities

Issue	Activity	Period	Partners	Estimated costs	Source of funding

Evaluation of participants (ballot tests)

	Name and surname	Dates and results of ballot tests			Total
		..../....	..../....	X/X	
01					
02					
X					

Evaluating the poultry farmer field school

Empowerment process report among FFS members

Examples of change	Name of member	Changes observed (use numbers)
1. Improved participation in group activities		
2. Became confident in presentation		
3. Became less shy in front of others		
4. Became more social with others		
5. Become better at self-explanation		
6. Tried new ideas by him/herself		
7. Taught what she/he had learned to others		
8. Realized own hidden talent		
9. Became respected by others		
10. Became self-disciplined		
11. Attended to other functions		
12. Started to go to a formal school/studying		
13. Obtained employment		
14. Earned more income		
15. Got more time to try other new things		
16. Diversified farm activities		

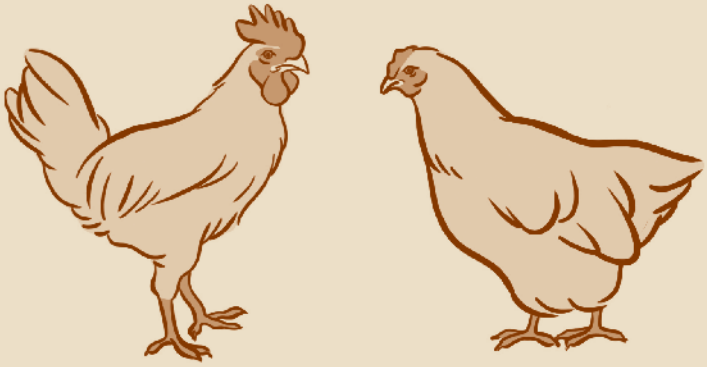
Group empowerment

Poultry FFS name	
Facilitator	
Backstopping officer	

Changes desired in the group	Changes observed (ranked)
1. New/reinforced by-law	
2. Improved time management	
3. More cohesion	
4. Full participation by all members	
5. More participation in decision-making	
6. Less dominance by group officials	
7. Improved leadership skills	
8. New group activities started	
9. Increased group funds	
10. Applied for/acquired funds/assistance	
11. More transparent fund management	
12. Improved accounting of group funds	
13. Less disparity among group members	
14. Participation in community events	
15. Increased popularity with neighbours	
16. Related to the formation of new group	
17. Saving schemes (such as tontines)	
18. Acquisition of inputs through cooperative	
19. Cooperative management skills	
20. Improved access to market (through, for example, organized sales)	

ANNEX 4

Templates for the agro-ecosystem analysis sheet and comparative experiments



Agro-ecosystem analysis sheet

The following table illustrates the components and sequence of a typical AESA sheet. As the AESA is linked to a comparative experiment, the parameters for observation and analysis vary depending on the topic under study.

See (annex): ***Annex 5. Examples of comparative experiments and agro-ecosystem analysis sheets***

Step 1. **Experiment identification information** Name of FFS: FFS subgroup name: AESA number: Title/problem being addressed: Date: Week number: Time of observation:		
Step 2. **General information**	**Step 3A.** **Parameters** Chick/flock performance	**Step 3B.** **Observations** Housing/bird behaviour and health
Step 4A. **Environmental health** Observe the useful/supportive aspects of the ecosystem: natural foods (insects and worms) in the environment – termites, mealworms, silkworms, grasshoppers, common housefly maggots, black soldier flies, cockroaches	**Step 5.** **Drawing** Draw the problem as viewed by participants	**Step 4B.** **Environmental hazards** Observe the harmful aspects of the ecosystem: lice, houseflies, nematodes, fungi, mould, predators
Step 6. **Summary of parameters and observations** List what must be corrected before the next meeting	**Step 7.** **Conclusions**	**Step 8.** **Recommendations**

Components of the AESA sheet

"Title/problem being addressed" is the objective of the experiment.

"Name of subgroup" is the group that carried out the AESA and that looks after the related experimentation unit

"AESA number" is the number of times the experiment has been monitored.

"Week number" is the number of meetings that the FFS has had.

"General information" describes the setting in which the production site is located, including:

- climatic season:
- month;
- time of observation (for the AESA);
- weather conditions;
- animal type (breed, name or tag number, date of hatching, etc.).

"Parameters" are measurable indicators of change resulting from a management practice.

Examples of parameters by stage of the birds' life cycle

Indicators to be observed and/or measured	When to measure
• Chick mortality • Growth rate • Disease incidence • Feed intake	First 21 days of chick development
• Mortality • Disease outbreaks • Period to maturity • Time to laying • Feed intake • Live weight	Growers
• Number of eggs laid • Mortality • Laying intervals • Disease incidence • Weight gain • Number of eggs set • Number of eggs hatched	Laying chickens

! If the group has many participants with low literacy levels, the AESA parameters should be listed in the form of simple drawings that reflect field conditions and observations.

"Observations": record aspects such as whether or not birds are sick and changes in the environment.

The "Drawing" illustrates what the problem looks like on the animal, plant or infrastructure. It helps to ensure that FFS participants with low levels of literacy are included in discussions of the problem observed. In some cases, specimens of the problem (insects, poisonous plants) or of useful insects/plants that are new to the group are better than drawings. Specimens should be shown to all the farmers in the group so that they can suggest ways of managing the problem.

"Recommendations" are the actions to be taken in order to improve the parameters and correct any negative observations. Implementing these recommendations is expected to result in immediate improvements in production. Recommended actions should be discussed among the participants at the end of the AESA session, and their effectiveness should be monitored from one session to the next.

