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FAO ANIMAL PRODUCTION AND HEALTH



guidelines

DECISION TOOLS FOR FAMILY POULTRY DEVELOPMENT

INTERNATIONAL RURAL POULTRY CENTRE
AN INITIATIVE OF THE KYEEMA FOUNDATION

IFAD
Enabling poor rural people to overcome poverty

FAO FIAT PANIS

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DECISION TOOLS FOR FAMILY POULTRY DEVELOPMENT

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Foreword

The global human population is growing rapidly and consumption patterns are shifting towards a significant and increasing demand for animal products. The livestock sub-sector accounts for about 30 percent of the agricultural gross domestic product (GDP) in developing countries and is growing faster than most other agricultural sub-sectors. Livestock is fundamental to the livelihoods of about 1 billion of the world's poorest people and comprises the sole asset of many resource-poor farmers.

Family poultry encompasses the full variety of small-scale poultry production systems found in rural, urban and peri-urban areas of developing countries. It contributes to good human nutrition by providing food (eggs and meat) with high quality nutrients and micronutrients. The small income and savings provided by the sale of poultry products is especially important for women, enabling them to better cope with urgent needs and reducing economic vulnerability. Family poultry also produces manure for vegetable gardens and crop production. In addition to its economic and nutritional importance, village poultry production fulfils socio-cultural and religious functions widely recognized for their importance to smallholder livelihoods.

The Food and Agriculture Organization of the United Nations (FAO) promotes the development of family poultry production through projects in numerous countries and support for the International Network for Family Poultry Development (INFPD). The International Fund for Agricultural Development's (IFAD) experience and lessons learned from loan and grant projects confirm that small livestock and, in particular, poultry constitute a valuable asset, which plays a crucial role in family farming systems and contributes comprehensively to rural poverty reduction.

This publication provides decision tools aimed at governments, development organizations and NGOs to help decide, plan and implement family poultry development interventions. It describes the techniques and tools necessary to assess operational environments in order to design interventions best suited to local conditions. Furthermore, it presents a range of information and good practices on family poultry projects to assist with the development of appropriate strategies. These will allow development workers to benefit from lessons learned and to use the available information to develop effective and sustainable family poultry development activities and projects.

This book was produced as part of the IFAD-funded "Smallholder Poultry Development Programme" implemented by FAO in cooperation with INFPD and the International Rural Poultry Centre (IRPC) of the Kyeema Foundation.

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Experienced experts were identified as authors for the topics of the different chapters. Brigitte Bagnol from the IRPC coordinated the writing and production of the decision tools. All chapters were reviewed by the members of the Steering Committee and by additional poultry experts.

Sincere thanks go to the many specialists who contributed valuable information and provided feedback during the development of this toolkit.

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Mary Young edited first drafts of the chapters and David McDonald edited the final manuscript.

Acronyms

BCR	benefit-cost ratio
FAO	Food and Agriculture Organization of the United Nations
FP	family poultry
FPD	family poultry development
HHL	household food waste and leftovers
IFAD	International Fund for Agricultural Development
INFPD	International Network for Family Poultry Development
M&E	monitoring and evaluation
MF	microfinance
MFI	microfinance institution
ND	Newcastle disease
NGO	non-governmental organization
PRA	participatory rural appraisal
SFR	scavengeable feed resource
SFRB	scavengeable feed resource base

Introduction

Robyn Alders and Brigitte Bagnol

Poultry plays a key role in many households across the globe. Family poultry makes a significant contribution to poverty alleviation, food security, HIV/AIDS mitigation, empowerment of women and wildlife conservation in many countries. This toolkit focuses on family poultry production, which comprises extensive and small-scale intensive poultry production. Family poultry makes up to 80 percent of poultry stocks in low-income food-deficit countries (Pym *et al.*, 2006) where owners raise poultry in small numbers ranging from single birds up to a few hundred.

Poultry can include a wide range of birds from indigenous and commercial breeds of chickens to Muscovy ducks, mallard ducks, pigeons, guinea fowl, geese, quail and turkeys. Chickens are the most frequently commercialized of all these birds and, as such, this toolkit focuses in particular on this species.

Poultry is a frequent and essential part of the fabric of societies across a broad range of cultures. When designing a project it is vital to analyse the poultry value chains. These include the social and cultural aspects of the food system, as well as the institutional environment in which food is produced, processed, marketed, retailed and consumed. Enforced rules and regulations also impact on the value chain whether formal (public legislation and private standards) or informal (social and cultural structures), and so must be taken into account.

A significant proportion of development projects and programmes are implemented in ecologically fragile areas, where poor rural people have to overcome poverty and protect the lands and natural resources on which they depend. This toolkit is designed to assist the development of feasible and appropriate family poultry projects and is presented as a stepwise decision-making tool. It provides proven, cost-efficient and ecologically sustainable options for family poultry production that have proven their worth in a variety of settings.

The toolkit also provides references to documents from the International Fund for Agricultural Development (IFAD), the Food and Agriculture Organization of the United Nations (FAO), the International Network for Family Poultry Development (INFPD), and the International Rural Poultry Centre (IRPC) of the KYEEMA Foundation. It contains a range of practical information including descriptions of techniques and tools to increase the efficiency of operations for different categories of smallholders and the productivity of their poultry. It also includes a glossary and checklists for planners to help assess local conditions and the requirements to implement interventions.

Chapter 1

Defining family poultry production systems and their contribution to livelihoods

Olaf Thieme, Funso Sonaiya, Antonio Rota, E. Fallou Guèye, Frands Dolberg and Robyn Alders

Key objectives

- To obtain a common understanding of the roles and purposes of family poultry production and the different production systems.
- To describe the opportunities and limitations of the different family poultry production systems.

Classification of production systems

Poultry are domesticated avian species that are raised for eggs, meat and feathers. The term "poultry" includes chickens, turkeys, guinea fowls, ducks, geese and other species such as quails and pigeons, or birds considered to be game, like pheasants. Chickens constitute about 90 percent of the poultry population and are, by far, the most important poultry species in all parts of the world (Table 1). The term "poultry" is therefore often used synonymously for chickens.

In developing countries many people keep small numbers of poultry for home consumption, to sell and for various socio-cultural uses. This practice was originally concentrated in villages and thus became known as "village poultry" production. However, increasing urbanization has resulted in the growth of village type poultry in urban and peri-urban

TABLE 1
Distribution of poultry species populations by region in 2011 (%)

	Chickens	Ducks	Geese and guinea fowl	Turkeys	Other poultry
Africa	96.03	1.10	0.85	1.21	0.81
Americas	93.95	0.45	0.01	5.58	0.00
Asia	88.07	8.99	2.70	0.10	0.14
Europe	91.30	2.65	0.89	5.03	0.13
Oceania	96.45	1.60	0.07	1.88	0.00
World	90.55	5.53	1.67	2.09	0.15

Source: FAOSTAT, 2012

areas. Where poultry are housed all or most of the time the system is often called "backyard production". The term "scavenging poultry" is used to describe the feed supply of this production system, and is almost synonymous with village poultry. However, decrease in the scavengeable feed resource base (SFRB) in villages and the absence, or very limited availability, of natural feed resources in urban environments, has led to an increase in supplementary feeding. The term "family poultry" was created to describe the full variety of all small-scale poultry production systems found in rural, urban and peri-urban areas of developing countries. Rather than defining the production systems *per se*, the term is used to describe poultry production practised by individual families as a means of obtaining food security, income and gainful employment (Besbes *et al.*, 2012).

Different ways of characterizing family poultry production have been suggested based on criteria such as size of flock, management, and purpose of production including degree of commercialization and location (FAO, 2004a). For the purpose of conducting a situation analysis and planning a development intervention, the toolkit identifies four family poultry production systems:

- small extensive scavenging
- extensive scavenging
- semi-intensive
- small-scale intensive.

Table 2 provides a general characterization of these categories (see also Guèye, 2003a).

Site effects on family poultry production

The type and intensity of family poultry production and its development opportunities largely depend on site effects. Site effects are expressed through the importance of seasonal differences, the interactions between poultry and crop production, and the access to services and markets. Seasonal factors such as the differences between dry and wet seasons or winter and summer influence the availability of feed resources, the occurrence of diseases and the need for housing.

More intensive cultivation and the need to protect crops during the growing season may restrict the free movement of poultry, causing feed scarcity. If birds depend only on range for feeding, this can result in poor nutritional status and eventually a seasonal or general reduction in bird numbers.

The distance of the producer from market affects the availability of inputs and services for production and the opportunities and ways of selling products. This is expressed in the relative importance accorded to poultry production for either food security or income generation. Table 3 provides a schematic description of this relationship.

Diversity of management interventions

The performance of family poultry production depends on the type of genetic resources; feeding practices; the prevalence of diseases, prevention and control; the management of flocks and the interactions among these factors. Different combinations of these factors result in diverse production conditions.

Local genetic resources dominate the family poultry production systems in village environments (FAO, 2010a), but crossbreds with exotic breeds are becoming more common

TABLE 2
Characteristics of the four family poultry production systems

Criteria	Small extensive scavenging	Extensive scavenging	Semi-intensive	Small-scale intensive
Production/farming system	Mixed, poultry and crops, often landless	Mixed, livestock and crops	Usually poultry only	Poultry only
Other livestock raised	Rarely	Usually	Sometimes	No
Flock size (adult birds)	1–5	5–50	50–200	>200 broilers >100 layers
Poultry breeds	Local	Local or crossbred	Commercial or crossbred or local	Commercial
Source of new chicks	Natural incubation	Natural incubation	Commercial day-old chicks or natural incubation	Commercial day-old chicks or pullets
Feed source	Scavenging; almost no supplementation	Scavenging; occasional supplementation	Limited scavenging; regular supplementation	Commercial balanced ration
Poultry housing	Seldom; usually made from local materials or kept in the house	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	Very high >70%	Very high >70%	Medium to high 20% to >50%	Low to medium <20%
Access to reliable electricity supply	No	No	Yes	Yes
Existence of conventional cold chain	No	Rarely	Yes	Yes
Access to urban markets	Rarely	Rarely or indirect	Yes	Yes
Products	Live birds, meat	Live birds, meat, eggs	Live birds, meat, eggs	Live birds, meat, eggs
Time devoted each day to poultry management	< 30 minutes	< 1 hour	>1 hour	>1 hour

TABLE 3
Influence of site effects on family poultry production

Location		Main purpose		Poultry production system
Remote village	↑	Food security	↑	Small extensive scavenging
	↓	Income generation		
Village with access to rural markets		Food security = Income generation	↑	Extensive scavenging
			↓	Semi-intensive
Peri-urban village with access to urban markets	↓	Food security	↑	Semi-intensive
	↑	Income generation	↓	Small-scale intensive

Note: upward arrow = higher importance; downward arrow = lower importance; equals sign = equal importance.
Source: developed by A. Rota and O. Thieme.

through the introduction of development projects. Family poultry producers mostly based in urban and peri-urban environments are also using commercial hybrids. Multiplication through broody hens is the most common system in family poultry production, but more intensive systems use parent stock flocks and artificial incubation through hatcheries.

In most production systems owners provide some supplementary feed. This may range from small amounts to attract the birds back to the homestead to feed supplementation when the natural feed resource base is scarce, and can extend to full feeding in confinement with commercial compound feed. The most common supplement is small amounts of grain or household leftovers for scavenging birds.

Diseases of economic importance that result in high mortality for chickens are Newcastle disease (ND) in all regions and fowl cholera in Southeast Asia. The major concerns for ducks are duck plague and duck cholera. The most successful control programmes against these diseases in family poultry have involved vaccination by community vaccinators or poultry workers (Alders *et al.*, 2010).

Important management interventions include the adjustment of production cycles to seasonal patterns and the provision of shelter or confinement. Temporary or full confinement is used to have better control over the management of birds and to reduce losses from theft or predators. Experiences from South Asian countries show that adoption of good practices of poultry management can significantly contribute to an improvement of farmers' livelihoods (SA PPLPP, 2010).

Inputs, outputs and efficiency

Depending on the production system and its intensity, the inputs into family poultry production can include different levels of feeding, housing, healthcare, labour and the birds themselves. These inputs can be valued either in terms of their direct cost or their opportunity cost.

The main outputs from family poultry production are food for home consumption, either in the form of poultry meat or eggs, and income from the sale of these products. In Asia, family poultry manure is used as feed for fish when poultry are raised on top of the ponds as part of an integrated system, for example, fish-cum-duck farming. Poultry also plays important social and cultural roles in the lives of rural people, not least for building social relations with other villagers. Ritual use of poultry is found on all continents and local breeds have a specific role in this respect.

A pragmatic way to measure the production efficiency of poultry meat production in family poultry systems with self-multiplication is to use the ratio of the annual quantity of meat produced to the number of adult hens maintained. In countries with large numbers of smallholder producers and extensive production practices, this quantity can be as low as 1 kg compared with more than 5 kg in intensive production systems. In production systems with an emphasis on egg production the number of eggs per hen per year is a good indicator of efficiency.

Poultry and livelihoods

Family poultry is an integral component of the livelihoods of poor rural households, and is likely to continue playing this role for the foreseeable future (FAO, 2008). It makes a substantial contribution to food security and poverty alleviation in many countries around the world (Dolberg, 2008; Alders and Pym, 2009) and thus represents a major contribution towards achieving Millennium Development Goal 1 (halve the number of poor people in the world by 2015). It also contributes to achieving the MDGs with respect to gender equity and women's empowerment and promoting the well-being of rural populations. Chickens can play an important role in providing additional resources to households with people living with HIV/AIDS. Although output may not be high, a great advantage of family poultry egg production is the frequent, if not daily, provision of nutrients of high biological value, which are ideally consumed by the vulnerable members of the households. Guidelines to measure the consumption of meat and eggs at the household level are given in FAO (2011)[1].

Gender aspects

Understanding and considering the gender roles in family poultry production is crucial to identifying the most appropriate approach when designing and implementing development activities. Despite regional differences in family poultry production, women generally undertake the day-to-day care and management of birds often with assistance from their children. Men usually construct night shelters, procure inputs and assist occasionally with the marketing of products. This division of labour may change, however, as poultry production intensifies. There are a number of reasons for the key role played by women:

- Family poultry production requires little initial investment and generates quick and frequent returns. This model suits well the types of day-to-day expenditure of women.
- Family poultry keeping can be done without leaving the homestead and does not usually conflict with the other duties of women.

1 FAO's *Guidelines for measuring household and individual dietary diversity*: www.fao.org/docrep/014/i1983e/i1983e00.pdf

- In places where religious beliefs or societal norms require women to remain in their household compound or village, poultry keeping is a suitable income-generating activity.

Circumstances where men take a particular interest in family poultry include ritual practices and sports. Notably, cock-fighting can be an important motivation for family poultry production. Men will also take an increased interest in poultry when the household owns no other livestock.

Chapter 2
Assessing the situation

Brigitte Bagnol, Funso Sonaiya, Olaf Thieme, and Robyn Alders

Key objectives

- To analyse the characteristics of the local family poultry sector.
- To obtain a clear understanding of the sector and potential for intervention(s).

The first step in the development of feasible and appropriate family poultry projects is to determine the characteristics of the poultry sector, its potential for improvement and to assess the demand for poultry products.

Ideally, a multidisciplinary team of poultry specialists, extension workers, economists and social scientists would undertake a systematic assessment of the poultry production situation. This process should be replicable and its scale should reflect the duration of the planned intervention. A variety of tools enable proper assessment of the poultry situation in a given area. These include individual interviews with key people and focus group discussion with groups of male and female farmers from local communities. The assessment findings must then be triangulated with available secondary data.

The duration of a field assessment will depend on the scope of the project and the availability of funds for project design and planning. A rapid assessment can be performed in approximately three, nine and 27 days for local, regional and national programmes, respectively. The objective is to obtain a good sense of the realities in different areas and assess the similarities and differences. Detailed planning at the start of the implementation phase will require more time.

In all cases the assessment should include:

- a community assessment;
- a household and farm-level assessment;
- a market assessment and assessment of the value chain(s).

Table 4 summarizes the main information to be collected. This should be followed by a strengths, weaknesses opportunities and threats (SWOT) analysis.[2]

Community assessment: a rapid assessment of the main elements characterizing the environment for implementing smallholder poultry development activities, their accessibility and requirements for improvement, and in case of inaccessibility and/or unavailability, the need for the establishment of institutions that work to ensure access to:

- extension and training services;

[2] FAO's *Guidelines for the Preparation of Livestock Sector Reviews* provide general information about performing a situation assessment: www.fao.org/docrep/014/i2294e/i2294e00.pdf.

- veterinary services;
- supplier services for feed, vaccines, medicines, day-old chicks, improved hens, small equipment, etc. Access to these suppliers and the quality of offered products and/or services (e.g. fake veterinary products, unavailability of products due to rupture of stocks, ineffective vaccines because of rupture of the cold chain) at accessible prices are key factors for the success and sustainability of rural poultry;
- credit and saving services;
- marketing services and facilities.

National or international service providers may facilitate access to such services. The operational capacity of these service providers must be carefully assessed.

Household and farm level assessment: a participatory rural appraisal (PRA) in the targeted project area to collect basic data towards the development of a solid project baseline. The significance of rural poultry for household food security should be estimated and described. The PRA will assess:

- the interest level and capability of the target beneficiaries;
- the situation of the local family poultry production system. Traditional good practices in rearing chicken should be collected for consideration in project design;
- the main scope of the intervention: food security; food security and income generation; and income generation according to location (e.g. remote village, village with access to rural markets, peri-urban village with access to urban markets) and enabling environment;
- the main poultry commodities produced covering seasonality issues;
- characteristics of the market – opportunistic or planned;
- the phasing of project intervention.

The Australian Centre for International Agricultural Research (ACIAR) has published a methodology for participatory community exercises to identify problems associated with village chicken production.[3]

Market assessment: an assessment of the market potential for family poultry products. This analysis should include demand for products, prices, investment and running costs, and expected revenue for different types of poultry production systems.[4]

Value chain assessment: an assessment of family poultry value chains with a focus on identifying the key people in the chain to identify gaps and opportunities. Using participatory approaches with all value chain actors and possibilities to upgrade the family poultry value chain should be identified.

Data analysis and SWOT analysis: analysis of the information collected. This should lead to a proper assessment of the existing poultry situation, the constraints (hazards) and the potential for improvement. The following questions are of particular importance:

- What are the characteristics of the observed production systems?
- How many or what percentage of farmers belong to the different production systems?
- What types of poultry (e.g. chickens, broilers, layers, ducks, geese) are kept and in what numbers?

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[3] See Appendix 2 of *Improving village chicken production: A manual for field workers and trainers* available at: http://aciar.gov.au/publication/MN139.

[4] Gausi *et al.* (2004) provides a good example. See www.lrrd.org/lrrd16/12/gaus16097.htm.

- What is the objective of the activity?
- How many birds are sold and consumed?
- Who is selling the birds and where?
- What are the seasonal patterns of supply and demand?
- What are the highest and the lowest prices and when do these occur?
- What are the major problems?

TABLE 4
Information needed for assessment of poultry situation in an area

Parameter	Data to collect	Source of information
Flock characteristics (disaggregated by production system)	- Number of households raising poultry per village - Number of poultry kept - Type of breed (eggs, meat or both) - Purpose of production - Feed source - Housing - Access to and use of electricity - Sex, age, class, education of owners	Extension agents from public or private sector, owners
Feed resources	- Additional feed from farming - Potential agricultural products available - Commercial feeds available (price, distance)	Extension agents, animal health provider, owners
Replacement birds	- Day-old chicks and pullets availability (price, delivery time)	Extension agents, hatcheries, pullet growers, owners
Structure and capacity of animal health services	- Number and qualifications of staff - Means of transport and communication - Cold chain - Surveillance system - Access and adequacy of medicines and vaccines	Extension agents, animal health provider, owners
Market analysis	- Species and quantities traded, seasonal peak(s), people involved, transport used, distances - Sex, age and education of people involved - Poultry price (at the farm gate and along the chain) - Major cultural festivals with peaks of sale and consumption - Seasonal pattern of production	Extension agents, traders, suppliers, sellers
Value chain actors	- For the main poultry commodities, identification of people involved in setting and enforcing rules across the chain - Efficiency across the chain - Equity across the chain	Extension agents, traders, suppliers, sellers
Policy, institutional and cultural environment	- Legislation - Institutions supporting farmers, rural women - NGOs, banking institutions providing credit - Animal health education and control - Sanitation and biosecurity	Government institutions, NGOs, banking institutions

BOX 1

Assessing type of poultry by production system

Estimate the number of **households** that keep poultry according to the following production systems by writing the appropriate letter in each box: none (A), rare (B), sometimes (C), common (D) and very common (E).

Species and breeds	Small extensive scavenging	Extensive scavenging	Semi-intensive	Small-scale intensive
Family chickens				
Broilers				
Layers				
Other chicken breeds (specify):				
Ducks				
Geese				
Others (specify):				

Source: adapted from the FAO Participatory Disease Surveillance and Response (PDS/R) programme in Indonesia.

Gender issues

Women are more frequently excluded from markets than men and opportunities for them to move from subsistence production to market-oriented poultry production are fewer. As Bagnol (2009) notes, "Appropriate technologies need to be developed, which will take into account not only women's workload but also the potential impact of the technology on their status and economic control over resources and property."

Chicken diseases and capacity of veterinary services

High mortality, often due to Newcastle disease, is a disincentive for owners to invest in improving their poultry raising activities. Other common diseases are fowl cholera, duck plague, internal and external parasites, and highly pathogenic avian influenza (HPAI). It is important to ascertain whether sufficient animal health services exist, including: qualified veterinary staff and vaccinators, means of communication, cold chain and transport availability, animal health education, and sale and control of veterinary medicines at national, regional and village level.

Feeding and feed supply

Inadequate and poor quality feed resources can make any expansion of the poultry sector impossible. The ready availability of commercial feed can be an important requirement for the promotion of semi-intensive production, and is essential for intensive family poultry production.

Availability of improved genetic resources (day-old chicks and pullets)

The availability of improved breeding stock and multiplication facilities (hatcheries) within a reasonable distance (the relation of cost/benefit needs to be assessed) offers farmers the possibility to develop semi-intensive or small-scale intensive poultry production.

Housing

Keeping chickens inside the home can be a threat to human health in the event of an avian influenza outbreak, and can also constitute a constraint to flock increase. In semi-intensive farms, housing can also be inadequate. Project implementation may require local adaptation or construction of housing and equipment (e.g. poultry shelters, feeders, waterers and candling boxes), and therefore access to a artisans and technicians.

Marketing options

It is important to ascertain whether marketing opportunities can be strengthened and producer associations boosted to support more market-oriented poultry production. Advice on egg handling and storage, training in flock management, and live bird and egg marketing may also be needed.

Microfinance service providers (MFSPs)

The existence of structures offering credit to farmers (private sector or NGOs) can allow the project to orient itself towards the support of semi-intensive or intensive smallholder poultry production systems or marketing initiatives.

Technical expertise in research and extension

Availability of staff to develop and disseminate new concepts and approaches for family poultry production is a key success factor. This aspect also includes organizations (e.g. research institutions, government extension services, NGOs) and their appropriate structures to implement development projects.

Policy and institutional environment

Most countries have policies relating to poverty alleviation, gender equity and the empowerment of women. Identifying such policies, as well as institutions able to support the project initiative, can help to develop good institutional support.

Funding

The level of funding and the manner of its distribution will vary according to local circumstances. A realistic estimate of costs should be made and funding guaranteed for the period required to establish a good foundation for the planned poultry production activities.

A checklist such as that provided in Table 5 can help to identify general and specific production system hazards (constraints) and assist with the planning of the selected development scenario.

The assessment aims to evaluate to what extent farmers consider poultry production an important aspect of their livelihood and if they are interested in improving it. The family

TABLE 5
Hazard checklist

Hazard category	Constraints	Hazard category	Constraints
Market	Too small	Predation	Avian
	Low price		Mammals
	Seasonality		Reptiles
	Too distant		Other
	Other		
Genetics	Low egg number	Theft	Humans
	Low egg size		
	Other	Credit	Expensive borrowing
	Cross-breeding		Other
	Inbreeding		
Nutrition	Scarce scavenging base	Labour	Family too busy
	Faulty feeders		Other
	Competitors for feed		
	Poor ingredients	Equipment	Faulty feeders
	Cost		Leaky waterers
	Overstocking		Faulty incubators
Seasonality	Seasonal production		Poor nests
	Seasonal feed ingredients		Poor brooding facilities'
Weather	Heat	Social	Food security issues
	Cold	Bird welfare	Overcrowding
	Wind	Disease	Avian Influenza (AI)
	Rain		Newcastle disease
	Sun		Infectious bursal disease
Environmental	Garden damage		Fowl pox
Cost	Costly medication		Infectious laryngotracheitis
	Costly materials		Coccidiosis
	Costly equipment		Parasites
Other			Other

poultry project algorithms (Figure 10 and Figure 11 in chapter 4) will help to analyse the specific situation.

A range of possible solutions are available for each of the problems identified and the options available. Designing an adequate poultry project requires that the programme is matched with the local problems and the local conditions.

The characteristics of poultry systems, the problems identified and the availability of all inputs will determine the focus of the intervention, the type of training, the programme timeframe and the project funds required. The principal question that needs to be asked is: "what is available and what can be realistically provided by a project?"

Chapter 3

Identifying appropriate interventions

Key objectives

- To define the technical interventions in a family poultry project.
- To determine and prioritize areas of intervention.

Introduction

Funso Sonaiya

Once the situation has been assessed (see Chapter 2), the possible development alternatives should be analysed in greater depth. There are nine areas to consider:

- breeding and reproduction;
- nutrition or feeds and feeding;
- health and biosecurity;
- housing;
- marketing and value chain development;
- microfinance and access to credit;
- institutional development;
- training and extension;
- creating an enabling policy environment.

This chapter discusses each of these areas in turn.

The next step is to determine the appropriate development alternative for the project area according to the available project resources and capacity. Once this is done, the project must identify the specific intervention that best addresses the constraints of the situation:

- breeding (type of birds, multiplication);
- feeds (purchase and/or production of feeds), feeding (how to calculate requirements for quantity, quality);
- health (diseases, control, biosecurity);
- housing (seasonal and/or environmental considerations);
- marketing (seasonal considerations, level of demand for birds and eggs).

It is important to assess the suitability of single versus multiple interventions. Table 6 lists the options for technical interventions in relation to the constraints they address.

TABLE 6
Technical constraints and interventions required for family poultry

Constraint	Intervention required
Genetic limitation or specific needs identified	Introduction of improved indigenous (and, if necessary, exotic) breeds and advice on special management
Feed as a limitation to increased flock size	Supplementation with locally available feed ingredients in combination with complete confinement, and regular provision of feed and water.
Disease risk	Disease control, biosecurity, improved sanitation and vaccination
Limited production and high demand	Upgrade to semi-intensive or intensive poultry production with housing
Marketing or inputs limits potential benefits and expansion of activity	Advice on egg handling and storage; training of farmers in flock management and live bird and egg marketing
Need for inputs to upgrade poultry production	Microfinance and access to credit
High costs and need for greater efficiency	Institutional development
Need for improved knowledge and practices	Training and extension
Policy limitations	Creation of a favourable policy environment

3.1 BREEDING AND REPRODUCTION

Jean-Claude Fotsa, Poul Sørensen and Robert Alexander Pym

Key objective

- To identify appropriate breeding approaches for the four production systems.

Introduction

The chosen strategy for breeding improvement will differ according to the production system. The choice is also influenced by regional factors, such as the local market, the requirement for eggs and meat, and attitudes towards traits such as feather colour and other characteristics that may have religious or ritual meanings.

As shown earlier (Chapter 1, Table 2), different genetic stock are likely to be used in the four production systems, according to the innate characteristics of the birds and their need for food and other inputs to express their genetic potential. The selection of the appropriate genotype for the production system in question is a fundamental requirement, and genetic improvement of stock under all systems is a significant undertaking requiring good management, accurate recording and, in most cases, considerable inputs either by the farmer or a government or NGO breeding unit.

Choice of appropriate stock for each production system

Genetically "improved" specialized meat or egg-type chickens are widely available in developed and developing countries, and are used by the large majority of large-scale commercial poultry producers and companies. These birds have been bred exclusively for

meat or egg production and require high-level inputs in terms of nutritional and health management to express their genetic potential. These birds are typically three or four-way crosses between "sire" and "dam" lines selected for different aspects important for either meat or egg production.

General-purpose indigenous breed birds are ubiquitous in the rural regions of nearly all developing countries. In contrast with the above specialized "breeds", these birds have, for the most part, considerably lower genetic potential for meat and egg production, but are able to survive, reproduce and produce meat and eggs in the often harsh, semi-scavenging village environment. There is, however, significant variation in productivity between the various indigenous breeds and ecotypes across different regions, within and between countries, and indeed in the climatic and nutritional environments typically experienced by the birds.

In addition to these two types, a number of dual-purpose breeds/crossbreds are available in certain regions. These have been bred exclusively to express relatively good meat and egg production under moderate climatic and nutritional management conditions, rather than the optimal conditions required by specialized meat and egg types.

Commercial layers developed from imported parent stock have the capacity to lay more than 300 eggs per year, while indigenous hens often lay only 40 to 60 eggs (FAO, 2010a). Genetic potential to produce eggs aside, a major cause of the five to eightfold difference in egg production is the time – about 13 weeks – that a broody indigenous hen spends laying and hatching a clutch of eggs and rearing the chicks to about seven weeks of age. During the hatching and rearing time she does not lay, which shortens the remaining time available for further egg production and means that she can produce about 3-4 clutches per year.

To achieve a laying rate corresponding to more than 300 eggs per year, under confinement housing, a commercial layer hen requires something like 100-110 g per day of a high-quality layer diet containing 11.7 MJ metabolizable energy, 180 g crude protein and 35 g calcium per kg. The typical scavengeable feed resource base would provide only a fraction of this, which means that these birds are unsuitable for unsupplemented extensive production systems, if reasonable productivity is required. Further, the capacity for broodiness has been bred out of commercial-strain layer hens making them incapable of natural reproduction. The growth rate of indigenous genotype chickens particularly the early growth is also generally much slower than that of commercial broilers. While broilers under typical confinement rearing may reach 2 kg live weight at five weeks of age, indigenous-breed male birds often weigh no more than 1 kg at 20 weeks (FAO, 2010a). This is a reflection of true genotype differences, but also of rearing environment, in which feed quantity and quality is the major factor.

Under intensive production systems, there is a very good argument for using genetically "improved" meat or egg genotypes, or at least intermediate performing crossbred birds. The low productivity of indigenous breed birds, even under high level management and nutrition, does not warrant their use under such conditions, unless the premium paid for their eggs and meat compensates for their generally much lower performance. There is very little opportunity within development projects for influencing the genetic potential of either the genetically "improved" egg or meat birds, or of the indigenous breed birds, other than through cross breeding. The possible impacts of this are discussed below.

Selective breeding within any genotype in which maximum progress is attempted is a slow, expensive and demanding process. There is a need for accurate pedigree records, and all selected birds should receive the same management/environment to ensure that differences in performance are a true reflection of genetic and not environmental influences. To do this effectively requires relatively large-scale, well-financed operations with sizeable populations expressing significant additive genetic variation. There are two areas, however, where farmers with moderate size breeding flocks which contribute to the gene pool of the following generation, can improve performance of their flock (see Figure 1). One approach is to cull poor performing hens, in terms of low egg production, chick production and/or mothering ability, so that their progeny are excluded from the breeders in the following generation. The other approach is to ensure that new cocks come from farms where all cocks selected for breeding purposes have relatively high growth rate in the early growth phase. This same approach can be adopted within government or NGO breeding/genetic improvement programmes.

Notwithstanding their much lower genetic potential for egg and meat production, indigenous breeds are used almost exclusively in small extensive scavenging production systems around the world. Indigenous genotypes are chosen for the following reasons:

- the hens become broody, so can reproduce without the need for artificial incubation and brooding;
- they are agile and can run fast, fly and roost in trees, thereby evading predators;
- they have been shown to be more resistant to bacterial and protozoan diseases and to parasitic infestations than commercial broilers or layers;
- their meat and eggs are generally preferred to those from commercial birds, not only by rural communities, but also often by urban dwellers.

In some government and NGO poultry improvement programmes and in certain extensive scavenging and semi-intensive production systems, local indigenous and commercial genotypes have been crossed in attempts to produce birds tolerant to local conditions, while also capable of reasonable performance. This involves the need for maintaining separate parent lines/breeds for the generation of the F1 crossbred progeny. In nearly all cross-breeding programmes, the crossbred bird exhibits considerably better egg production and/or growth rate than the indigenous breed parent. However, where the progeny are intended for use under extensive production systems, the following problems may manifest:

- loss of broodiness in hens, making them incapable of reproducing naturally;
- need for additional inputs (particularly balanced feed) to achieve the genetic potential for production;
- a change in appearance and "type", which may affect the birds' acceptability to farmers and consumers of poultry eggs and meat.

Notwithstanding these limitations, there is a strong case for genetic improvement through crossbreeding for birds intended for large-scale extensive and semi-intensive production systems.

Under small-scale (and larger) intensive production systems, the need for high productivity means that genetically "improved" commercial broiler or layer genotypes are the only economically viable genotypes. There is a case for using commercial genotypes better

adapted to the local environment (e.g. single-gene heat adaptive capability such as naked neck) if such are available. Given the cost and complexity of breeding programmes at this level and the use of three or four-way cross commercial stock, however, there is little point in contemplating further genetic improvement or modification of commercial birds.

Genetic improvement under extensive scavenging production system conditions

General considerations

One of the greatest limitations to profitability under the extensive production system is the high mortality rate of the birds. Artificial selection has only a very limited impact in this regard, given the complexity and low heritability of liveability. However, considerable natural selection occurs under scavenging conditions. The most effective way of reducing mortality in indigenous birds under extensive scavenging conditions is through health and general management procedures, as described in the following sections.

While improving egg production is important, there is a negative relationship between broodiness/mothering ability and egg production. Hens that do not become broody have greater opportunities to lay more eggs. However, broodiness is essential in situations where artificial incubation is not an option and chick production is regarded as important. Under this system, improvement in egg and/or chick production can be achieved by culling hens that lay only small clutches of eggs and/or have low hatchability. The level of culling will depend on the size and productivity of the breeding population. Thus, there is a considerably greater opportunity for genetic improvement in larger scale extensive flocks than in smaller flocks of 10 to 15 birds.