Comparative experiments

This template can be used while designing comparative experiments to be implemented during a poultry FFS. The parameters and observations listed will form the basis for developing the AESA format.

Name of FFS..... **Location.....**

Learning enterprise

Poultry enterprise on which the experiment focuses.

Background information

Introduction to the issue and explanation of why it is important. Background information is based on the problems and potential solutions identified by FFS participants during the preparatory phase.

Problem: The main problem to be addressed in the experiment.

Learning objective

The overall objective of the experiment.

Experimentation constant/uniform situation

The conditions/variables that must be the same for all the treatments.

Trial description and treatments

Average number of birds in the experimentation area: This value has to reflect the average number of birds per poultry house/flock in the same type of production system in the location of the FFS.

Average stocking density (only for intensified systems): This value has to reflect the average stocking density per poultry house in the same type of production system in the location of the FFS.

Number of birds for every treatment and replication: The same number of birds have to be used in each treatment and replication, but different individual birds should be used for each.

Number of treatments: The number of practices/technologies that are assessed, including the control group (if there is one).

Number of replications/cycles: The number of times the trial is carried out.

Trial design: Description of the different treatments assessed in the experiment.

Key requirements

All the production inputs that are necessary for carrying out the experiment.

Parameters/observations

The parameters/observations that are analysed and recorded during the AESA exercise.

Parameters: The parameters to be measured in order to compare the different treatments.

Observations: General observations on the flock and its environment and health.

Duration

The total duration of the experiment (all replications/cycles).

Evaluation

The questions that have to be asked in order to analyse the data recorded in the AESA and define conclusions and recommendations.

The recommendations can be shared with other FFS groups and the community at large during field days or the FFS graduation event.

Notes

Remarks on the aspects to be considered during implementation of the experiment.

Expected outcomes

What the experiment is expected to achieve in terms of animal production and health and improvements in households' livelihoods and resilience.

Learning curriculum/schedule

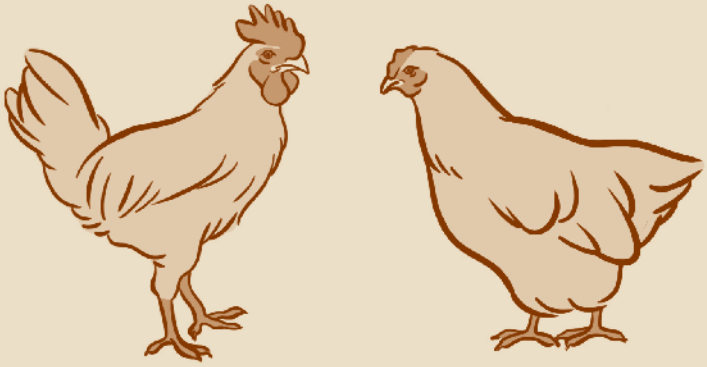
The activities related to the experiment that are to be undertaken during the FFS meeting. The responsibilities and requirements for each meeting should also be noted.

This learning curriculum/schedule for the experiment forms the basis of the overall learning curriculum/schedule of the poultry FFS. Socioeconomic special topics are added according to demand.

Week	Host team	Activity	Requirements	Targets/remarks

ANNEX 5

Examples of comparative experiments and agro-ecosystem analysis sheets



This annex provides some examples of comparative experiments that can be carried out in poultry FFS. The experiments – including the related parameters, materials and observations – and the AESA sheets have to be adapted to local needs and conditions.

EXPERIMENT 1
Supplementary feeding in extensive systems

Name of FFS.....

Location.....

Learning enterprise

Feeding regimes for extensive systems.

Background information

In low-input extensive poultry production systems, chickens are free-range and scavenge for feed during the day. At certain times of year, the scavenging feed resource base is deficient in protein-rich feeds, while at others energy-rich feeds may be lacking. Supplementary feeding can be used to increase the productivity of scavenging village chickens and to assist them when the scavenging feed resource base is insufficient to allow the whole flock to thrive.

Problem: The growth rates and slaughter weights of chickens are very low and vary throughout the seasons.

See (modules): ***Poultry diets (2.1.4)*** *and* ***Feed and water (2.1.8.1)***

Learning objective

To assess the effect of supplemented and non-supplemented feeding regimes on the health, growth and economics of extensive poultry production enterprises.

Experimentation constant/uniform situation

- Biosecurity conditions and disease prevention measures (including vaccination) remain the same throughout the experiment.
- Environmental conditions remain the same.
- Chicks or growers are of similar age and from the same source.
- For the first three weeks, birds are fed the same feed according to recommended rations.

Trial description and treatments

Number of birds in scavenging poultry flocks in the experimentation area: for example, 50

Number of birds included in each treatment and replication: for example, 5

Number of treatments: 2

Number of replications: 2

Trial design

- *Treatment A:* Birds without supplementation (no investment in feed and feeding equipment)
- Treatment B: Birds with supplementation (investments in feed and feeding equipment)

During the first two weeks of the experiment give all the birds the same feed and then separate them into experimental groups with different feeding regimes.

Key requirements

- Day-old chicks/growers.
- Vaccines for routine vaccination against endemic diseases.
- Source of good-quality supplementary feed.
- Multivitamins.
- Watering equipment.
- Feeders for cafeteria feeding.
- Poultry housing.
- Brooder.
- Weighing scale.
- Essential poultry drugs.