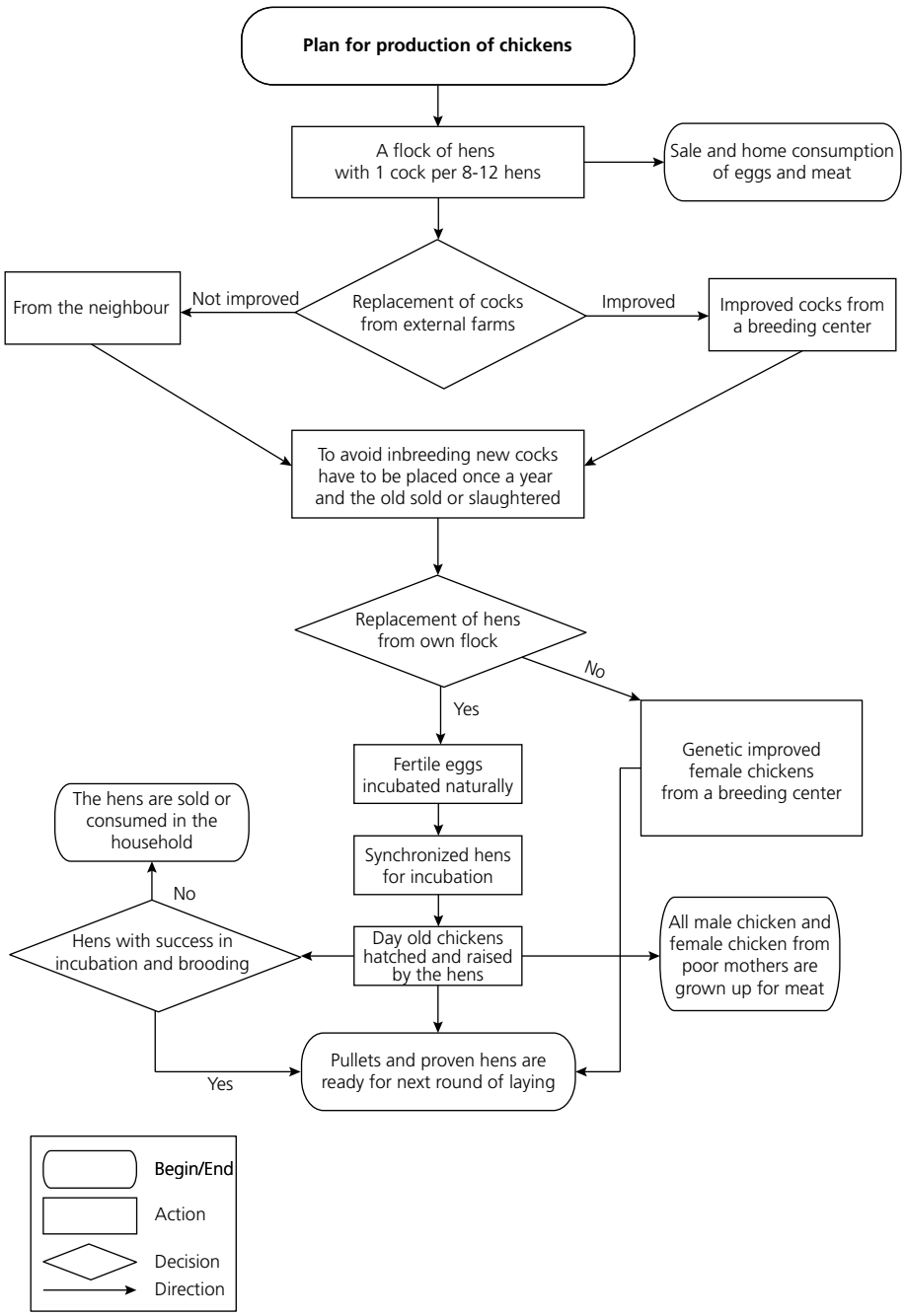
In larger scale operations of ten or more breeding hens, those that demonstrate good broodiness and mothering ability can be used as brooders for eggs laid by hens which have high egg production potential and low propensity for broodiness. The balance between the two types and the possibility of selection for increased egg production in the breeding programme depends upon a number of factors, including the relative demand for chickens and eggs.

Meat production is the prime reason for small and larger scale extensive family poultry production in most developing countries. A high reproduction rate, and hence good egg production, is an essential element. Thus, any attempts at genetic improvement in extensive poultry production should focus on improving both egg and meat production.

Growth rate and meat production traits have relatively high heritabilities (i.e. a significant proportion of the variation in growth rate between birds of the same sex and age, given the same rearing environment, is due to genetic factors). As such, they respond readily to genetic selection. However, improved growth rate under semi-scavenging conditions, while associated with larger birds with more meat, also means higher maintenance requirements and fewer birds with limitations to supplemental feeding and/or the SFRB.

Irrespective of the source of the stock, it is important to maintain an appropriate sex ratio (approximately one male to ten hens) and to change the cock(s) on the farm once per year to avoid inbreeding. A high level of inbreeding will impact negatively on hatchability, liveability of the chicks and egg production (i.e. on all reproductive fitness traits). Where possible, brother-sister and other close relative mating should be avoided and males

FIGURE 1
Production plan for dual-purpose chickens



should ideally be sourced from another village or from a government/NGO breeding farm. To maintain good fertility, the hen should be mated no less than once per week while she is in production. The above sex ratio normally ensures such frequency, but males may be replaced in cases where libido is lacking.

Approaches

Given the significantly fewer number of males required than hens in a breeding population, it is much easier to effect genetic improvement of the flock through the males than through the hens, particularly where genetically improved males are available from government, NGO, or private breeding farms. To ensure success, however, the breeding programmes must be well conducted and the stock in question genuinely genetically superior in terms of growth rate and egg production relative to the local genotype. It is also important that the breeding takes place in an environment similar to that of the region in which they are to be distributed, which means that the cocks are genetically adapted to that environment. Aside from ability to pay for genetically "upgraded" males, there is no reason why both small and larger scale farmers should not adopt this approach. In some cases, genetically improved hens will also be available, but the impact of these on the genetic makeup of the flock will be much lower.

There is cause for caution regarding the genetic "superiority" of such birds, since their progeny will be expected to perform under village semi-scavenging conditions. Egg production under cage confinement may be poorly correlated with reproductive performance under semi-scavenging conditions.

Despite considerable genetic variation in most indigenous genotypes for egg and meat production, the complexity of the production system and the desirable traits presents considerable obstacles to effective selection for improved performance. There are examples where performance has been improved through this approach, but they are few and the gains have been modest (FAO, 2010a).

Okeno *et al.* (2012) investigated breeding objectives and selection schemes for indigenous chickens in Kenya based on a bio-economic model accounting for the risk attitude of the farmers in small extensive scavenging, extensive scavenging and small scale intensive systems. They found that breeding with indigenous breeds would be profitable in the two first mentioned production system but not for the last mentioned system. Okeno et al. (2013) further investigated three breeding objectives (dual purpose, meat and eggs) under a pure line scheme or a crossbreeding scheme. The most profitable breeding system was the purebred selection for better meat production of indigenous chicks. These findings from Kenya can also provide guidance for genetic improvement of indigenous chicks in other countries with similar environments.

Irrespective of where breeding males are sourced, the chicks may be produced by broody hens or by artificial incubation of the eggs. Small-scale farmers tend for the most part to use the former approach, but there are opportunities for increasing the scale and efficiency of operation by utilizing artificial incubation, where available. A development project might consider this as a desirable aim or input. Farmers could make use of a local hatchery utilizing either Parched Rice or Rice Husk Incubators, which run solely on solar energy and typically result in 65-75 percent hatchability. Farmers could alternatively form a

cooperative and purchase or build a similar incubator for incubation and hatching of day-old-chicks. Mini hatcheries can be established in rural communities and IFAD has demonstrated in Bangladesh that poor women can successfully handle mini-hatchery technology.[5] These methods are useful and self-sustaining, allowing local poultry farmers to replace their stock and supply day-old-chicks to other local poultry farmers. Uganda's experience, in this regard, provides a model for consideration (FAO, 2009a).

Eggs for incubation should not be more than seven days old, and all eggs should be stored at a temperature between 15 °C and 25 °C. Embryo development takes place at temperatures above 25 °C. The incubation period lasts 21 days and eggs need to be turned every 6 to 8 hours during the first 18 days of incubation to maximize hatchability. Under natural incubation, hens do not discriminate between their own and foreign eggs. After the chicks have hatched, the hen will care for them for the next two months or so during which time she will not lay eggs. This period can be shortened if the farmer provides the necessary brooding conditions for the chicks. Male chickens not required for breeding purposes should be grown to market weight as rapidly as available food resources allow. It is important that they are removed from the flock well before they reach sexual maturity.

Figure 1 illustrates a number of breeding options for extensive production systems utilizing indigenous chickens.

Genetic improvement considerations under semi-intensive and small-scale intensive production systems

There is a persuasive argument for using commercial improved breeds/strains of broilers or layers in semi-intensive and small-scale intensive operations involving confinement rearing and supplementary feeding. However, their suitability depends on the level and quality of feeding and the likely exposure of the birds to sub-optimal conditions. Where feeding is sub-optimal and commercial diets are either not available or considered too expensive, there is a case for using indigenous breeds or crossbreds. One important factor is the relative prices paid for the meat and eggs produced by the different genotypes. Where a significant premium is paid for meat and eggs from indigenous breeds, the cost of confinement rearing and feeding of these birds can be justified, in spite of their considerably lower productivity.

While there is limited opportunity for further genetic improvement of specialized egg or meat-type birds, decisions need to be made about the most appropriate breed/strain to use in the situation at hand. Where a development project is planning to set up a franchised breeding farm and hatchery to produce day-old crossbred birds for distribution to family poultry producers, the following issues require consideration:

- *layers and meat-type birds:* cost of breeding stock and any incentives from the breeding company; availability and reliability of supply; disease status of stock;
- *layers:* management requirements for parental breeding stock; relative efficiency of egg production; white *vs.* brown eggs and other egg-related factors influencing acceptability to the community in question;

[5] See www.ifad.org/lrkm/pub/hatchery.pdf

- *meat-type birds:* relative management requirements for the parental breeding stock; reproductive rate in the breeder females; efficiency of growth rate of the broilers; physiological issues such as propensity for leg weakness or ascites.

Most of the above issues are also important where a development project is considering obtaining crossbred day-old commercial stock from existing franchise hatcheries for distribution to family poultry producers. This approach, however, is much simpler and less costly than setting up facilities for breeding flocks and a hatchery. It also significantly reduces exposure to potential problems with disease outbreaks in breeding flocks or with the supply of eggs or day-old breeding stock from the breeding company.

Genetic improvement can be achieved through cross-breeding, which normally involves a two-way cross between an improved exotic and a local breed, with the aim of combining the better production capacity of the former with the latter's adaptability to harsh environments. This system also maximizes the expression of heterosis, or hybrid vigour, in the cross, normally reflected in improved fitness characteristics. A number of factors determine whether this approach can be considered within the constraints of a development project. These include the need for such crossbred stock, access to suitable genotypes, the expertise to conduct an effective crossbreeding operation and the resources to do so.

Where there is a perceived need for crossbred birds, a simpler approach would be to access either the male line birds or the crossbred progeny themselves from an existing source, such as a government or private enterprise breeding programme, and distribute these (normally annually) to the family poultry producers participating in the development project. In the former case, the breeding hens would be held by the farmer, and in the latter, the entire flock would be replaced periodically.

Without prior testing, it is very difficult to predict the performance, benefits and problems of F1 crosses between any two genotypes. Thorough testing is therefore necessary to determine the suitability of crossbreds for the region and intended production system(s), prior to attempts to produce such birds for distribution to farmers. Wherever possible, it is preferable to utilize known genotypes and crossbreds.

Examples of crossbreds that have made substantial contributions to small-scale poultry production in developing countries are Sonali birds in Bangladesh and CARI Nirbheek birds and Kuroiler in India (Ahuja *et al.*, 2008; FAO, 2010a). It is important to understand that farmers always need to buy the F1 generation chickens for replacing the previous generation and that they should not reproduce from the F1 generation. This requires that the governmental, NGO or private based breeding unit is maintaining the different breeds for crossing and is able to continuously deliver the F1 generation chickens.

For all production systems in tropical developing countries, tolerance to high temperatures is a key requisite. One of the most effective ways of improving heat tolerance is through the incorporation of single genes that reduce or modify feathering, such as those for naked neck *(Na)*, frizzle *(F)* and scaleless *(Sc)*, as well as the autosomal and sex-linked dwarfism genes, which reduce body size (Cahaner, 2008). These genes are segregating in some indigenous populations, as natural selection for heat tolerance is an important component of reproductive fitness. Crossbreds produced from mating between commercial birds and indigenous birds expressing these feathering types, may have merit in semi-intensive and small-scale intensive production systems where high temperatures are a problem. Use of dwarfism genes is a possibility if the focus is on egg and not meat production.

3.2 FEEDS AND FEEDING

Funso Sonaiya

Key objectives

- To discuss the different feeding options (commercial feed, local feed, scavenging) available to provide nutrients to the birds.
- To examine methodologies used to assess the scavengeable feed resource base (SFRB) for family poultry development projects.

Feeds

A regular supply of feed, over and above maintenance requirements, is essential for improved productivity in all four family poultry systems. Careful attention should be paid to ensuring adequate and balanced feed resources. When feed resources are scarce, it is preferable to maintain a few birds in production than more birds without sufficient food for production. A list of feed resources available to family poultry producers was compiled from surveys undertaken in the Asia and Pacific region (Ravindran and Blair, 1993) and in Nigeria (Sonaiya, 1995).

Local feeds

In Low Income, Food-Deficit Countries (LIFDCs), a surplus of food grains is generally not available. It is therefore not advisable to develop a wholly grain-based feed system. The recommended practice is to identify and use locally available feed resources to formulate diets that are as balanced as possible (Branckaert *et al.*, 2000).

The by-products of processing local crops (brans, oil and seed cakes) can be used as both energy and protein sources (Hutagalung, 1981), but cannot form a balanced ration on their own. It is recommended to contact an experienced nutritionist with a well-equipped laboratory to formulate least-cost, balanced rations.

Commercial feeds

A common recommendation is to use commercially manufactured feed. However, many farmers find this too costly and the supply irregular. In Malaysia, small flocks of poultry are fed on "domestic feed", a reduced-price feed marketed by feed millers with a lower "nutrient density"[6] than commercial broiler diets. Such "feed dilution or extension" takes many forms, including the use of lower density feeds such as grower feed for producing hens; and skip-a-day feeding where the recommended feed type is used, but not provided every day. The most common method is to purchase "pre-mixes". These usually contain protein, vitamins and minerals, to which basal feed ingredient(s) is added as necessary. In fully commercial operations, the basal ingredients will be food grains (yellow maize, guinea corn, wheat, rice, oat, millet), tubers (cassava, yam, potatoes) or plantains.

[6] Balanced for all nutrients, but lower in energy because of the inclusion of low-energy ingredients such as rice or wheat bran.

BOX 2

Scavengeable feed resource

The scavengeable feed resource (SFR) includes:

- Household kitchen waste
- Grains and grain by-products
- Roots and tubers meals
- Oilseed cakes and meals
- Leaves of trees, shrubs (including *Leucaena, Calliandra* and *Sesbania*) and fruits
- Animal protein meals; blood, termites, maggots, earthworms, oysters, snails
- Aquatic plants (*Lemna*, *Azolla* and *Ipomoea aquatica*).

Scavengeable feed resources

The scavengeable feed resource base (SFRB) is defined as the total amount of feed available to all scavenging animals in a given area (Roberts and Gunaratne, 1992). It depends on the number of households, the types of food crops grown, and the methods of crop cultivation and processing, as well as the climatic conditions that determine the rate of decomposition of the feed resources.

The SFRB comprises materials from two sources: household food waste and leftovers (HHL), and materials from the environment, such as crop by-products and the gleanings of gardens, fields and wastelands (Olukosi and Sonaiya, 2003; Sonaiya, 2006) (Box 2).

Recommended procedures and parameters for SFRB assessment

Roberts and Gunaratne (1992) proposed two methods of determining the value of the SFR without estimating usage of the range. The first is based on HHL; the second is based on the metabolizable energy requirement for maintenance and production (MPE).

The HHL method requires weighing the amount of household food leftovers generated by each family per day, and determining the proportion of the crop content of the scavenging birds, which comprises household leftovers as determined by visual inspection. This is multiplied by the ratio of the number of families in the community to the number of families in the community with chickens. Sonaiya (2006) modified the original equation to use the total number of chickens instead of the number of flocks in the village

The MPE method only requires the calculation of the amount of energy required to support the maintenance and production of chickens in the flock. This means that if there is scavengeable feed available, the actual amount of the scavengeable feed consumed by the birds is related to their energy requirement for maintenance, growth and egg laying. In the absence of any other source of feed, the daily consumption of the flock is the SFR.

Techniques to avoid competition between humans and poultry through on-farm feed production

The conventional feed ingredients used for poultry are grains also used as human food. Family poultry improvement projects can avoid competition between humans and poultry by using the following techniques.

- Year-round protein production from:
  - manure-based duckweed production in shallow ponds with clean and polluted water sources;
  - protein supply from leaves such as cassava, *Leucaena, Sesbania,* and *Glyricidia*; and
  - animal protein supply, for example, from blood meal, rumen microbes, hatchery by-product waste and leather by-products.
- Utilization of non-conventional feed ingredients such as tealeaf waste, duckweed, poultry litter, earthworms and insects (cultivated and natural) as protein sources for semi-scavenging poultry.
- Determination of the amount and composition of feed materials available for scavenging and their seasonal and regional variations.
- Matching available SFR with the optimum number of birds that the SFR can sustain;
- Cultivation of earthworms, maggots, termites and cockroaches, which are incorporated into the feeding system.
- Use of industrial by-products such as those from breweries and fish-processing plants as supplementary feed.

Feed energy sources used as substitutes for expensive commercial feeds include cassava, sweet potato, coco yam *(Colocasia esculenta),* arrowroot *(Maranta arundinacea),* coconut residues, coconut oil, palm oil and other non-traditional energy sources.

Non-conventional **protein-rich** feedstuffs that are good substitutes for fish meal, soybean and groundnut oil meals include earthworm meal, maggot meal, winged bean, pigeon pea, jack bean, *Azolla (A. pinnata, A. caroliniana, A. microphylla)*, leaf meals and leaf protein concentrates such as *Moringa oleifera*.

Mineral rich sources from animals include scorched seashells, snailshells and eggshells, fish and chicken bones. Mineral rich sources from plants include papayas, *Leucaena*, *Calliandra*, *Sesbania* and aquatic plants.

The **cafeteria feeding system** is a popular method for feeding scavenging chickens, which gives them the opportunity to select nutrients according to their physiological demands.

Smallholders using extensive systems unwittingly adopt cafeteria choice feeding of nutrients. Energy supplements such as maize, sorghum and millet are offered early in the morning and late in the evening. During the day, birds scavenge mostly for protein (insects, worms, larvae), minerals (stones, grits, shells) and vitamins (leafy greens, pepper, oil-palm nuts). There is evidence to show that such a cafeteria system is not inferior to offering complete feeds. The real need, therefore, is to determine the nutrient content of the available feed resources and to give such nutrients to birds at the right time, which does not necessarily mean at the same time.