Parameters/observations

Parameters

- Age of birds.
- Weight of birds.
- Slaughter age.
- Quantity of feed consumed.
- Cost of feed.

Observations

- Feeding behaviour.
- Poultry manure (colour, texture).
- General behaviour of chickens (dull, bright).
- General health and body condition (crown colour, discharges, swellings, coughs).
- Condition of house and feeding equipment.
- Feed storage and quality.
- Number of birds that died.

Duration

32 weeks.

Evaluation

Analyse the results in the two feeding regimes as reflected in the learning data collected throughout the production cycle (from the AESA sheets) and define conclusions and recommendations based on the following questions:

- Did supplementation increase the growth of the birds?
- Did supplementation reduce the time to maturity (faster growth)?
- Did supplementation result in better health for the birds?
- Was supplementation cost-effective or was it too costly?
- Are materials for the supplementation available locally and can they be prepared on the farm to reduce costs further?
- Compare the two feeding regimes and make recommendations of actions to be taken.

Notes

Monitor the value of the chickens that are consumed, sold, used in cultural events, or die.

Expected outcomes

- The potential of the selected chicken types to gain weight is demonstrated.
- Chicken types with efficient scavenging behaviour are identified and promoted.
- Investment in structures that allow the separation of flocks according to age for better feeding management.
- A production strategy is developed under which each FFS participant sets targets for the number of chickens to be reared within a certain period. The whole FFS can work towards meeting the demands of a specific market.
- Farmers buy or plant grain crops to supplement chicken diets.
- The sorting and grading of grains to be used in a mixture for chicken supplementation are promoted.

Learning curriculum/schedule

Week	Host team	Activity	Requirements	Targets/remarks
1	Group 1	• Planning and assignment of responsibilities • Preparation of the weekly learning timetable • Purchase of inputs • Preparation/construction of the housing unit (separation of pens and materials for a brooder) • Special topic: brooding and brooder management • Sourcing of chicks	• Funds for purchasing inputs • Housing unit • Heat source for the brooder	• All requirements purchased and heat source for brooder tested • Invite specialist in the special topic (at least a week in advance) • Obtain materials locally, where possible

Week	Host team	Activity	Requirements	Targets/remarks
2	Group 2	• Stocking • Weighing of chicks • Demonstration of brooder construction	• Local improved chicks • Thermometer • Chick waterers and feeders • Weighing scale • Roll call register and record book	• All birds raised in one brooder • Invite specialist in the special topic (at least a week in advance)
3	Group 3	• Demonstration of how to undertake AESA and record data • Special topic: disease control and management in poultry	• Feed • Disinfectants • Vaccines • AESA template • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in the special topic (at least a week in advance)
4	Group 1	• AESA	• Feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
5	Group 2	• AESA • Separation of chicks into groups for the different trial options/ treatments	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
6	Group 3	• AESA • Special topic: parasites (internal and external), vermin and their control	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in the special topic (at least a week in advance)
7	Group 1	• AESA	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
8	Group 2	• AESA • Special topic: poultry production and climate change	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in the special topic (at least a week in advance)
9	Group 3	• AESA	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	

Week	Host team	Activity	Requirements	Targets/remarks
10	Group 1	• AESA	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
11	Group 2	• AESA • Special topic: poultry housing and hygiene	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in the special topic (at least a week in advance)
12	Group 3	• AESA	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
13	Group 1	• AESA	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
14	Group 2	• AESA • Special topic: marketing of poultry and poultry products	• Commercial supplementary feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in the special topic (at least a week in advance)
15	Group 3	• Market survey for birds produced by FFS group	• Commercial supplementary feed • Visit to market • Flipcharts and markers • Weighing scale • Roll call register and record book	• Engage with local authorities for visit to markets
16	All groups – facilitator-led	• Preparation of AESA records for final analysis • Cost–benefit analysis • Cleaning and disinfection for replication	• All AESA records • Receipts for feed purchases • Records of bird sales	

Note: The trial is repeated with different special topics, an exchange visit and a field day combined with graduation. The results of all the replications are analysed.

AESA sheet

<table>
<tr><td colspan="3">Step 1.
Experiment identification information
Name of FFS:
FFS subgroup name:
AESA number:

Title/problem being addressed:

Date:
Week number:
Time of observation:</td></tr>
<tr><td>Step 2.
General information
Flock name
Season
Weather
Housing
Local breed/ecotype
Vaccinations (date and types)</td><td>Step 3A.
Parameters
Age of birds
Weight of birds
Slaughter age
Quantity of feed consumed
Cost of feed</td><td>Step 3B.
Observations
Feeding behaviour
Poultry manure (colour, texture)
General behaviour of chickens (dull, bright)
General health and body condition (crown colour, discharges, swellings, coughs)
Condition of house and feeding equipment
Feed storage and quality
Number of birds that die</td></tr>
<tr><td>Step 4A.
Environmental health
Observations on the useful/supportive aspects of the ecosystem (names, drawings or specimens): scavenged feed (insects), scavenged feed (plants), friendly insects/natural enemies</td><td>Step 5.
Drawing
Illustration of concern: harmful feature of the environment – vegetation, weather, pests</td><td>Step 4B.
Environmental hazards
Observations on the harmful aspects of the ecosystem (names, drawings or specimens): pests (insects), predators</td></tr>
<tr><td>Step 6.
Summary of parameters and observations
List of what must be corrected before the next FFS meeting</td><td>Step 7.
Conclusions</td><td>Step 8.
Recommendations</td></tr>
</table>

EXPERIMENT 2
Feed source for broilers (intensified poultry system)

Name of FFS.....

Location .....

Learning enterprise

Feed sources for broilers.

Background information

The cost of feeding in intensified poultry production often accounts for 70–80 percent of total costs. Therefore, any opportunity to reduce feed costs results in increased income for farmers, provided that the birds' nutrient requirements are met. Commercial feed is not always readily available/accessible in remote rural areas, which hampers the intensification of poultry rearing systems.

Problem: Commercial poultry feed is frequently expensive, unavailable and often sourced from distant locations, incurring high costs.

*See (modules): **Poultry diets (2.1.4); Broilers (2.1.9.3)***

Learning objective

To assess the impacts of different feeding types (commercial feed versus on-farm feed preparation) on growth, health and the economic viability of broiler production.

Experimentation constant/uniform situation

- Day-old chicks are of the same breed and line and from the same source (hatchery).
- Birds are provided with the same environmental conditions and spacing.
- Biosecurity conditions and disease prevention measures (including vaccination) are the same.
- For the first two weeks of the experiment all the birds are fed with commercial feed.

Trial description and treatments

Average number of birds per poultry house in the experimentation area: 200

Average stocking density: 10 birds/m^2

Number of birds for each treatment and replication: 15

Number of treatments: 2

Number of replications/cycles: 3

Trial design

- *Treatment A:* Broilers fed commercial feed
- *Treatment B:* Broilers fed farm-made feed

For the first two weeks feed the birds with the same feed and thereafter separate them into experimental groups with different feeding regimes.

Key requirements

- Commercial feeds.
- Day-old chicks.
- Formula and ingredients for on-farm feeds.
- Vaccines for routine vaccination against endemic diseases.
- Feeding/watering equipment.
- Multivitamins.
- Weighing scale.
- Mixer.
- Grain crusher.
- Litter.
- Lighting and heating equipment (such as solar panels).
- Poultry house divided into compartments for the different treatments.
- Personal protective equipment.
- Footbath.
- Essential poultry drugs.

Parameters/observations

Parameters

- Bird weight.
- Feed consumption per day.
- Feed costs.
- Age of bird (weeks).

Observations

- Feeding behaviour.
- Poultry faeces (colour, texture).
- General behaviour of chickens (dull, bright).
- General health and body condition (crown colour, discharges, swellings, coughs).
- Condition of house and feeding equipment.
- Feed storage and quality.
- Number of birds that died.

Duration

27 weeks.

Evaluation

Analyse the results in the two feeding regimes as reflected in the learning data collected

throughout the production cycle (from the AESA sheets) and define conclusions and recommendations based on the following questions:

- Did the farm-made ration increase the growth of the birds?
- Did the farm-made ration reduce the time to maturity (faster growth)?
- Did the farm-made ration result in better health for the birds?
- Was the farm-made ration cost-effective in terms of preparation and feeding to the birds?
- Are the materials for the farm-made ration available locally and can they be prepared on the farm to reduce costs further?
- Compare the two feeding sources and make recommendations.

Notes

Other possible solutions to the problem:

- Organize farmers to buy commercial feed in bulk.
- Encourage farmers to produce ingredients for farm-made feeds.
- Reduce wastage of food by having the correct equipment, such as feeders with a lip or design that prevents birds from knocking feed out of the feeders when eating.

Learning curriculum/schedule

Week	Host team	Activity	Requirements	Targets/remarks
1	Group 1	• Planning and assignment of responsibilities • Preparation of the weekly learning timetable • Purchase of inputs • Preparation of the housing unit (with disinfection, litter and compartments) • Special topic: formulation of feeds (ingredients and how they are mixed) • Sourcing of birds	• Funds for purchasing inputs • Housing unit	• All requirements purchased according to requirements, and heat source for brooder tested • Invite specialist in special topic (at least a week in advance) • Obtain materials locally, where possible
2	Group 2	• Stocking of houses • Weighing of chicks • Brooder management • Special topic: brooding and brooder management (including practical demonstration of brooder construction)	• Broiler chicks • Thermometer • Feeders and waterers • Weighing scale • Material for a practical demonstration of brooder construction • Roll call register and record book	• All birds raised in one brooder • Invite specialist in special topic (at least a week in advance)

Week	Host team	Activity	Requirements	Targets/remarks
3	Group 3	• Demonstration of how to undertake an AESA and record data • Special topic: disease management/ biosecurity	• Disinfectants • Vaccines • AESA template • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in special topic (at least a week in advance)
4	Group 1	• AESA • Separation of chicks into the different trial options	• Commercial feed and on-farm feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• On-farm feeds formulated and stored for use
5	Group 2	• AESA • Special topic: record-keeping	• Commercial and on-farm feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite specialist in special topic (at least a week in advance)
6	Group 3	• AESA	• Commercial and on-farm feed • Flipcharts and markers • Weighing scale • Roll call register and record book	
7	Group 1	• AESA • Special topic: marketing	• Commercial and on-farm feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Invite professional involved in poultry marketing (at least a week in advance)
8	Group 2	• AESA • Identification of market for birds • Preparation of records for final analysis	• Commercial feed and on-farm feed • Flipcharts and markers • Weighing scale • Roll call register and record book	• Market survey to identify market for sales of birds
9	All groups – facilitator-led	• Cost–benefit analysis • Cleaning and disinfection for cycle 2	• All AESA sheets for analysis • Receipts of feed purchases • Records of bird sales	

Note: The trial is repeated twice with different special topics, an exchange visit in the second replication and a field day combined with graduation in the third replication. The results of all the replications are analysed.