Techniques, constraints and limits of on-farm production of protein sources

Blood meal

Absorb the blood on a vegetable carrier such as citrus meal, brewers grain, palm kernel, ground maize cob or rice and wheat bran, then spread the material out for drying on trays heated from below or placed in the sun (Makinde and Sonaiya, 2010).

Termites

Chop sorghum, millet and maize straw, place it in clay pots or calabashes and moisten it. Place the mouth of the container over a hole in a termite colony under construction and cover the container with a jute sack to prevent drying out. Place a heavy stone on the container to secure it in position. After three to four weeks, a new colony of termites should be established inside the container. Chicks, guinea keets and ducklings relish the eggs and larvae, while adult birds feed on the termites. Cattle dung can be used in place of straw.

Maggots

Fill a 1 m^3 capacity tank with water to about 15 cm from the top. Soak dried stalks of maize, amaranth, groundnut, soya or any other vegetable material in the water. Add poultry droppings and other animal waste to attract flies. Cover during the hottest hours of the day to avoid prolonged exposure of the fly eggs to the sun. After five to seven days, the maggots are sufficiently developed to feed to poultry. Maggots are best fed fresh, but can be steeped in boiling water to kill them before sun drying for storage.

Earthworms

1 kg of fresh earthworms can be produced daily in an area of 25m^2. This is sufficient to supplement at least 50 chickens with high-quality protein. It must be noted, however, that earthworms (and snails as well) may be important vectors for tapeworms, such as *Davainea* and *Raillietina*, and also contain a growth inhibitor.

Aquatic animal products

Marine shells from mangrove oysters (*Ostrea tulipa),* mangrove periwinkles *(Tympanotonus fuscatus)* and clams are abundant in coastal areas. Snails and their shells are harvested from forests. Marine by-products such as prawn dust and shrimp heads also supply both minerals and protein.

3.3 HEALTH, PUBLIC HEALTH AND BIOSECURITY

Robyn Alders, Philippe Ankers and Emma Watkins

Key objective

- To provide a general overview of the key health issues involved in family poultry production and examples of how these issues have been successfully addressed on the ground.

BOX 3

The more intensive the production system, the more expensive the inputs required

"It may seem that having more poultry will make an enterprise more profitable, but this is not always the case. Care must be taken to ensure that inputs and expertise are available and affordable; otherwise attempts to intensify poultry production will not be sustainable. As the density of a poultry population increases, more sophisticated disease control measures are required."

FAO, 2004b

Family poultry health

Health is an essential component of any family poultry production project. The production system(s) involved will dictate the relevant health issues. A situation analysis of health issues will be required to ensure that the project design takes into account the key issues. Healthy birds are not only free of disease, but are also adequately nourished and have access to appropriate shelter.

Major poultry diseases must be prevented or controlled if family poultry production is to become a reliable source of food and/or income. Where poultry disease surveillance and diagnosis is incomplete, participatory epidemiology can be employed to identify diseases or disease syndromes of importance, which can be confirmed by laboratory diagnosis.

Newcastle disease (ND) is considered the most important poultry disease worldwide. It is endemic in many countries and can kill 100 percent of susceptible chickens. ND vaccines and good husbandry can prevent the disease in areas where conventional vaccines can be kept cold. Where a robust cold chain is not available, thermotolerant ND vaccines should be used. Family poultry may also be affected by fowl cholera, fowl pox, external parasites among others, which can be prevented by a combination of vaccination and good husbandry.

The development and application of thermotolerant ND vaccines has greatly reduced the impact of this disease in family poultry, and these vaccines are also being administered to commercial poultry flocks in some tropical countries. The control of ND contributes to improved links between producers and animal health services. Sustainable ND control provides a solid foundation on which to build improved poultry husbandry, cost-efficient surveillance and diagnostic services in collaboration with producers.

The prevention and control of other poultry diseases identified in the project areas as being of economic or public health importance should be included in the project design. Participatory epidemiology (Catley *et al.*, 2012) provides a cost-effective complement to classical approaches to disease surveillance and diagnosis. Support of national animal health services should be sought in relation to disease prevention and control activities. In the south-eastern region of Africa, fowl pox has emerged as an important problem in village chickens following the control of ND, while in some parts of Asia, fowl cholera is widespread. Duck plague is a serious constraint in South-east Asia. Infectious bursal disease

BOX 4

Good practice with the use of thermotolerant ND vaccine in rural poultry

Experience gained during the implementation of ND control activities involving thermotolerant ND vaccines has shown that a sustainable programme comprises five essential elements:

- An appropriate vaccine, vaccine technology and vaccine distribution mechanisms.
- Effective extension materials and methodologies that target veterinary and extension staff, as well as community vaccinators and farmers.
- Simple evaluation and monitoring systems of both technical and socio-economic indicators.
- Economic sustainability based on the commercialization of the vaccine and vaccination services and the marketing of surplus chickens and eggs.
- Support and coordination by relevant government agencies for the promotion and implementation of vaccination programmes.

Source: Copland and Alders, 2005

(also known as Gumboro disease) has proved a major problem for small-scale intensive poultry units. Diseases related to poor nutrition, for example, vitamin A deficiency, may have a seasonal appearance in areas where the SFRB is limiting. Internal and external parasitism is also widespread.[7]

Family poultry and public health

Poultry production has received increasing attention from the public health community in recent years because of its links to zoonotic disease. Two zoonotic diseases of major interest are Salmonellosis and highly pathogenic avian influenza (HPAI; subtype H5N1). Both of these diseases have been more problematic in intensive production systems; however, their prevention (by purchasing birds from flocks certified free of key diseases and including training on appropriate biosecurity) should be included in any new family poultry project, irrespective of the production system.

Despite concern over the involvement of poultry in the transmission of zoonotic disease, it is important to remember that family poultry continue to be raised because of the multiple benefits they provide to their owners. As outlined in Chapter 1, family poultry provide animal protein in the form of meat and eggs, and may be used for sale or barter in societies where cash is not abundant. They fulfil a range of functions that are difficult to value in terms of money; they provide pest control and manure; and they are used in festivals, ceremonies, treating illnesses and for meeting social obligations.

In the wake of the HPAI H5N1 pandemic, millions of poultry were killed or slaughtered to control the spread of the disease. These measures severely impacted the livelihoods of

[7] See Ahlers *et al.* (2009), FAO (2004a) and NSPD (2007) for a review of the diseases to be considered and the associated control methodologies.

many households, especially women, in some countries (FAO, 2009b). The HPAI H5N1 pandemic also highlighted the readiness of vulnerable households to slaughter and consume unhealthy birds or carcasses of poultry that have died of infectious disease because of food insecurity, a practice that pre-dates the HPAI H5N1 pandemic. Improving overall production levels of birds and incomes of farmers will help to reduce such practices.

Biosecurity

Biosecurity risks and requirements vary according to the production system involved. The range of biosecurity measures that can be promoted when developing poultry projects include: segregation measures (confinement, controlling contacts with other birds, introduction of healthy birds only), cleaning (shelters, equipment, clothes and shoes) and decontamination measures. As family poultry includes small-scale intensive, semi-intensive and extensive production systems, the biosecurity issues to be addressed must be tailored accordingly.[8]

Investing in adequate biosecurity practices remains difficult for small-scale intensive poultry producers with low profit margins, especially with huge fluctuations in feed prices. Lack of access to information and education, mainly for women, continues to result in households and producers that are unfamiliar with the germ theory of disease and the science behind good nutrition and poultry husbandry. For a new project to effectively address biosecurity issues, it will likely require communication and education components as well as a participatory approach to the development of a biosecurity plan. As small-scale non-industrial intensive and traditional household poultry production may occur side-by-side within one village, a cooperative, community approach may be needed to develop effective, realistic biosecurity measures (in the case of free-roaming birds, in particular, the whole village becomes the epidemiological unit).

Biosecurity does not start or stop at the household or farm gate. It is important to consider biosecurity along the whole value chain, including in live bird markets and between markets and the producer's home.

BOX 5

Definition of Biosecurity

"Biosecurity is the implementation of measures that reduce the risk of the introduction and spread of disease agents. Biosecurity requires the adoption of a set of attitudes and behaviours by people to reduce risk in all activities involving domestic, captive exotic and wild birds and their products."

FAO, 2008

[8] See Ahlers *et al.* (2009) and FAO (2008) for recommendations regarding biosecurity issues to be considered for family poultry production.

CASE STUDY 1

Examples of best practice for family poultry

Indonesia's Village Biosecurity, Education and Communication (VBEC) programme began in August 2009 with a qualitative and quantitative socio-cultural assessment in six pilot villages. This allowed better comprehension of community understandings, beliefs and practices regarding poultry keeping, poultry disease and bird movements. During the process, Participatory Disease Surveillance and Response Officers or local livestock services staff provide technical assistance and improved awareness about the transmission of viruses and the prevention of diseases, helping community members to develop their own technically sound approach to controlling and preventing disease.

The programme employs a "bottom-up" approach, whereby the local community jointly implements a series of realistic HPAI prevention and control activities in line with local conditions. Each village agrees the resulting action plans and a district livestock services staff member ensures continuity, feedback and technical soundness. Information, education and communication activities target existing community groups, such as Posyandus (village integrated health services), religious and devotional groups, self-help and women's groups, churches and mosques, elementary, junior and high school students, and other miscellaneous community gatherings. In villages where commercial poultry producers exist, specific technical extension messages are provided, including technical discussions covering management issues, poultry anatomy and practical biosecurity pertinent to the levels of the production systems present (FAO, 2010b).

Another project in Indonesia focusing on cost-effective biosecurity for non-industry commercial poultry operations has made excellent progress by involving all key stakeholders in poultry health activities (ACIAR, 2010).

3.4 HOUSING AND OTHER INFRASTRUCTURE

Robyn Alders

Key objective

- To provide a general overview of housing and other infrastructure required for each of the different family poultry production systems.

Introduction

Housing and other infrastructure requirements vary considerably depending on the production system concerned. The basic requirements for poultry housing are space, ventilation, light and protection.

Poultry houses provide shelter from predators and bad weather, and can improve poultry production. They also assist with easy handling of birds if individual treatment or vaccination becomes necessary. Care must be taken to use designs and materials that do not promote infestations of internal and external parasites and the transmission of infectious disease agents.

Extensive family or village poultry production

Villagers value their poultry, but most are left to fend for themselves under completely free-range conditions. The chickens find their own feed and water, breed at random, lay their eggs where they find it suitable to do so and raise their chicks on their own. Villagers slaughter or sell their chickens only when necessary and, in many regions, eggs are not collected for sale or consumption, but rather left for the hen to hatch.

Farmers are often cautious of change and are naturally wary of taking on added risk or adopting new practices. This is especially so for poorer farmers, as any change potentially risks the lives and health of themselves and their families. Management changes should therefore be introduced gradually. In addition, extension staff should undertake participatory exercises with the community to establish the most serious problems and ascertain which practices have the greatest chance of adoption. Management change should start with those practices and then introduce other improvements once farmers have seen the benefits of the innovations.

Some simple management practices can help to turn village farmers from passive observers of their poultry into active producers, while still using minimal labour and other inputs. Flocks from different households in a village intermingle, interbreed and share the same feed resources. Hence, families should be encouraged to work together with their neighbours and learn from one other.

Poultry can become a more productive and important part of the farming system with little financial risk and impediment to the other activities of farmers. Housing village poultry at night will protect them from rain and the cold; from predators such as rats, dogs, snakes and other wild animals; and from theft. Housed birds are also easier to catch to inspect for signs of illness or injury, or to vaccinate against diseases.

Exploitation of the scavengeable feed resource base is one of the major advantages of the low-input village poultry production system. Housing for adult and older growing birds should therefore be provided only at night and the birds allowed to range free for feed during the day.[9]

When discussing appropriate overnight housing for extensively raised village poultry, it is important to bear in mind that farmers will weigh up the benefits of improved housing, which may improve biosecurity, against security issues associated with the theft of birds if appropriately designed. Farmers that have security concerns will tend to encourage their birds to roost overnight close to the household sleeping quarters or in chicken housing with small front doors (that make it difficult to take birds but consequently difficult to clean).

Adult chickens and growers are often provided with elevated night housing. Some also have inverted metal cones around the legs to prevent snakes and rats from entering the house (Figure 2). Chicken houses built close to the ground are suitable for hens with young chicks that cannot enter an elevated house. Locally made cages can be moved easily and kept off the ground. They can be used to protect birds from predators and moved around to allow the birds access to new scavengeable feed. They may be used to keep chickens inside the house overnight or to separate newly introduced or sick chickens from the flock for several days (Figure 3).

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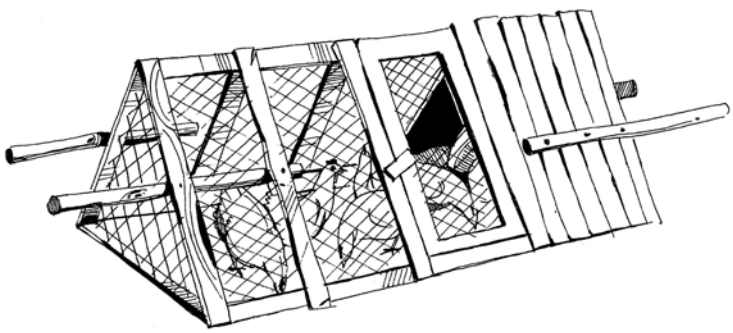
[9] See the ACIAR manual *Improving village chicken production: A manual for field workers and trainers* for further details on the points discussed below (Ahlers *et al.*, 2009).

FIGURE 2
Elevated night housing

Source: Ahlers *et al.*, 2009

FIGURE 3
Mobile cage



Source: Ahlers *et al.*, 2009

Chickens favour perches, as they like to sleep above the floor. Roosting on perches minimizes contact between the birds and their droppings, and therefore helps to prevent diseases.

Provision of clean nests in safe places assists in controlling and improving productivity. The quality of eggs is better if nests are clean. Moreover, it is easier to find eggs if nests are provided, rather than allowing birds to lay eggs in hidden locations. Locally available items such as baskets, boxes, buckets or similar containers can be used for nests.

Predators are a major problem in village chicken production, causing almost unavoidable losses in free-range systems. Predators of chickens include other birds, mammals and reptiles, and even ants. Design of protective measures should take into consideration the common predators in the region and their hunting methods.[10]

Semi-intensive family poultry production

Housing for semi-intensive family poultry production systems builds on the efficiency of SFRB by adding the provision of supplementary feed to complement its deficiencies, improved housing and transport facilities to get increased numbers of birds to market.[11]

To promote cost efficiency, poultry houses including nests should be designed for local conditions and use local materials. Small chicks should be kept with their mother at night in a "night basket", a conical cage with a floor. A night basket may be made from bamboo or thin pieces of wood. Dry cut straw, rice husks, sawdust or shavings of 8-10 cm depth can be used as litter. In the morning, the chicks should be removed from the night basket and kept in a day basket.

Considerable care should be taken if poultry runs and/or yards are to be constructed. The following points should be considered:

Fenced areas may reduce predation if well built, but can also facilitate predation by snakes, small mammals and thieves, as the birds will be unable to escape. The fence must be built so that the size of the netting prevents predators from entering and must be lodged in the ground so that predators cannot burrow under it.

Fenced areas must be sufficiently large to allow birds to scavenge for feed. If the area is too small, the birds will quickly eat all of the grass, insects, etc. and be left with bare earth. The birds would then grow poorly unless the producer provided all of their feed requirements. When considering the size of the run, requirements should be based on the period of the year when the scavengeable feed resource base is at its lowest, usually during the dry season.

Intensive family poultry production

The basic requirements for poultry housing for small-scale intensive poultry production are well covered in the FAO technical guide on small-scale poultry production (FAO, 2004a). The guide also provides guidance on appropriate nests, perches, feeders, waterers and brooders.

Designing housing for small-scale intensive poultry production is challenging, as it must meet biosecurity standards within a capital investment level that can be justified by the scale of operation. In addition to poultry housing, pest-proof storage areas for supplies such as feed and areas for support personnel to change or wash their boots and clothes are

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[10] See the housing sections in Ahlers *et al.* (2009) and FAO (2004a) for further details on extensively raised birds.

[11] Further details on housing for semi-intensive systems can be found in the manual, Keeping village poultry: A technical manual on small-scale poultry production, published by the Network for Smallholder Poultry Development (NSPD, 2007).

also required. As the birds are constantly enclosed, they are unable to supplement their diet by scavenging. This means that the producer must provide 100 percent of their feed and water. The feed must be nutritionally balanced according to the type of bird being raised (e.g. age and breed) and free from microbial contamination. Feed must be stored in an area where it cannot be interfered with by rodents or wild birds (which can introduce disease agents) or become moist (to prevent fungal growth). For example, pigeon droppings have contaminated poultry feed and led to outbreaks of ND in chickens ingesting the contaminated feed. Aflatoxins ingested on moist grain will greatly reduce the productivity of birds and cause immunosuppression in those that consume it.

3.5 MARKETING AND VALUE CHAIN DEVELOPMENT[12]

Jan Hinrichs, Jenny Ifft and Sam Heft-Neal

Key objectives

- To understand the steps involved in identifying potential constraints to improving the family poultry value chain.
- To discuss and/or list the tools used to identify and analyse value chain components.

Value chain development

Family poultry can contribute to income generation only where appropriate value chains are present. Value chains are groups of people and processes through which a commodity is supplied to the final consumer. Incentives, information and other formal and informal linkages connect the people involved in the chain.

Understanding the value chain is vital to building the basis for sustainable interventions and value chain development. A variety of tools from different disciplines are available to identify and analyse the various components of the value chain (Table 7). The chosen assessment and intervention approach for poultry value chains should be guided by the objectives of the intervention or project. In general, poverty reduction and income generation projects focus on increasing output, product prices and traded volumes for producers. Many development projects have also been conducted to reduce the risk of disease transmission among poultry and between poultry and humans. These interventions are more likely to be sustainable if incentives such as increased income generation are ensured. Further, establishment of a new value chain or changes to existing value chains requires the identification of companies and entrepreneurs able to overcome the financial and social costs. Development projects can contribute to this process, but should be careful not to crowd out entrepreneurial activity. Rigorous and multi-disciplinary value chain analysis plays an important role in ensuring the sustainability of such projects.