AESA sheet

<table>
<tr><td colspan="3">Step 1.
Experiment identification information
Name of FFS:
FFS subgroup name:
AESA number:
Name of FFS:
FFS subgroup name:
AESA number:</td></tr>
<tr><td>Step 2.
General information
Weather
Breed
Disinfectant application
Litter type
Prophylactic treatments (including routine vaccinations)</td><td>Step 3A
Parameters
Bird weight
Feed consumption per day
Feed costs
Age of bird (weeks)</td><td>Step 3B:
Observations
Feeding behaviour
Poultry faeces (colour, texture)
General behaviour of chickens (dull, bright)
General health and body condition (crown colour, discharges, swellings, coughs)
Condition of house and feeding equipment
Feed storage and quality
Number of birds that died</td></tr>
<tr><td>Step 4A.
Environmental health
Observations on the useful/ supportive aspects of the ecosystem (names, drawings or specimens):
scavenged feed (insects),
scavenged feed (plants),
housing conditions (including litter),
natural enemies/friendly insects</td><td>Step 5.
Drawing
Illustration of concern: harmful feature of the environment – vegetation, weather, pests</td><td>Step 4B.
Environmental hazards
Observations on the harmful aspects of the ecosystem (names, drawings or specimens): pests (insects), predators</td></tr>
<tr><td>Step 6.
Summary of parameters and observations
List of what must be corrected before the next FFS meeting</td><td>Step 7.
Conclusions</td><td>Step 8.
Recommendations</td></tr>
</table>

EXPERIMENT 3
Feeding layers (intensified poultry system)

Name of FFS .....

Location .....

Learning enterprise

Feeding regimes for layers.

Background information

The cost of feeding in intensified poultry production often accounts for 70 to 80 percent of total costs. Therefore, any opportunity to reduce such costs results in increased income to the farmers provided that the birds' nutrient requirements are met.

Problem: Commercial layer feed is expensive and there is need for a local alternative to fishmeal in order to reduce costs.

See (module): ***Poultry diets (2.1.4)*** *and* ***Layers (2.1.9.3)***

Learning objective

To assess the effectiveness of a potential substitute for fishmeal in feeds for layers in terms of birds' health and growth and farm economics.

Experimentation constant/uniform situation

- Biosecurity conditions and disease prevention measures (including vaccination) are the same.
- Birds are of the same breed, line and age and come from the same source (hatchery).
- Feed comes from the same source.
- Environmental conditions and spacing are the same.

Trial description and treatments

Average number of birds per poultry house in the experimentation area: 200

Average stocking density: 3 birds/m^2

Number of birds for every treatment and replication: 20

Number of treatments: 3

Number of replications/cycles: 1 (each treatment is replicated twice during the cycle)

Trial design

Treatment A (control/farmers' practice): Fishmeal + maize bran (commercial feed)	Treatment B: Soybean meal + maize bran (farm-made)	Treatment C: Maggots + maize bran (farm-made)
Treatment C: Maggots + maize bran (farm-made)	Treatment A (control/farmers' practice): Fishmeal + maize bran (commercial feed)	Treatment B: Soybean meal + maize bran (farm-made)

Key requirements

- Birds (three weeks old).
- Commercial feeds (treatment A).
- Grain crusher.
- Mixer.
- Formula and ingredients for on-farm feeds (treatments B and C).
- Feeding/watering equipment.
- Poultry house divided into compartments for the different treatments.
- Personal protective equipment.
- Footbath.
- Vaccines for routine vaccination against endemic diseases.
- Multivitamins.
- Weighing scale.
- Litter.
- Disinfectant.
- Sprayer.
- Lighting equipment (such as solar panels).
- Essential poultry drugs.

Parameters/observations

Parameters

- Age of birds (weeks).
- Weight of birds.
- Age at first egg.
- Numbers of eggs per day and per week.
- Size of eggs (diameter).
- Texture of eggs (including deformities).
- Number of eggs at peak laying.
- Duration of laying.
- Feed consumption per day.
- Feed costs.

Observations

- Colour and texture of droppings.
- Feeding behaviour.
- General behaviour of chickens (dull, bright).
- General health and body condition (crown colour, discharges, swellings, coughs).

- Presence of pests and friendly insects.
- Condition of litter and feeding equipment.
- Feed storage and quality.
- Number of birds that have died.

Duration

The experiment lasts for 31 weeks (about eight months). It ends when the birds are at peak production.

Evaluation

Analyse the results in the three feeding regimes as reflected in the learning data collected throughout the production cycle (from the AESA sheets) and define conclusions and recommendations based on the following questions:

- Did the rations B and C increase egg production and to what extent?
- Did the rations B and C reduce the time to first laying?
- Did the rations B and C improve the quality of the eggs?
- Did the rations B and C offer better health for the birds?
- Were the rations B and C cost-effective in terms of preparation and feeding to the birds?
- Can the ingredients for rations A and B be sustainably sourced locally, and can the rations be prepared on-farm?
- Compare the three feeding regimes in terms of cost, egg quality, age at first egg, and overall egg production, and make recommendations for future action.

The recommendations can be shared with other FFS groups and the community at large during field days or the FFS graduation event.

Expected outcomes

- Increased number of eggs.
- Testing of feeding options.
- The benefits of and process for routinely checking the quality and adequateness of feeds are reflected on.
- The challenges and benefits of different poultry feed ingredients are known.
- A tested formulation that is based on what is grown locally is appreciated, so entrepreneurs can start to produce locally mixed feeds.
- Entrepreneurs can supply fresh, good-quality eggs to their clients.