Value chain analysis needs to identify the means and scope by which the quantity and/or value of poultry products from family poultry production can be increased. The following steps address potential constraints to improving the family poultry value chain with regard to achieving higher value creation for targeted producers and traders:

[12] The views expressed are those of the authors and should not be attributed to the United States Department of Agriculture and its Economic Research Service.

TABLE 7
Assessment tools for value chain analysis

Step	Tool	Objective and/or output
1	Demand analysis: income elasticity and cross-price elasticity for other livestock products	To predict consumer response to price changes and the impact of income on demand
	Household surveys and analysis of expenditure on livestock products	To establish current livestock production consumption and consumer attitudes and behaviours
	Willingness-to-pay experiments	To use laboratory or field experiments to assess consumer preferences for specific product characteristics, such as safety or freshness or local production, and estimate the price people might be willing to pay
2	Participatory mapping with people in the main value chain(s) drawing maps of the transaction points along the value chain	To obtain spatial information in participatory workshops or key informant interviews
	Key informant or focus group semi-structured interviews using an interview checklist	To characterize actors in the value chains with regard to their perceptions, expectations and behaviours
3	Semi-structured focus group and key informant discussions	To obtain value chain governance and actor profile information
4	Analysis of product prices, trading and production costs along the value chain	To assess the power and information distribution along the chain
	Enterprise budgets, margins and income distribution	To understand the economic motivations of people involved in the poultry value chain
	Social contracts and estimation of transaction costs	To understand how social capital and other institutions affect poultry value chains
5	Synthesis of different assessment tools	To identify priorities for policy, research and investment in value chains, and to assess if existing value chains match consumer needs

- Assess consumer preference and willingness to pay for certain poultry product characteristics that could be supplied by a large number of family poultry producers.
- Map and characterize the people involved in working and running businesses in the main value chains. Participatory descriptive mapping visualisation is a tool well suited to this task.
- Assess existing relationship structures and coordination mechanisms between the actors and identify potential governance constraints to supplying the desired product characteristics. Often market institution building interventions are required to develop more efficient family poultry value chains.
- Identify potential equity issues within the poultry value chain using a cost and profit structure assessment and a transactions cost assessment for the people in the main value chain. A brief overview of the profit margin for producers and traders helps to identify where market power is exercised along the value chain, as well as incentives for participation in further developments. Better knowledge about consumer preferences for specific product characteristics allows traders to fully capture the price premium. This information asymmetry could be addressed by targeted value chain governance interventions, such as market institution building and the introduction of

certification and price information schemes. Transactions costs can also affect equity issues across value chains. Social capital and other institutions that govern economic relationships between people can play an important role in value chains. For example, costs of trading might be lower among members of the same ethnic group. Social capital could potentially increase or decrease profit margins, and might not be fully reflected in an analysis of profit margins. An analysis of transaction costs should accompany the analysis of profit margins to ensure accurate identification of equity issues (see Case Study 2).

- Synthesize different assessment tools (Table 7) to map priorities for public policy, research and investment into supply chains, and consider their findings. It is especially important to identify areas where market chains are not meeting consumer needs.

Family poultry production in developing countries is often based on low-intensity production systems using local breeds or crossbreeds. The meat or eggs produced differ in appearance and taste from more intensive higher input production. A market analysis can shed light on the feasibility of developing a niche market for special poultry products and determine the price premium to meet additional production and marketing costs.

Marketing

In many instances, family poultry production is not the main household income-generating activity, and formal marketing links for production inputs and outputs are generally non-existent. However, in many countries well-established informal trading networks supply the majority of live chickens and ducks, as well as eggs. The absence of developed poultry sectors in combination with consumer taste preferences for local breeds results in a premium price for native birds, driving the demand for native breeds raised in family poultry production systems. If consumers prefer to buy live birds to ensure freshness and disease freedom, then marketing will be organized in a way that ensures live bird trading along the entire value chain. Considerable transport costs occur from the collection of birds from relatively small native chicken flocks in rural areas. Only a few birds are ready for sale from a single-family poultry flock at any point in time. Therefore, self-marketing of birds in urban centres by members of family poultry-producing households is often not profitable. Collection of larger batches and transport by live bird traders may be the only option to ensure access to higher value markets. The absence of competition and other marketing options for rural farmers can result in information asymmetry and exercise of market power between family poultry producers and traders. However, traders face considerable collection and transport costs in rural areas.

Case Study 3 describes experiences with the implementation of a market information and coordination system to develop a value chain for family poultry.

An example of a private sector initiative for input supply marketing of improved native breeds is the dual-purpose "Kuroiler" breed introduced by Keggfarms in West Bengal, India (Ahuja *et al.*, 2008). The improved breed grows faster and produces more eggs, while still retaining the feather colour and agility of native birds. A network of company representatives, mother units and agents supplying mother units and households with breeds, accessed potential family poultry farming households. The sustainability of this input supply marketing system is driven by the livelihood interdependence of all actors.

The marketing of duck and chicken eggs differs from live birds with regard to storage and the need to organize daily product collection from farms. Eggs can be stored for a few days at all stages along the supply chain. The continuous production of eggs from laying chicken hen flocks tends to lead to repeated market transactions with the same trading partners. Formal marketing arrangements with regard to quantities and prices are also more common.

CASE STUDY 2

Safe native poultry certification in Ha Noi, Viet Nam

In 2008, the Pro-Poor HPAI Risk Reduction Project implemented a pilot project in Ha Noi to establish a certified smallholder poultry supply chain, including test marketing of traceable free-range chicken. The project aimed to improve understanding of how markets act as catalysts for rural poverty alleviation, and explore how smallholders can contribute voluntarily to the global commons of disease prevention. The project selected several small poultry farms with feeding practices that adhere to national farm safety standards. The farms sold 3 600 chickens over a one-month period to a supply chain covering eight vendors in Ha Noi markets. Local veterinary officials supported the farms and the traders that delivered birds to slaughterhouses that cooperated with the project. Use of local institutions and existing vendor-slaughterhouse relationships improved the sustainability of these activities. In addition, the use of chicken tags ensured traceability. This tag was applied at the farm and remained on the chicken until purchase by the consumer.

The project improved understanding of how existing institutions and stakeholders can work dynamically to establish traceable supply chains. Tags were a simple innovation that improved traceability and proved popular among clients. Vendors claimed that selling safe chickens differentiated them and extended their customer base. Households were willing to pay a substantial premium for safety-branded chickens sold in wet markets.

Cooperation with farming groups that mandate or promote safe production practices could help to recruit interested farmers, especially those with free-grazing chicken production systems, which are important for maintaining meat quality (taste-texture) perceptions. Access to information and technology valuable to smallholder farmers, such as vaccination for common poultry disease, could increase their participation. Professional training is also important, in particular for product certification and enforcement of standards by veterinarians and technicians. The government could play a positive role by nurturing a supportive policy environment for firms to work with smallholder farmers. In particular, it could work to strengthen veterinary institutions, improve intellectual property protection, develop third-party labelling or branding programmes, improve existing market infrastructures, and develop small wholesale markets with registered slaughterhouse facilities in strategic urban locations.

Note: The project received financial support from the UK Department for International Development (DfID) and was implemented by FAO.

CASE STUDY 3

SMS marketing of native poultry in northern Thailand via eBird

Increased awareness of disease risk and livelihood implications within the informal poultry supply chains of Southeast Asia, led a team of researchers from University of California Berkeley and Thailand to develop eBird. This dynamic and automated system provides a safe and efficient mechanism for directly connecting poultry farmers with vendors via mobile phones. The platform enables technical outreach, as well as passive poultry health surveillance, via detection of abnormalities in transaction volumes and farmer reporting.

During the pilot study period, blood tests were also successfully integrated into the eBird marketing system. This permitted active surveillance and traceability of birds passing through the system. Randomized blood tests to selected households actively marketing poultry were achieved at a cost of approximately US$8 per sampled farm.

The goals of the eBird system are to increase producer incomes, improve food quality and mitigate public health risks from livestock trading. The direct connection between producers and vendors helps to incentivize producer investment in product quality. In addition, the system allows observers to engage in cost-effective surveillance targeted to market-bound birds.

A six-month pilot study of the eBird system, conducted in northern Thailand, tested the effect of bypassing middlemen on producer prices. Directly connecting producers and vendors was found to raise the average producer sale price per bird by approximately 30%. However, only producers selling large quantities of birds were able to utilize the system as designed (~20% of proposed transactions). Most vendors were unwilling to travel to producer households to collect fewer than ten birds. Producers were similarly uninterested in delivering small numbers of birds to market. These producers were thus unable to utilize the system and had to sell to middlemen within the traditional trading system.

Note: Financial support for the pilot study was provided by FAO, the UC Global Health Institute and the Bill & Melinda Gates Foundation.
Source: Drew Behnke, Zongyot Chaiwong, Sam Heft-Neal, Ryan Triolo and David Roland-Holst.

3.6 MICROFINANCE AND ACCESS TO CREDIT

Md A. Saleque

Key objectives

- To understand the importance of microfinance (MF) for family poultry production.
- To identify the different interventions of MF and assess the appropriate financial products for specific target groups.

Introduction

Microfinance (MF) is the provision of financial services to low-income clients or solidarity lending groups, including consumers and the self-employed, that traditionally lack access to banking and related services. It includes a broad category of services, such as micro-credit, savings and insurance. About 90 percent of the people in developing countries lack access to financial services from institutions, either for credit or savings. During the 1980s and 1990s, particularly in Asia, Africa and Latin America, thousands of microfinance NGOs and other organizations were established to provide micro and small loans, using individual and group lending methodologies. In the 1990s, while many of the NGOs failed to reach scale or financial sustainability, others led the way in demonstrating that:

- poor people, particularly poor women, are excellent borrowers, when provided with efficient, responsive loan services at commercial rates;
- microfinance institutions (MFI) can provide microloans to poor people in an efficient and financially sustainable way;
- microfinance-lending savings, and other financial services to poor people, are an effective way to help poor people increase income and assets, manage risk and work their way out of poverty.

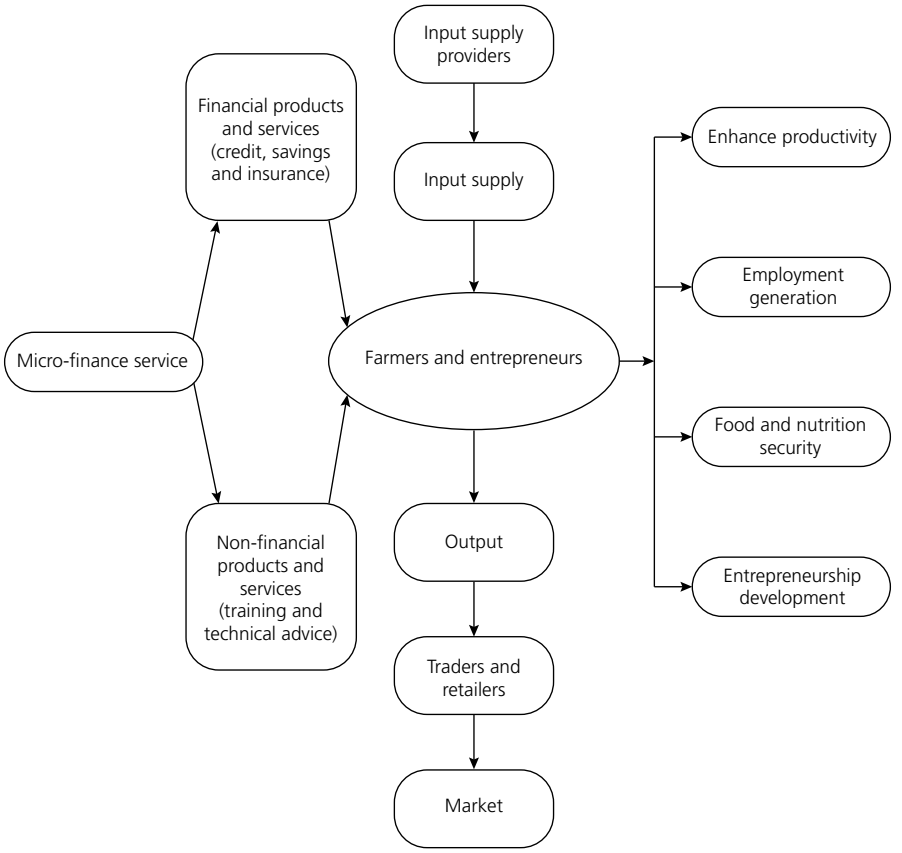
Over the last 30 years, microfinance has revolutionized rural development. Many institutions and models have emerged that are expanding financial services in new directions, using technology and innovations to serve more clients in increasingly remote communities, and offering them an ever-wider range of products. A range of poultry projects in Bangladesh highlighted the positive impact of microcredit (provided by the government and NGOs with support from bilateral and multilateral development agencies) on the livelihoods of rural poor people. These projects demonstrated convincingly the capacity of family poultry to increase food security, reduce vulnerability and alleviate poverty, especially for the poorest households in poor countries. MFIs across virtually all the developing world now recommend family poultry as an income-generating activity. Microfinance thus serves as a means to empower the poor, and provides a valuable tool to assist the economic development process.

Community-based management (technical component) and microfinance (financial component) are the two essential components for the development of family poultry. From a study in Benin it was reported that community-based management (CBM) in combination with poultry-based microfinance (i.e. microfinance formally granted for village poultry production) significantly improves household income (Sodjinou, 2011).

For planning of family poultry projects it is important to understand:

- how MF interventions help to improve poultry production;
- how to determine which interventions are most appropriate in each situation;
- how to determine if a family poultry project is an appropriate option under the prevailing local conditions;
- how to assess and select project implementation partners through a competitive process;
- how to develop and provide appropriate financial products that address the needs of family poultry farmers and actors at different levels of the value chain.

FIGURE 4
Microfinance and family poultry value chains



Necessity of MF for the family poultry value chain

In response to the availability of credit, many families, women and youths in rural, sub-urban and even urban areas have taken up family poultry farming. However, the most basic formal financial services reach only about 10 percent of rural communities. Financial institutions including private commercial banks are largely profit-oriented and risk averse. Even nationalized banks are reluctant to provide credit facilities to the very poor because of the high risk involved. Numerous other reasons preclude poor people from obtaining even small amounts of working capital from the formal banking system, such as the complex nature of the system, lack of security, high transaction costs and slow processing of loan requests. Microfinance is designed especially to enhance the well-being of rural farmers, the poor and the extreme poor, not covered by commercial financial institutions.

An initial assessment should be conducted to determine the importance of microfinance for poor households seeking to enter into sustainable poultry production (Box 6 and Figure 5). This will provide a clear picture of the local conditions, players, and any active

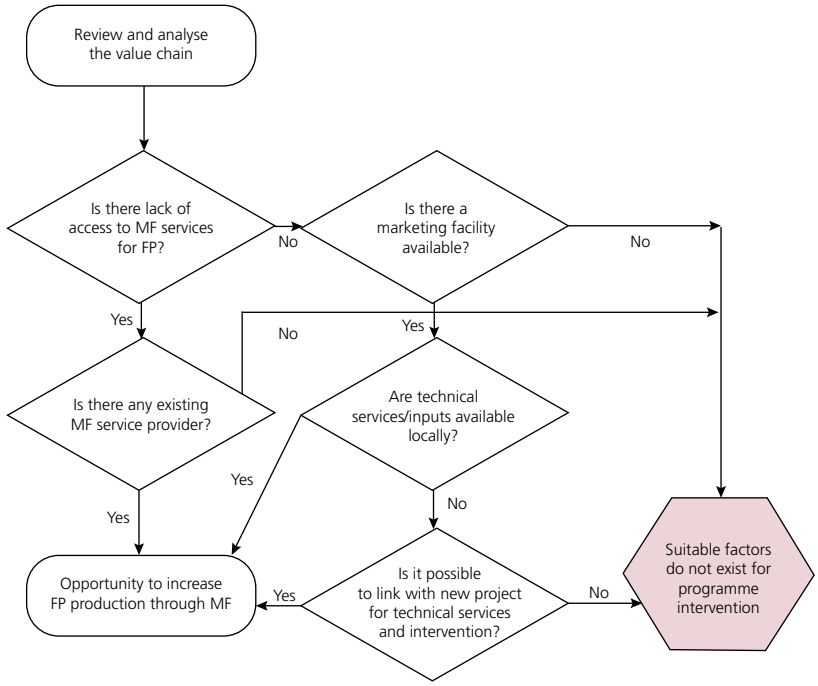
BOX 6

Key questions for microfinance interventions

- What are the types of clients and what are their demands?
- What are the key elements of the poultry value chain, and the forward and backward linkages?
- What challenges and gaps are identified in the market analysis of rural areas?
- What possible interventions could address the identified gaps in rural areas?
- What other donors and stakeholders are working on the issue and have strong technical capacity in this area?
- How strong are existing financial service providers – both formal and informal?
- How strong is their outreach and financial performance? What are the trends over the last three years?
- What are their strengths and weaknesses and capacity-building needs?

FIGURE 5

Decision tree for use of microfinance resources



donors or ongoing projects. This analysis can be expanded to identify potential entry points for the MF intervention. MF interventions for the development of family poultry depend on local supply and demand:

- *Supply* includes MFIs, credit unions, NGOs that provide financial services, poultry supply agents and in some cases self-help groups (SHGs).
- *Demand* includes the households and individuals (both poor and marginal) served by MFSPs.

Microfinance interventions

How microfinance responds to the needs of poultry farmers

Since the beginning of 1980s, specialized programmes designed by NGOs and government projects have provided financial support on a credit basis to women who, in turn, have proved themselves to be "bankable". The essential elements in the design of any MF programme for family poultry are, therefore, target orientation, gender specificity and sustainability of the activities (Saleque, 2007). Access to credit has been identified as a major mechanism by which a household can improve its economic condition.

BOX 7

Steps to be followed for microfinance interventions

- **Step 1.** Consult with communities to identify the demand for and supply of financial services among the rural poor. What financial services are provided, by whom, to whom and how? What are the gaps in coverage in terms of types of customers served, types of services provided and geographical reach? If there are no service providers other than informal groups and moneylenders, why not? From this analysis, determine whether or not a financial services intervention would be beneficial. If yes, identify the type(s) of organizations that would potentially be willing as well as able to develop financial services for family poultry producers in the project area.
- **Step 2.** Locate professionally managed financial services organizations by visiting potential partner organizations to determine their desire to serve rural communities, their need for capacity-building assistance, and assess the ability of the project to deliver such services. If professionally managed financial services organizations do not exist, then visit traditional informal village-based entities and community-based financial organizations (CBFOs), such as savings and credit cooperatives (SACCOs), self-help groups (SHGs) and "village banks" to learn about their features, products, systems, sustainability and coverage.
- **Step 3.** If the prospects for adequate capacity-building are sound, analyse the need for a credit line or a revolving loan fund.

Source: Ritchie, 2005

Differentiated financial services are not usually designed according to the needs of people living at different levels of poverty. The level of poverty should, therefore, be taken into consideration when designing the project. The target market of the project for the family poultry value chain should be clearly identified (e.g. potential regions, areas and farms). Poultry keeping is a useful way to identify poor households, and can be used as a targeting tool much like the housing index for microcredit work (Gibbons *et al.*, 1999).

3.7 INSTITUTIONAL DEVELOPMENT

Erwin Kinsey

Key objectives

- To examine typical institutions including farmer groups and their roles within the family poultry sector.
- To provide a guide for more sustainable service provision within the value chain.

Family poultry keeping in developing countries can evolve from home consumption towards a viable business through the provision of essential services, many of which can be resourced from within rural communities. Institutional development implies empowerment of local actors within the community as well as public-private partnerships outside. Practical decisions can be taken to address certain gaps and tasks divided among strategic partnerships. A well-coordinated, collaborative effort by different stakeholders is the most sustainable way of achieving tangible results in the poultry sector. This both necessitates and results in institutional development, such as that described in Case Studies 4 and 5.

In many rural areas of developing countries, farmers still depend on government departments or NGOs for livestock services. If services such as training, "improved" cockerels, provision of veterinary services, finance and market support are subsidized, they are subject to the budget of the service provider and may be discontinued. It is important that support from government and NGOs lead private actors, such as veterinary shops, community vaccinators, feed suppliers, micro-financiers and others, to deliver critical services.

Ideally, by working in groups, farmers are able to achieve some economies of scale, thus reducing overheads on inputs and services (e.g. feeds, vaccines, savings and finance). Their success depends on several variables, many of which are related to preventive and curative animal healthcare through the delivery of sustainable services. Decreased mortality rates by vaccination against diseases (i.e. ND) are critical to success and can be undertaken by fellow village actors. Once mortality is controlled, farmers will quickly perceive the improved economics of family poultry keeping. Combining animal health interventions with proper animal husbandry practices, such as improved feeding and improved housing, encourages poultry producers to take greater interest in producing birds of desired quantity, quality and consistency. Successful production levels lead more easily to support for the formation and strengthening of poultry marketing groups for joint sales, which in turn leads to the formation of saving and credit associations, the keeping of bank accounts and the creation of strong collateral.

Farmer education through groups is widely known as an effective way to scale out improved technologies, because farmers learn best from fellow farmers. Research and shared

learning led by farmers themselves has been achieved through Farmer Field Schools (FFS) in which members commit for a season or number of seasons to test and adapt new technologies. This approach applies well to groups of poultry producers who benefit from interaction and sharing local knowledge. FFS also function as forums for researchers and extension staff to enable farmers to test new innovations and address constraints through dialogue.

Whether to become a part of a group is a choice. A group of people with a common interest forms the core. The group may consist of only women or a mix of men and women producers; it may be an established group such as people infected or affected by HIV, or a youth group. A simple technology such as ND vaccination can be well managed by a new group, which selects a natural community leader to learn the techniques who then offer services to the rest of the group for a fee.

Even with the strongest groups, experience has taught that some challenges are best addressed by individuals. Generally, management of small enterprises is compounded when the total turnover is not adequate to satisfy the needs of individual members. The more technically complex the activity or service required, the smaller the group that should undertake it (Figure 6).

Whether registered associations or informal short-term groups, all groups depend upon nurturing, empowering leaders who are good facilitators. Transparent budgets, clear charters, specific action plans and participatory open management make groups easier to set up and run. However, no formula can substitute for commitment to local farmers' ability to rely upon and learn from each other in addressing local problems. Basic elements of good leadership include integrity, the ability to listen and harness group consensus towards full participation, and determination to follow through on decisions to find solutions.

Village Cooperative Banks (VICOBA) or Savings and Credit Associations (SACCOs) often lead to a higher level of commitment within groups. VICOBA are groups of 15–30 people who form a constitution and keep their savings in common, held locally in a steel box with three locks for which three different members hold keys. The treasurer and counters are members of the group. Where VICOBA are transparent, they have built trust, local control, peer pressure and accessibility, with low interest loans possible for those who have contributed adequate amounts over time.

In summary, well-designed strategies and a range of critical services are needed to make the poultry sector grow.

Farmer associations or groups need to address the value chain from inputs to production to marketing for successful poultry development. Farmer associations can combine efforts with the private sector to access vaccines, feeds, poultry housing materials and markets.

For some services, individual farmers or private service providers are more effective. Where they perform services on a cost-recovery basis, the result is generally more sustainable than groups providing a wide range of services themselves. Diversifying group activity can form part of a group's long-term strategy, but is not necessary in the short term.

Groups may need to split and reform in order to be effective. If an individual can readily accomplish a challenge, groups add little value. This is particularly the case for more technical enterprises.

Governance structures are important. A well-functioning group is not an accident but an achievement resulting from hard work, the commitment of all members and good leadership.

CASE STUDY 4

Department for International Development – Research Into Use (DfID-RIU) in Tanzania: Rural groups market indigenous chickens in Tanzania's capital

In Tanzania, a Research Into Use (RIU) programme, funded by DfID, has encouraged farmer groups to self-organize and become entrepreneurs in poultry-related activities. Partnerships with a number of private sector organizations in the coastal region near Dar es Salaam have enabled the programme to address constraints in the value chain that act on indigenous poultry keepers. Through support to groups and individual service providers, the programme has established support systems for basic poultry services, such as veterinary drugs, feed and poultry equipment, small hatcheries, extension and business development services, and marketing services in the poultry industry.

The programme solved problems in chick supply capacity, veterinary services and feeds, business development services and unreliable markets by mobilizing farmer entrepreneurs, self-help organizations, poultry feed producers and paravets to play specialized roles to enhance the quality and quantity of production of indigenous chickens. Livestock certificate holders provided critically needed household advice especially during the first 30 days of caring for chicks. A privately managed livestock advisory system addressed issues to increase quality and efficiency in provision. Guaranteed markets for chicks and grown poultry for slaughter have encouraged scaling up of enterprises from home production to a range of 100–300 birds. Local hatcheries for indigenous chicks have grown up to supply growing demand from farmers.

Groups or associations of farmers benefit through "joint input order systems" in terms of procurement of feeds, vaccines and other drugs at cheaper cost. The RIU programme introduced a coupon system to provide subsidized chick feed, feed stations, essential minerals, vitamins, drugs and vaccines for one month. This ensured that a reasonable number of chicks survived to maturity and allowed other interventions, such as marketing, to take place. The coupon system initiated demand, which has supported the emergence of rural supply chains.

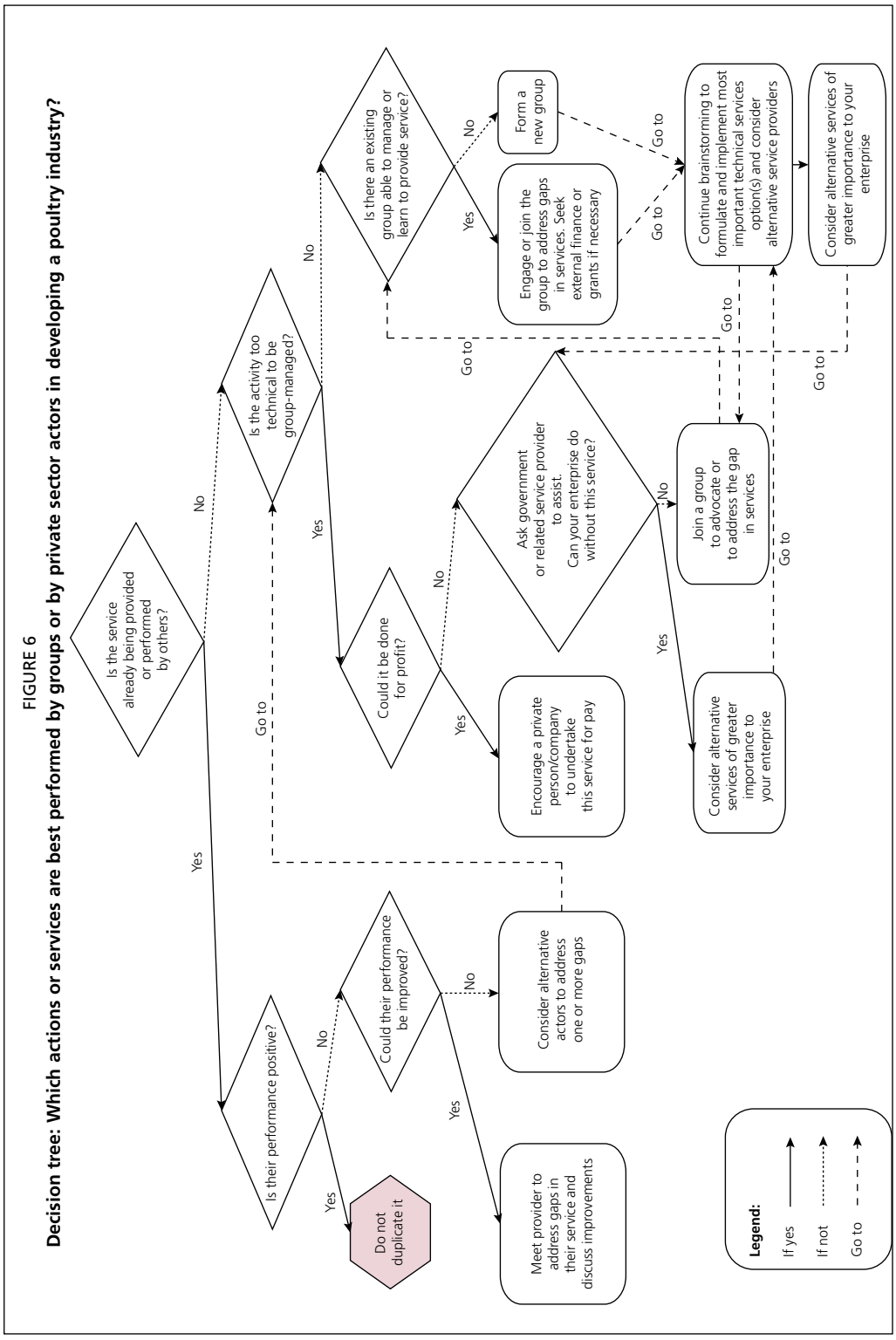
In response to the rapidly growing Dar es Salaam market for indigenous birds, the programme organized collective marketing through district-level facilities and networks linking groups and entrepreneurs. This constitutes one of the major successes of the project with 3 500 farmers from 86 villages in the pilot Coast Region keeping 600 000 chicks per year, a number that is growing. This has created greater demand for information on types of indigenous chicken breeds, appropriate vaccines, veterinary drugs and feeding regimes. Partnership with the private sector for large-scale hatchery services was also envisioned, as well as the use of quality and affordable chicken feeds and family poultry-keeping equipment (e.g. feeders, drinkers) for indigenous chickens.

While early signs showed significant mobilization, later some links in the value chain broke and some services have been discontinued.

Source: RIU

FIGURE 6

Decision tree: Which actions or services are best performed by groups or by private sector actors in developing a poultry industry?



CASE STUDY 5

Healthy chickens increase villagers' prosperity

Naisula Estomiy is a 36-year old mother of two living in Olkereyan village on the outskirts of Arusha in Tanzania. In June 2009, Naisula joined a village group to attend a poultry production training session with Global Service Corps – Tanzania (GSC-TZ). Based on Naisula's interest and lively participation in the training, she was selected by others in her group to attend a special training session to become a community chicken vaccinator. She learned how to vaccinate chickens as a small business on behalf of the group and the wider community.

With the support of her village extension officer, she set up a regular schedule of chicken vaccination in her sub-village to protect them from ND. Prior to the vaccination programme, villagers were unwilling to invest significantly in raising chickens as the majority died from ND. They rarely provided food for their chickens and instead left them to scavenge. Naisula learned how to apply the simple eye-drop vaccine to all chickens, regardless of age, at a cost per vaccination of only TZS50, equivalent to US$0.03 per chicken.

The vaccination programme has significantly lowered chicken losses and in 48 villages where GSC-TZ has trained community vaccinators, poultry keepers now experience higher yields. Naisula has increased her flock by 700 percent to 90 chickens and collects 25 eggs per day (a whole week often passed with no egg collection prior to the programme). She vaccinates about 3 000 chickens every fourth month, and is also able to collect a small fee for her vaccination rounds. This amounts to an income of TZS 150 000 for one week of work, and enabled her to purchase a wire mesh perimeter fence to confine her growing chicken flock within her yard. The increased income from bird and egg sales also translates into more food for her family and school fees for her two children.

When groups mobilize their own savings they make sound loan decisions, encourage timely repayment and share information. Annual audits are necessary, and should be performed more frequently for new groups. Capacity-building is always needed (IFAD, 2010).

3.8 TRAINING AND EXTENSION

P.V.K. Sasidhar, David Hadrill, Brigitte Bagnol and Robyn Alders

Key objectives

- To provide knowledge and tools to help project designers plan and carry out training.
- To provide knowledge and tools to help project designers select extension methods for various teaching and training occasions.

Family poultry training

Family poultry (FP) training aims to improve skills and spread useful information among all FPD project stakeholders. The training should be designed according to the poultry production system (see Table 2) being targeted. This will also dictate the selection of trainers and the generation of training resources from the public and private sectors, NGOs and international donors. One-off training will have little long-term impact. Aim to formulate a two to three-year training strategy for family poultry development project with a participatory approach.[14]

Six stages of FP training: To implement training under a FPD project, the following six sequential stages are important for all stakeholders. However, the first **four** stages are more crucial for FPD project planners, depending on the FP production system being targeted (i.e. small extensive scavenging, extensive scavenging, semi-intensive and intensive system).

Stage 1. Training needs assessment: A "training needs assessment" (TNA) helps project designers to define the target group and its learning needs (Table 8). FPD project planners can gather information for the TNA with semi-structured interviews and other participatory techniques. Questionnaires are best avoided in village situations. A TNA has three parts (Iles, 2002a):

- Characteristics of the participants:
  - level of education, literacy, gender, age, ethnic group and religion
  - importance of poultry to livelihoods.
- Existing knowledge and skills:
  - disease control (awareness and/or use of medicines to treat poultry; use of vaccine)
  - housing (protection from predators, type of housing in use)
  - breeding (knowledge of improved breeds)
  - feeding (knowledge of supplementary feeds).
- Attitudes:
  - What do they think about change to poultry production?
  - What are their views on training, recommended feeding, breeding and management practices?

Stage 2. Training objectives: Following the TNA, project planners should write down the overall aim of the training with clear objectives expressed in terms of what the participants should be able to achieve at the end of training (Box 8). Good training objectives are **s**pecific, **m**easurable, **a**chievable, **r**ealistic and **t**ime-bound (SMART).

The key learning points for each training session extend naturally from the objectives. Some sub-topics may be more theoretical (e.g. age for vaccination) while others lend themselves to practical training (e.g. how to vaccinate a bird).

Stage 3. Design the training: While preparing the training material for an FPD project, planners should continually refer back to the aim and objectives to ensure they are on track. Brainstorm all possible learning points that could help achieve the training objectives with all FPD project stakeholders. Separate the learning points into "essential" and "good but optional". Keep the essential ones and use the others as time permits. Decide the ideal course length. FPD project planners should discuss training with trainers and break it down into sessions, each of which should not be more than 90 minutes (Table 9).

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[14] For more information on participatory methods, see Bagnol (2007); Chambers (2002), Iles (2002a, b) and Pretty *et al.* (1995).

TABLE 8
Priority topics for family poultry training according to production system

Training needs	Small extensive scavenging	Extensive scavenging	Semi-intensive	Small-scale intensive
Features of a chicken				
- Simple anatomy	-	**	***	****
- Poultry handling	*	**	***	****
- Recognition of healthy and sick chickens	**	**	***	****
Husbandry				
- Indigenous breeds	****	***	*	-
- Improved breeds	*	*	****	****
- Housing, ventilation, cleaning	*	**	***	****
- Protection from predators	****	***	**	*
- Scavenging	****	**	**	-
- Supplementary feeding	****	***	***	****
- Nutrition, diets for growing and laying birds	*	*	***	****
- Sanitation	*	*	***	****
Diseases				
- Vaccination	*	**	***	****
- Medication	*	**	***	****
- Signs of common diseases, treatment and control of ND	*	**	***	****
- External and internal parasites	**	***	****	****
- Vaccination techniques	**	**	***	****
- Biosecurity measures	-	**	****	****
Record keeping				
- Egg production and sales	-	**	***	****
- Mortality	***	***	***	****
- Diseases: diagnosis, number of cases, treatment, treatment outcome	*	**	***	****
- Inventory of stock (pharmaceuticals, feed, etc.)	-	*	***	****
- Vaccinations performed, payment received	*	**	***	****
Marketing				
- Egg handling, storage and marketing	-	**	***	****

Note: a larger number of stars * indicates higher priority.

BOX 8

Writing training objectives

Vague training objectives, such as "the trainees will know about ND vaccination", are not very useful. Here is an example of a much more useful objective.