Learning curriculum/schedule

Week	Host team	Activity	Requirements	Targets/remarks
1	Pullet	• Planning and assignment of responsibilities • Purchase of inputs • Special topic: breeding maggots and processing soybean meal	• Funds for purchasing inputs • Maggots • Soybean meal • Roll call register and record book	Invite specialist in special topic (at least a week in advance) Obtain materials locally, where possible
2	Cockerel	• Preparation of the housing unit (with disinfection, litter and compartments) • Special topic: demonstration of feed formulation (ingredients and how they are mixed) • Sourcing of birds	• Housing unit • Litter • Disinfectant • Feed ingredients • Roll call register and record book	Invite specialist for special topic and demonstration (at least a week in advance)
3	Hen	• Introduction and weighing of birds • Demonstration of how to undertake an AESA and record data • Demonstrations of feeding (amounts) and vaccination against infectious bursal disease	• Birds • Weighing scale • Feed • Water • Feeders and waterers • AESA template • Flipcharts and markers • Weighing scale • Roll call register and record book	Feeding of set amounts and ranking continues throughout the experiment
4	Chick	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
5	Pullet	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
6	Cockerel	• AESA • Vaccination of birds against infectious bronchitis	• Vaccines • Flipcharts and markers • Weighing scale • Roll call register and record book	
7	Hen	• AESA • Special topic: climate change and adaptation	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)

Week	Host team	Activity	Requirements	Targets/remarks
8	Chick	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
9	Pullet	• AESA • Special topic: important poultry diseases and their control • Learning exercise/ demonstration on vaccination	• Vaccines • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
10	Cockerel	• AESA • Special topic: vaccination of birds against Newcastle disease with practice of vaccinations	• Vaccines • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
11	Hen	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
12	Chick	• AESA • Special topic: vaccination of birds against endemic diseases (such as infectious coryza and fowl pox)	• Vaccines and syringes • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
13	Pullet	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
14	Cockerel	• AESA • Identification of an expert in business and farm planning	• Flipcharts and markers • Weighing scale • Roll call register and record book	
15	Hen	• AESA • Special topic: business and farm planning	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
16	Chick	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	

Week	Host team	Activity	Requirements	Targets/remarks
17	Pullet	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
18	Cockerel	• AESA	• Flipcharts and markers • Weighing scale • Roll call register and record book	
19	Hen	• AESA • Special topic: marketing and quality control	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
20	Chick	• AESA (laying starts)	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	In the remaining weeks of the FFS, host teams collect and grade eggs for packaging and marketing and collect AESA data on eggs
21	Pullet	• AESA	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	
22	Cockerel	• AESA • Special topic: family nutrition (chickens and chicken products) • Planning of field day	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
23	Hen	• AESA • Planning of field day	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	
24	Chick	• Field day • AESA	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book • Tents, chairs, public address system	Invite a representative of the Ministry of Agriculture, researchers, other FFS groups, the community and other small-scale producers

Week	Host team	Activity	Requirements	Targets/remarks
25	Pullet	• AESA	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	
26	Cockerel	• AESA • Special topic on gender and livestock development	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
27	Hen	• AESA	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	
28	Chick	• AESA • Invitation of leaders and members of the community to upcoming graduation	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	
29	Pullet	• AESA • Special topic: group savings and loans • Preparation for graduation	• Egg trays • Measuring tape • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)

30	Cockerel	• Evaluation:
		  • analysis and processing of data
		  • interpretation of findings
		  • conclusions
		  • setting of recommendations
		• Preparation for graduation
			• All AESA sheets
			• Flipcharts and markers	

31	ALL	• Graduation • Sharing of results from the experiment • Sale of birds	• Tents, chairs, public address system, certificates, refreshments	Invite representative of the Ministry of Agriculture, researchers, stakeholders, local leaders and the community

EXPERIMENT 4
Selective breeding for egg production of indigenous chickens under intensified production system

Name of FFS.....

Location .....

Learning enterprise

Breed improvement through selection of indigenous chickens for egg production.

Background information

Improving poultry production requires proper methods for improving breeding. Through selective breeding, a limited number of productive hens and cocks can be kept as a breeding flock to provide better chicks.

Problem: Egg production is very low.

Learning objective

To improve egg production through the breeding of poultry with different laying characteristics and selection of the best birds for production purposes.

Experimentation constant/uniform situation

- Birds are of the same indigenous breed and source and approximately of the same age.
- They are housed under the same environmental conditions.
- Biosecurity conditions and disease prevention measures (including vaccination) are the same.
- The birds all have the same feeding regime.

Trial description and treatments

Average number of birds per poultry house in the experimentation area: 150

Average stocking density: 4 birds/m^2

Number of birds for every treatment and replication: 6

Number of treatments: 2

Number of replications: 0

Trial design

Treatment A: Farmers' practice using a local cock	Treatment B: Improved breeding using an improved cock

Steps

1. From the flock, select the 12 hens that produce the most eggs.
2. Divide the 12 hens into two treatment flocks with six hens housed with a local cock and the other six with an improved cock.

3. For each of the hens selected for experimentation:
   a. select the best eggs based on size (not too big and not too small), number, texture, colour, shape, strength of shell, deformities, etc. – select only clean, undamaged eggs that are not more than two weeks old;
   b. store the selected eggs in a cool dark place, keeping track of which eggs are from which hen.
4. Select broody, experienced hens to hatch the selected eggs from the 12 hens. If broody hens are not available, an incubator can be used.
5. Compare the hatchability of the eggs from all the hens selected for experimentation.
6. Select and remove any deformed chicks and all males.
7. Rear to maturity the offspring from the two flocks while selecting:
   a. the fast-growing healthy birds, removing the slow growing;
   b. birds that are active and appear alert, removing the docile;
   c. birds with bright alert eyes and bright-red combs and wattles, removing the others;
   d. birds with a cloaca of a reasonable size, removing those with a small cloaca.
8. When the birds reach maturity introduce new cocks (different from those used in step 2) for mating with all the selected hens from the two groups of birds (group A with a local cock, group B with an improved cock).
9. When the selected birds (groups A and B) start laying, collect and grade the eggs while removing the damaged and abnormal eggs.
10. When the birds (groups A and B) finish laying, incubate the eggs (with broody hens or in an incubator) until the second-generation chicks hatch. The second-generation chicks from the two treatments (A and B) are taken through steps 6 to 9 in a second cycle (using different cocks).
11. After 16 months, compare the results of the two groups (A and B) in terms of egg production.

Key requirements

- Indigenous cocks and hens and improved cocks.
- Vaccines for routine vaccination against endemic diseases.
- A poultry house divided into compartments for the different treatments.
- Personal protective equipment.
- Footbath.
- Essential poultry drugs.
- Weighing scale.
- Lighting/heating equipment (such as solar panels).
- Housing.
- Good-quality feed and water as necessary, and feeding/watering equipment.

Parameters/observations

Parameters

- Bird weight.
- Size of eggs.
- Texture of eggs.
- Egg weight.
- Number of eggs laid per bird.
- Number of eggs hatched.
- Number of healthy non-deformed birds.
- Growth rate of pullets.
- Age at first egg.
- Broodiness of pullets.
- Size of cloaca.

Observations

- Feeding behaviour.
- Poultry manure (colour, texture).
- General behaviour of chickens (dull, bright).
- General health and body condition (crown colour, discharges, swellings, coughs).
- Presence of pests and friendly insects.
- Condition of house and feeding equipment.
- Feed storage and quality.
- Number of birds that died.

Examples of traits of selected indigenous chicken breeds of Ethiopia

Trait	Tukur	Melata	Kei	Gebsima	Netch
24-week body weight (g)	960	1000	940	950	1180
Age at 1st egg (days)	173	204	166	230	217
Eggs/bird/year	64	82	54	58	64
Egg weight (g)	44	49	45	44	47
Fertility (%)	56	60	57	53	56
Hatchability (%)	42	42	44	39	39

Source: FAO, 2014.

Duration

This experiment will take 16 months.[2]

Evaluation

Analyse the results in the two treatments as reflected in the learning data collected throughout the production cycle (from the AESA sheets) and define conclusions and recommendations based on the following questions:

- Did treatment B:
  - increase egg production and to what extent?
  - reduce the time to first laying?
  - improve the quality of the eggs?
  - offer better health to the birds?
- Was treatment B cost-effective?
- Compare the two treatments in terms of cost, egg quality, age at first egg, and overall egg production and make recommendations.

Notes

Monitor the value of the chickens that were consumed, sold, used in cultural events, etc. or that died.

Expected outcomes

- Increased supply of eggs.
- The benefits of and process for adopting selective breeding is reflected on.
- The challenges and benefits of adopting different breeding practices are known.
- A breeding practice that allows poultry entrepreneurs to improve farm productivity and income has been tested.
- Entrepreneurs can supply fresh, good-quality eggs to their clients.

[2] The two cycles will allow identification of the best layers, but in order to come closer to the expected breeding value a third cycle of selective breeding may be undergone (of eight additional months).

Learning curriculum/schedule

Week	Host team	Activity	Requirements	Targets/remarks
1	All	• Planning and assignment of responsibilities • Purchase of inputs • Preparation of the housing unit (separation into compartments, etc.) • Sourcing of birds (healthy indigenous hens and cock and improved cock) and their separation into two groups housed in separate compartments	• Funds for purchasing inputs • Roll call register and record book	Obtain materials locally, where possible
2	1	• Special topic: the what and why of poultry breeds and breeding • AESA on hens and cocks	• AESA template • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
3	2	• AESA on hens and cocks	• Flipcharts and markers • Weighing scale • Roll call register and record book	
4	3	• AESA on hens and cocks and eggs • Special topic: grading of eggs • Egg collection	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
5	1	• AESA on hens, cocks and eggs • Egg collection • Special topic: egg incubation • Preparation of eggs for incubation	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
6	2	• AESA on incubation	• Broody hens or incubator • Flipcharts and markers • Roll call register and record book	
7	3	• AESA on incubation	• Flipcharts and markers • Roll call register and record book	
8	1	• Special topic: chick brooding and feeding • AESA on incubation and hatching of first-generation chicks	• Brooder and heating source • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)

Week	Host team	Activity	Requirements	Targets/remarks
9	2	• AESA on first-generation chicks	• Flipcharts and markers • Weighing scale • Roll call register and record book	
10	3	• AESA on first-generation chicks • Special topic: culling	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
11	1	• AESA on first-generation chicks • Culling of deformed/ abnormal chicks	• Flipcharts and markers • Weighing scale • Roll call register and record book	
12	2	• AESA on first-generation chicks	• Flipcharts and markers • Weighing scale • Roll call register and record book	
13	3	• AESA on first-generation birds	• Flipcharts and markers • Weighing scale • Roll call register and record book	
14	1	• AESA on first-generation birds	• Flipcharts and markers • Weighing scale • Roll call register and record book	
15	2	• AESA on first-generation birds • Special topic: sexing	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
16	3	• AESA on first-generation birds • Identification of male birds and removal from flock	• Flipcharts and markers • Weighing scale • Roll call register and record book	
17	1	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
18	2	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
19	3	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	