At the end of the three-day training, participant community vaccinators will be able to:

- Describe the importance of ND vaccination for disease control.
- State the vaccination age, recommended doses and intervals between doses.
- Describe how to transport and store vaccine.
- Handle birds safely with minimum stress.
- Assemble, disassemble, clean and store vaccination equipment.
- Vaccinate (x number of) birds by the eye-drop method in (y number of) days.
- State the fee to be paid for vaccination.
- Record completed vaccinations and payments using the standard form.
- State whom the recording form should be given to.
- State where to obtain ND vaccine.

In collaboration with trainers select a mix of training methods for use in each session. These might include hands-on practice, roleplay, brainstorms, and group work where groups are set a question to discuss and provide feedback in plenary, often using flip-chart paper. Ask the trainers to write down each session plan in detail (Box 9).

Session plans should be produced for every training session and compiled in an FPD project training manual.

TABLE 9
Outline of training course agenda

Title of the training					
Number and type of trainees	Training location				
Training objectives					
Session topic; trainer; time; methods and aids	Day 1	Day 2	Day 3	Day 4	Day 5
Session 1					
Tea break					
Session 2					
Lunch					
Session 3					
Tea break					
Session 4					

BOX 9

Example of a session plan

Title of session: Poultry external parasites (90 minutes).
Training objectives: After the session, participants will be able to: (i) name the diseases caused by external parasites and explain how they are spread, (ii) identify the signs of external parasite diseases, (iii) state appropriate treatments and their cost, and (iv) mix and administer these treatments with minimal risk to themselves and the birds.
Training materials: Large photos or projected images of affected birds, samples of medicine, birds for practising giving medicine, protective gloves if medicines are toxic, soap and water to wash hands, handouts.
Introduction: State the session title and objectives and explain why the session is useful.
Talk and pictures: Discuss the main diseases, their symptoms and the effects on production.
Medicines: Show samples of products and explain the costs.
Practical: Demonstrate and talk through the treatment for birds. Divide participants into pairs and ask them to practise. Correct and encourage them until done correctly.
Summary: Check understanding of the key points: (i) names of diseases (ii), how they are spread, (iii) signs of diseases, (iv) appropriate treatments, (v) cost, (vi) administration of medicines and, (vii) safety points.
Handouts: Distribute aide-memoires showing the key points.

Stage 4. Select participants and venue: For practical training, the ideal group size is 12. For more theoretical sessions, up to 24 trainees is satisfactory. Ensure that women are involved, especially if they are the main FP keepers. In some cultures, it may be necessary to train women separately from men and with women trainers.

Before training begins, visit the training place(s) along with trainers and consider:

- distractions
- space available for the activities planned
- materials readiness and electricity supply if a projector is required
- seating alternatives.

Stage 5. Carry out the training: Try to keep to the agenda and ensure that trainers also adhere to it. Make a note if some sessions take more or less time, so that the agenda can be revised before the session is repeated. At the end of each session and training day, ask the trainers to review the main points covered. It is a good idea to appoint a participant at the start of the day to summarize the day's training the following day.

Stage 6. Evaluate the training: The demand for evaluation of training programmes is rising. Funders and stakeholders increasingly want FPD project planners to explain: How was the money used? Should they continue to fund FPD training programmes? Are the training programmes effective? How will ineffective training under FPD projects be

improved (or terminated)? What new training programmes should be implemented to meet the needs of FP keepers or address FPD challenges?

Training evaluation is essential to answer these questions and also provides empirical indicators for funding of FPD projects. The FPD trainers also need feedback from participants to revise and continually improve the training. Develop an evaluation form for the training programmes under the FPD project. At the end of the training, distribute these forms and ask participants to indicate what they think about:

- the course objectives and relevance
- the content of the course
- the training methods and trainer(s)
- the appropriateness for the participants
- the length of the course and time of the year it is implemented
- the venue and catering
- improvements that could be made.

CASE STUDY 6

Participatory training of ND community vaccinators in Mozambique

Selection: Community vaccinators are selected in collaboration with community leaders and members after agreeing on key selection criteria. Every effort is made to ensure that men and women are equally represented among the chosen vaccinators.

Venue: Training should take place as close to the vaccinators' homes as possible to facilitate the participation of women, and enable practical work to be done in settings similar to those to be encountered by the vaccinators.

Language: The local language is the best choice as the language of instruction. Ideally, trainers are fluent in it. If not, trainers will achieve better results if they work with their translators before the workshop to agree on the most appropriate translation of technical terms not commonly used in the local language.

Timetable: The training runs over three days. About four hours per day is spent on theoretical instruction, broken up regularly with practical exercises. Opportunities are provided for the trainees to repeat key practical exercises three times, to anticipate and solve problems through roleplays, and for each trainee to practice presenting the ND control flipchart to a group.

Coordination: Supervising extension officers and community leaders are encouraged to join the group on the third day, so that they can help prepare the workplan for implementation of the first and subsequent vaccination campaigns.

Post-training support: Performance of the vaccinators is monitored after each campaign using an assessment sheet (an integral part of the monitoring and evaluation forms). This enables supervisors to assist and commend vaccinators as appropriate as they start preparing for the next campaign.

Source: Alders *et al.*, 2002

Family poultry extension methods

The role of extension methods to complement FP training depends on the objective(s) of the FPD project. However, all extension methods in FPD projects should pay attention to the following issues:

- information communication on FP;
- formation of opinion and decision-making in the FPD process;
- supplement FP training by enhancing knowledge of FP keepers; and
- help to identify constraints and clarify goals to attain FPD.

Appropriate selection of methods by planners for a particular type of FPD project is necessary in order to provide extension information to FP keepers (Box 10).

FP training and extension methods supplement and complement each other. Skilful combination of training and extension as a package will provide good results in a FPD

BOX 10

Family poultry extension methods selection guidelines

FP keepers' education

- For low literate – personal visits
- For educated – written materials

Time of dissemination

- Emergency for an individual FP keeper – phone call
- Emergency for a group or a large number of FP keepers – radio, television, public address system

Number of extension staff in FPD project

- Few – group and mass contact methods
- Large - individual contact methods

FPD project's credibility

- New project, yet to gain confidence of FP keepers – result demonstration
- Well-established project with proven success – circular letter

FP keepers' group size

- For < 30 – lecture or group discussion
- For > 30 – mass methods

FP subject matter

- To prove value of a recommended practice – result demonstration
- To teach a new skill – method demonstration
- To disseminate simple practice – news article
- To teach a complex technology – personal contact with audiovisual aids

Availability of media

- Creating awareness and reinforcement of ideas – television, radio and newspaper

FPD project objective(s)

- To bring awareness – mass methods
- To change attitude – group discussion
- To impart skill – demonstration

Source: Sasidhar, 2010.

project. Training and extension are tools to direct the learning activity of FP keepers. For a particular FPD project under any of the four FP production systems, training material development and understanding needs and selection of extension method are necessary to extend new knowledge and skills to FP keepers, and help achieve a successful FPD project. Therefore, a parallel investment by FPD project planners in "human capital" through training and extension is essential for the success of any FPD project, along with the genetics, nutrition, health, housing, management and policy interventions discussed in the other chapters.

3.9 CREATING AN ENABLING POLICY ENVIRONMENT

Ugo Pica-Ciamarra and Joachim Otte

Key objectives

- To understand the elements of an enabling policy environment for family poultry development.
- To understand the underlying principles of policy interventions that benefit family poultry systems.
- To understand the importance of targeting for successful family poultry policy interventions.
- To understand the role of experimentation in designing successful policy interventions in family poultry systems.
- To understand the importance of policy processes for successful policies that benefit family poultry systems.

Defining an enabling policy environment

An enabling policy environment is a system of formal and informal rules and regulations that allows family poultry keepers throughout the country to derive a net benefit from their birds, in terms of nutrition, cash income, reduced vulnerability, gender empowerment, crop productivity (fertilizer) and energy (e.g. biogas from poultry litter); in other words, to increase the contribution of poultry to their livelihoods.

Policy-makers may formulate and implement dozens of interventions that provide an enabling policy environment for smallholders. Examples include free (or at least subsidized) vaccination against ND, provision of supplemental feed for birds, the institutionalization of community animal health workers and financial support to marketing cooperatives (FAO, 2010c). It is impracticable to provide a blueprint list of appropriate interventions as, to be effective, these must be context-specific (i.e. consistent with the prevailing agro-ecological conditions and institutional architecture). However, a review of sustainable family-based poultry production systems suggests that interventions that create an enabling policy environment:

- comply with three high-order "policy principles";
- address, depending on needs, up to six major "domains" along the poultry value chain;
- are often designed through systematic experimentation or a trial and error approach;
- require a conducive macroeconomic and institutional context;
- emerge from collective actions by key stakeholders.

High-order policy principles

Family poultry policies will be likely to succeed if they adhere to three major high-order policy principles that are applicable in all agro-ecological conditions and policy contexts (Spielman and Pandya-Lorch, 2009; FAO, 2010c).

Appropriate targeting. Successful public investments in the smallholder poultry sector should focus on specific subsets of producers. There are no examples of successful interventions that have targeted the whole gamut of poultry owners, including the poor(est). Indeed, there exists a variety of smallholder poultry production systems (Chapter 1) and policies supporting "small extensive scavenging" and "extensive scavenging" rural poultry systems, which are largely livelihood oriented, and are not necessarily appropriate for sustaining "semi-intensive" or "small-scale intensive" smallholder systems, which are market-oriented.

Incentives. Successful investments in smallholder poultry systems should provide poultry keepers with incentives to contribute their own resources, including human and financial, to increase returns from their birds or family farms (i.e. they should be consistent with the household's objectives and risk attitude). This is particularly relevant when attempts are made to promote shifts from scavenging to semi-intensive or intensive rural poultry systems.

Public goods and smart subsidies. Effective investments in the smallholder poultry sector should either supply public goods, such as vaccination against zoonotic diseases (e.g. HPAI), and/or provide smart subsidies to farmers, that is, one-off support to trigger self-sustaining development of the sector (e.g. grants to build housing for birds). Smallholder poultry farming is a private "bankable" enterprise and any intervention providing private goods to poultry keepers, such as continuous subsidies for purchasing feed, is acceptable only if based on the evidence that its socio-economic returns (e.g. in terms of poverty reduction or improved nutrition) are higher than those from alternative options (e.g. cash transfer or school milk programmes).

Poultry policy domains

The three high-order principles should underpin all interventions in family poultry production systems. These relate to six major policy domains, namely: sourcing of birds, poultry health, poultry nutrition, basic infrastructure and/or equipment, marketing and research (FAO, 2010c; SA PPLPP, 2010).

Sourcing of birds. An enabling policy environment ensures that there is a regular supply of birds, of appropriate breeds, for rural households (Section 3.1). This is not particularly challenging for extensive poultry systems, as local/indigenous birds self-reproduce by natural incubation. Some form of public intervention is required in semi-intensive and intensive poultry production systems because the initial cost for the private sector to set up a system of distribution of improved/exotic birds in rural areas can be high, with the initial investment recovered only in the medium to long term.

Nutrition. Adequate feed is critical to improve poultry productivity, in terms of growth rate and egg production (Section 3.2). In scavenging production systems – where birds forage seeds, grains, kitchen waste, worms and insects – extension messages that promote small simple changes in feeding practices (e.g. adding crushed snail shells to feed) are often

effective. In semi-intensive and intensive production systems, where feed contributes up to 70 percent of all production costs, some government action may be required to stimulate the development of a market for feed, particularly in sparsely populated areas.

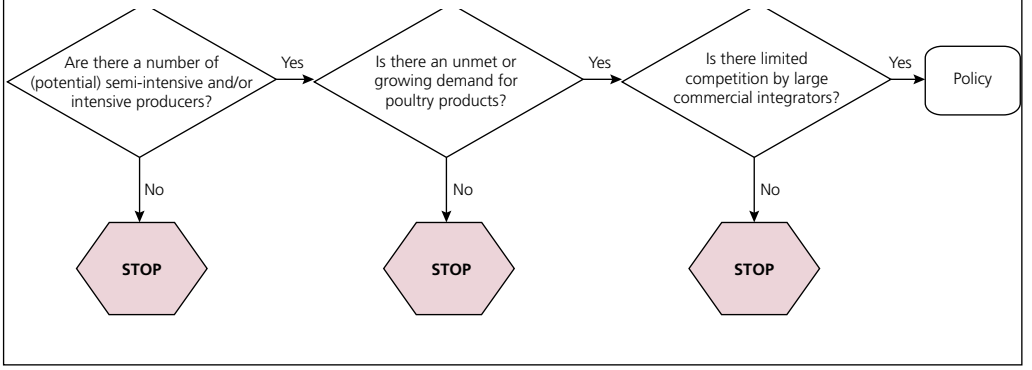
Poultry health services and veterinary supplies. Access to poultry health services and veterinary drugs is essential in all production systems to avoid/control the negative effects of epidemic and zoonotic diseases (Section 3.3). Public intervention may occur either directly (i.e. with the public sector itself providing animal health services and/or drugs) or indirectly, when governments provide incentives to veterinarians, animal health assistants and/or community-based animal health workers to supply services and drugs.

Basic infrastructure and equipment. Housing and/or cages for birds, waterers, feeders and some lighting are essential to increase bird productivity (Section 3.4). In scavenging poultry systems, information/advice on the investment cost for cages/shelter using locally available material (e.g. paddy straw) is important. In intensive production systems, some one-off support could be given to farmers for infrastructure and/or equipment as farmers rarely, if ever, have enough savings to make this type of investment.

Marketing (Section 3.5). Marketing is rarely an issue in scavenging systems. Local/indigenous birds have ready markets available locally, and local live birds and local eggs tend to receive higher prices than eggs and broilers from exotic breeds. In semi-intensive/intensive poultry systems, access to a reliable market is essential and some government support may be needed, particularly in the early stages of system development, to ensure that farmers can profitably access and utilize markets.

Research. Research results are largely public goods as all stakeholders, including non-payers, may benefit from research outputs. Incentives to invest in research are thus reduced. Even when research outputs are private goods, the private sector rarely invests in activities that benefit smallholders as these have limited purchasing power and are seldom seen as potential clients. Public investments in research, which can be conducted either by the public or the private sector or by both, targeting small-scale poultry production systems are thus essential for the long-term development of family poultry systems.

FIGURE 7
Opportunities for family poultry policy interventions in semi-intensive and/or intensive systems



CASE STUDY 7

Poultry in the Orissa State Livestock Sector Policy, India

In 2002, the Orissa State Government in India endorsed the Livestock Sector Policy, which includes a specific focus on poultry. The poultry development plan explicitly targets local birds in backyard units, which account for over 80 percent of all birds in the state. The policy foresaw the transfer of the six State Poultry Farms to the Orissa State Poultry Products Cooperative Marketing Federation (OPOLFED). The latter was transformed into a development cooperative with the responsibility of developing and supplying appropriate genetic inputs and technologies to backyard poultry producers (i.e. to produce birds that thrive well in rural areas, have faster growth rate and higher body weight than local breeds, and at least the same level of egg production). The cooperative also assists farmers in marketing their birds and poultry products. A poultry breeders' association provides animal health services and extension to backyard poultry farmers. The association is also expected to train farmers to set up self-help groups, which facilitates access to credit. The Orissa University of Agriculture and Technology College provides necessary technical inputs and support in matters relating to livestock (and poultry) sector development.

Source: Government of Orissa, 2002

Depending on constraints in the different poultry systems, decision-makers should design policy and institutional interventions in one or more of the above domains. While in extensive systems interventions in one or few domains suffice to generate positive returns, semi-intensive and intensive systems can only thrive, in the short to medium term, if all policy domains are sufficiently enabling (e.g. supplemental feed to improved birds would make little sense with no access to a reliable market). Indeed, for these systems integrated interventions often prove effective, but should be implemented only after an assessment of the potential for sector development (Figure 7). This assessment should ensure that: there is a significant number of potential semi-intensive and intensive producers, there is an unmet or growing demand for poultry products in nearby markets, and there is limited competition from large commercial integrators.

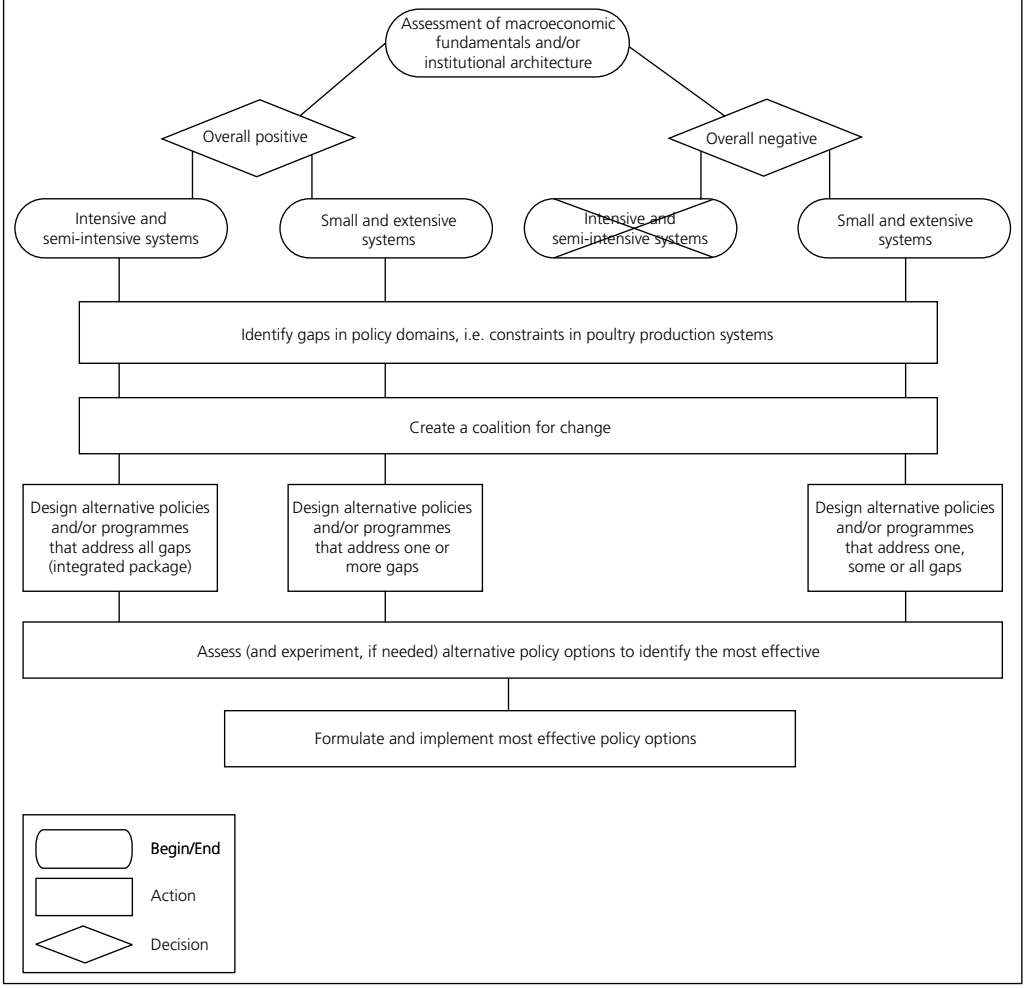
Policy experimentation

In each policy domain dozens of different interventions can be formulated. For instance, there are a variety of alternative and complementary options to improve the delivery of animal health services in rural areas. These include decentralization, sub-contracting of private service providers, support to veterinarians to open animal health clinics in remote areas, provision of vouchers for farmers to purchase animal health services, joint supply of human-animal health services to reduce delivery costs, institutionalization of community-based animal health workers, and support to membership-based organizations providing animal health services to their members (FAO, 2010c). A focus on allegedly first-best institu-

tions or policies risks creating blind spots, leading to institutional designs being overlooked that might achieve the desired objectives at lower costs.