Week	Host team	Activity	Requirements	Targets/remarks
20	1	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
21	2	• AESA on first- generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
22	3	• AESA on first-generation hens • Removal of birds with low growth, or that are inactive, docile, etc.	• Flipcharts and markers • Weighing scale • Roll call register and record book	
23	1	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
24	2	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
25	3	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
26	1	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
27	2	• AESA on first-generation hens	• Flipcharts and markers • Weighing scale • Roll call register and record book	
28	3	• AESA on first-generation hens • Special topic: selective breeding based on desired traits • Sourcing of a healthy indigenous cock and an improved cock and putting them in their respective compartments	• Indigenous and improved cocks • Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance) Select different cocks from those used for producing first-generation chicks

Week	Host team	Activity	Requirements	Targets/remarks
29	1	• AESA on first-generation hens, cocks and first egg laying	• Flipcharts and markers • Weighing scale • Roll call register and record book	
30	2	• AESA on first-generation hens, cocks and egg laying • Special topic: egg handling and storage	• Flipcharts and markers • Weighing scale • Roll call register and record book	Invite specialist in special topic (at least a week in advance)
31	3	• AESA on first-generation hens, cocks and egg laying • Incubation of the eggs	• Broody hens or an incubator • Flipcharts and markers • Weighing scale • Roll call register and record book	
32	1	• AESA on incubation	• Flipcharts and markers • Weighing scale • Roll call register and record book	
33	2	• AESA on incubation	• Flipcharts and markers • Weighing scale • Roll call register and record book	
34	3	• AESA on hatching of the second-generation chicks	• Brooder and heating source • Flipcharts and markers • Roll call register and record book	

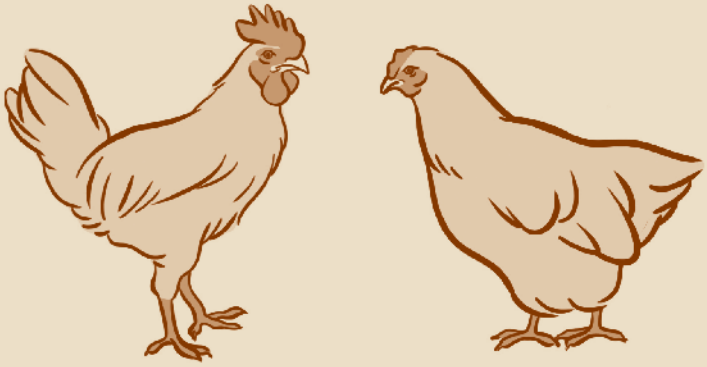
Note: Procedure from week 9 onwards to be repeated, with different special topics, until third-generation chicks are hatched. A field day for showcasing increased egg production can be held when the second-generation chicks are mature and start laying. Graduation can be held once second-generation chicks have matured and are producing eggs.

Other possible topics for experimentation

- Mixing of locally made feeds with conventional commercial formulations for intensified chick rearing for meat or egg production.
- The creep feeding system for chicks, using feeds made out of local, seasonal ingredients, compared with supplementary feeding from household waste in extensive systems.
- Comparison of results of supplementary feeding using reared earthworms versus feed produced in a home garden with a ground cover of mulch.
- Comparison of results of supplementary feeding using reared earthworms versus planting of Azolla (*Azolla* sp.) for chickens on commercial formulations.
- The benefits and challenges of improving poultry production through crossbreeding.
- Alternative methods of poultry disease prevention.
- Alternative methods of poultry parasite control.

ANNEX 6

Examples of topics for demonstrations



Demonstrations help farmers to understand the effectiveness of a given technology or practice (either through testing as part of a comparative experiment or through some other method) while also strengthening facilitation in the FFS. The following are examples of topics for demonstrations:

- Optimal poultry housing – identify the type of poultry housing that is the most cost-efficient for farmers.
- Methods of improving vegetation in the poultry yard, using perennial crops such as bananas, or short-fallow crops such as sweet potatoes, and observing the proliferation of insects and worms.
- Compost-making and vegetable production in bags compared with planting on the ground.
- Rearing of mealy worms, housefly maggots or red earthworms.
- The effect of egg selection on the number of chicks hatched.
- The effects of different means of protecting chicks from predators.
- The effects of the duration of light on the number of eggs produced.
- The effects of feeding green grass to chicks aged 0–8 weeks.
- How the supplementary feeding of laying hens with soybean oil affects egg production.
- How the dryness of the litter affects the control of coccidiosis.
- How the different ways of handling and storing eggs affects their freshness.

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A growing number of poultry farmer field schools (FFS) are being implemented in developing countries by a wide range of actors. Experience over the past two decades has shown that good-quality facilitation and learning activities are key to the success and long-term sustainability of poultry FFS.

This manual provides practical information and activities that help facilitators establish and implement good-quality FFS. It focuses on working with women and men poultry producers to sustainably enhance production, productivity and marketing in any family poultry production system, ranging from extensive to small-scale intensified, in line with producers' aspirations and local conditions. The first module of the manual covers poultry FFS establishment and learning activities, and the second provides "need-to-know" information on poultry production and health and FFS facilitation.

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