Decision-makers need to develop a strategy to pick the most appropriate instrument and ensure that is correctly implemented. Some instruments may be ruled out altogether because of budget constraints (e.g. there may be no funds to provide grants to private veterinarians to set up their own business in rural areas) or because they are inconsistent with the broader policy and institutional framework (e.g. there are no NGOs to which to sub-contract the delivery of veterinary services). With regard to potentially feasible alternatives, decision-makers should concentrate on one or two that appear most promising on the basis of evidence from research and experiences from other countries. A trial and error but systematic approach (i.e. experimentation) is often the most effective means to identify a suitable policy option (Banerjee and Duflo, 2009; FAO, 2012).

FIGURE 8
Decision tree: formulation of effective family poultry policies



The political economy of smallholder poultry policy interventions

The success of policies targeting family poultry production systems depends on the existence of sound macroeconomic fundamentals (e.g. low inflation rate) and functional institutions (e.g. effective judicial system), which are not determined by decision-makers in the livestock ministry or department.

At the same time, the value of family poultry production systems is to a large extent unappreciated because the contribution of birds to livelihoods is largely non-monetary, and because smallholders are disadvantaged in the national political arena. They are often poor, female, poorly educated and dispersed, and therefore face high opportunity costs of collective actions. Some support to smallholders to form a "coalition for change" is thus needed. This involves stakeholder analysis and the facilitation of policy processes. In particular, smallholders require support to access different sources of knowledge, manage conflicting interests and ideologies, learn from experiences of other stakeholders within and without the country, and incorporate those lessons in policy dialogues and implementation (PPLPI, 2008; Otte *et al.*, 2009). Such processes are, by nature, iterative and lengthy. They require a combination of long-term engagement and consistency in commitment with flexible and adaptive process management, and in short the design and implementation of enabling policies.

Chapter 4
Designing successful projects

Antonio Rota, Olaf Thieme, Giacomo De' Besi, and Paul Gilchrist

Key objective

- To develop a detailed project design and a strong framework to facilitate implementation.

Introduction

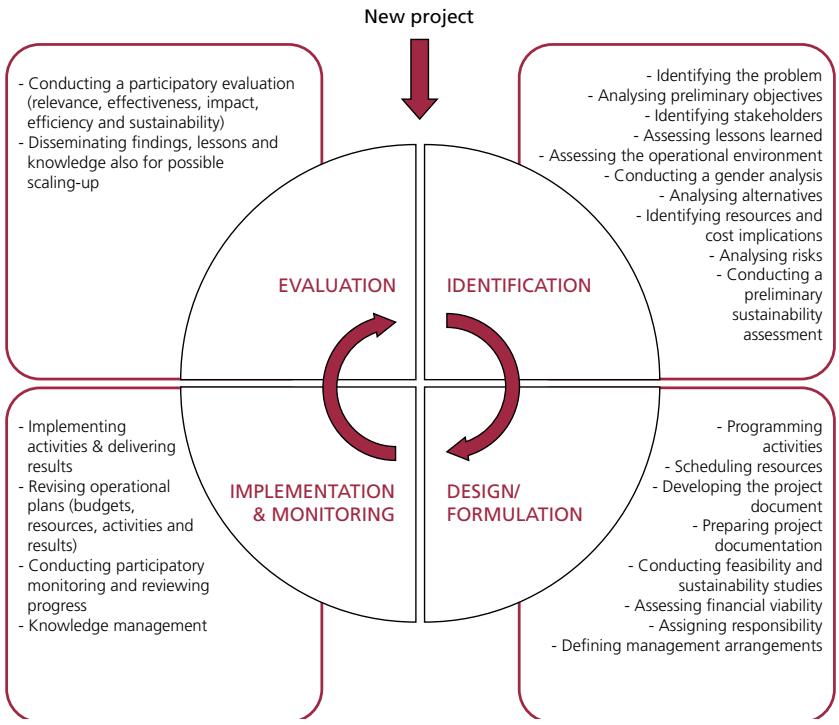
Family poultry interventions may be geared towards development or emergency response. In both cases, successful project design is fundamental to increasing the likelihood of project success. The design of successful family poultry projects entails supporting small farmers, rural households and landless families through a holistic, flexible, inclusive, equitable and self-reliant approach in a given time and budget framework. Project design should define potential interventions including the project's strategic objectives, expected results, stakeholders, potential technical service providers, capital requirements, implementation, project management structure and M&E evaluation system.

This chapter builds on the assessment of the situation highlighted in Chapter 2 and consideration of the possible interventions indicated in Chapter 3. It proposes best practices for FPD projects to be successful, economically viable and sustainable. Furthermore, this chapter briefly looks at the elements that characterize the design of emergency projects.

To bear in mind that throughout the project design process, the following key factors should be considered:

- **Interest and priorities of the community.** An important component of project design is to understand: (i) if the community is interested in the activities proposed by the poultry project, and (ii) the real needs and priorities of the family poultry producers. Projects should not try to push producers in directions they do not want to go.
- **Feasibility.** The project has to be economically justifiable and technically possible. It is important that the project objectives are realistic and achievable, and that the constraints and risks are thoroughly investigated. Project designers should define the resources (human, organizational, natural, financial, etc.) they will need during project implementation, and identify which are available locally. The use of local resources is recommended whenever possible.
- **Sustainability.** Financial and organizational sustainability of the interventions is fundamental for family poultry producers to benefit from the project beyond the period of donor support. Poultry interventions are sustainable if they satisfy human needs, are self-supporting (organizationally, technically, economically and socially) and environmentally friendly (Timon, 1993). In order to achieve sustainability, it is important that project designers factor in improved technologies, building on the knowledge

FIGURE 9
Project cycle and main activities for each phase



and skills that producers already possess in caring for poultry. Moreover, technologies introduced with poultry interventions should require affordable inputs or investments. Poultry technologies should be simple, favourable to spontaneous adoption and generate quick returns. For example, introducing improved breeds is an attractive intervention, but such breeds are often not sustainable for family poultry producers, mainly because they are more sensitive to illness and more demanding on feed quality and quantity (FAO, 2004a) and access to parent and grandparent stock.

- **Financial resources.** All project activities should be cost-effective and consistent with the budget. The project budget should provide a valid and realistic estimate of the costs associated with the activities carried out in the poultry intervention, including the inputs and resources needed (see sample poultry project budget in Annex 1). Furthermore, it is important to consider at all times whether the benefits of the interventions proposed are likely to outweigh the costs (see section on cost-benefit analysis).
- **Gender focus.** Due to the important role of women in poultry activities, the formulation of a gender-balanced project is vital. Gender analysis has to be carried out and the project should have a clear strategy to ensure that benefits are appropriately shared by women and men. Conducting a gender analysis allows designers to identify the key factors that may determine gender inequality, so that they can

be appropriately and proactively addressed.[15] Project designers should be aware of responsibilities and division of labour in poultry keeping and identify who has access to and/or control of resources (economic, education/information, social, time etc.) and opportunities. They should also consider that as the level of intensification of poultry production rises, the involvement of women generally declines, reducing the window of opportunity for women's empowerment (Guèye, 2003b).

- **Building family poultry institutions.** The project should support a wide range of capacity development for supplier, extension, rural financial and marketing institutions, but interventions should not lead to aid dependency. Instead, they should reinforce the autonomy of the institutions. Of particular importance is the facilitation of the creation of poultry keepers' institutions that can help their members to voice their needs and facilitate the provision of services and inputs to the members.
- **Lessons learned.** The project should incorporate lessons learned from experience and establish linkages with other ongoing and/or planned projects or programmes. Significant lessons can be drawn from experiences in poultry development in a specific operating environment or in developing countries in general.
- **Reaching the target group.** Project designers should ensure that the targeted clients have access to what is on offer to them. The poultry project interventions should provide the target group with inclusive and tailored assistance that will lead to sustainable and economically viable poultry production. Any necessary action to avoid "elite capture"[16] or corruption should be taken into account.
- **Cultural and social acceptability.** The interventions implemented in the project should be culturally and socially acceptable. Project designers should duly consider the social and cultural context, and methods and messages should be adjusted accordingly.
- **Political issues.** Legislation and public policies should be considered at all stages when designing poultry projects. Where possible and appropriate the project could be an opportunity for raising awareness and knowledge among policy and decision-makers of the importance of rural poultry for food security, income generation and employment generation.
- **Public health.** Project designers should ensure that biosafety and biosecurity measures are applied in project implementation, and that appropriate measures are promoted through capacity-building activities. As family poultry is often raised in or around residences, the risk for animal-to-human transmission of diseases is particularly high (see Section 3.3 for further information on family poultry and public health).
- **Environment.** The poultry interventions should not have a negative impact on the environment, but be environmentally sound. An appropriate level of environmental impact analysis should be carried out at the design phase and actions planned to minimize any eventual adverse environmental impact. The project design team should take advantage of possible opportunities for environmental improvement.

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[15] Practical information on how to undertake gender analysis in livestock projects can be found at: www.fao.org/docrep/012/al205e/al205e00.pdf

[16] "Elite capture" means that the benefits from the project are skewed towards the wealthier members of the community.

Planning: ensure a logical intervention strategy and have a participatory approach

It is vital to dedicate sufficient time and effort to project design, as incorrect or deficient design may lead to errors, weaknesses or failures during the implementation phase. First of all, designers should determine if poultry is considered important by its producers, as they might not be willing to invest time and other resources in this activity. Bridging the gap between the desired interventions of the clients and the project objectives is one of the major challenges of participatory project design. Then, the design team should consider all the possible alternatives to achieve the objectives of the project and identify the most appropriate and effective possible way forward.

Figure 10 shows the sequence of decisions and actions that should be taken to develop a comprehensive project. Stages and decisions should be performed in logical order and with the active participation of stakeholders. Designers should be ready to readjust or change development strategies whenever the conditions are unfavourable to the success of the project. This avoids an unnecessary waste of resources in the implementation phase.

Define the target group

The target group is the group of individuals who will benefit from the project activities. Therefore, the target group should be clearly defined at the start of the project in order to design the project accordingly. This can be done by building on the results of the initial assessment of the existing situation, using socio-economic data gather through structured interviews, PRA analysis, market and value chain analysis and so on (see Chapter 2).[17]

Enhance inclusion of stakeholders

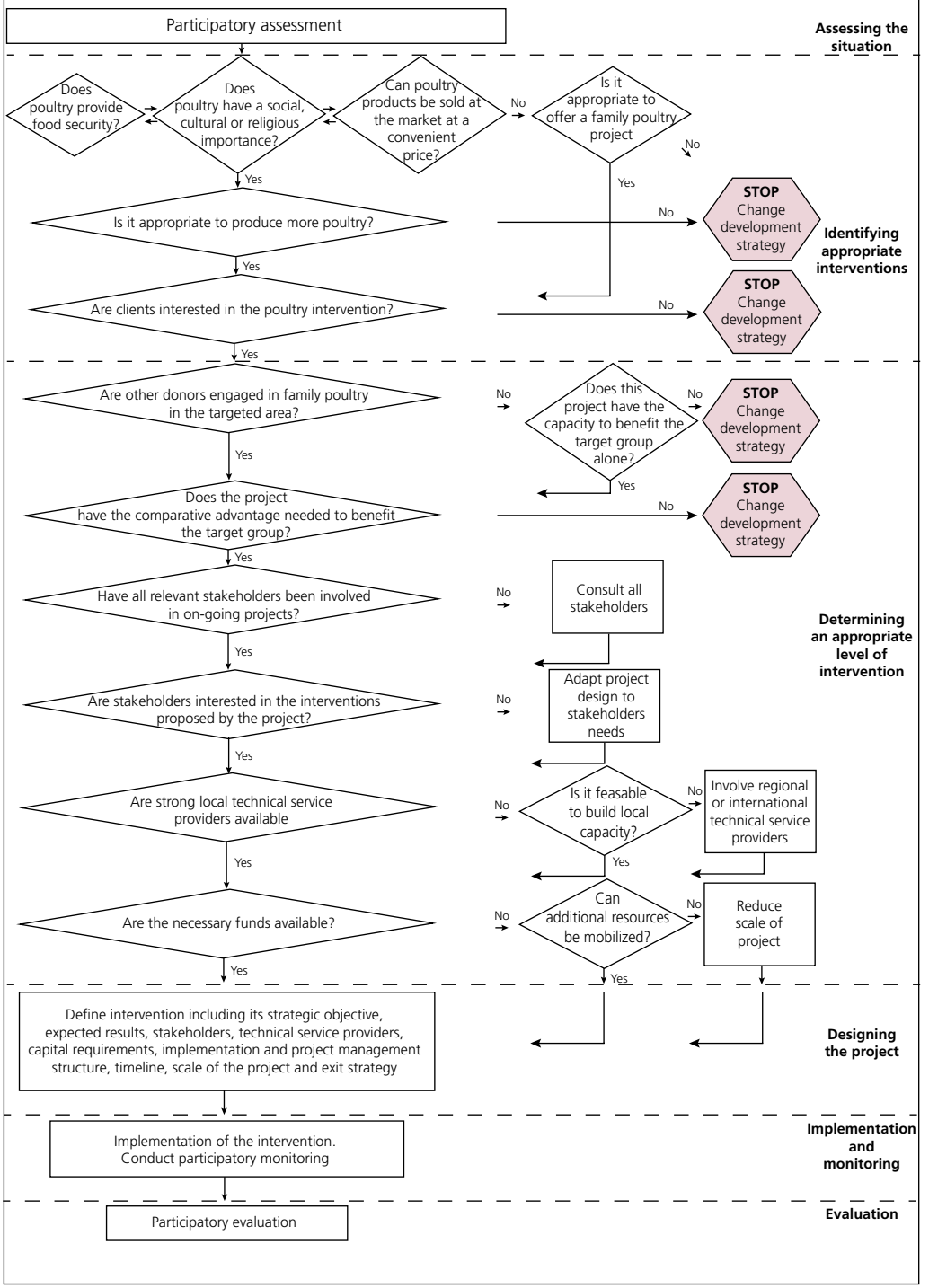
Participative involvement of stakeholders, with their experiences and expectations, is essential. All stakeholders including producers, other donors, suppliers, technical support personnel and credit providers should be involved in all phases of the project (identification, design/formulation, implementation and monitoring and evaluation). Stakeholders have deep knowledge of the local conditions and of the issue being addressed and therefore can contribute to identifying the most appropriate development strategies. Stakeholders can be involved at different levels in development projects. They can (IFAD, 2010):

- be consulted (e.g. interviews, workshops, focus group discussions)
- assist directly in the project
- have decision-making participation.

Strong donor partners should be involved, whenever possible, in project design, funding, implementation and monitoring. As other donors may be supporting interventions in related areas, it is important that projects work in coordination and without hindering each other. Coordination with other donors is a key element to avoiding duplication of efforts.

[17] For more information and resources on targeting, see IFAD's dedicated webpage at: www.ifad.org/targeting/index.htm.

FIGURE 10
Decision tree for project design



A stakeholder analysis is recommended. Each context requires the design team to understand who the intended clients are, who else will be positively or negatively affected, and who can influence and contribute to the project. Lastly, be aware of the human propensity for aversion to change, even when the benefits seem obvious.[18]

Design the project according to the operating environment

Successful planning for FPD requires an accurate understanding of the elements described in Chapter 2 in the specific context of each project. The following factors in particular should determine the type of interventions to be implemented in a specific operational environment:

- level of access to input and output markets (with particular attention to transaction costs)
- human, organizational and technical resources
- available services (e.g. training, vaccination, health, credit)
- social and cultural environment
- local practices and experiences and indigenous knowledge.

A crucial question that designers have to answer is: "What is available locally and what can be realistically provided by the project?"

For example, if the expected outcome of the project is to improve the production system of the targeted group from small extensive scavenging to small-scale intensive, but markets are not available for poultry meat, eggs, good-quality commercial feed, commercial day-old chicks and/or pullets, poultry health services and pharmaceuticals, the basic conditions for the success of the intervention are not present. Hence, project designers have to carefully determine if it is possible and realistic to create the conditions for the necessary inputs. It is only if the necessary inputs are present or made available by the project that there are opportunities for the introduction of improved and more intensive poultry production systems.

The family poultry project algorithm in Figure 11 is useful to identify the most suitable poultry production system to specific local conditions.

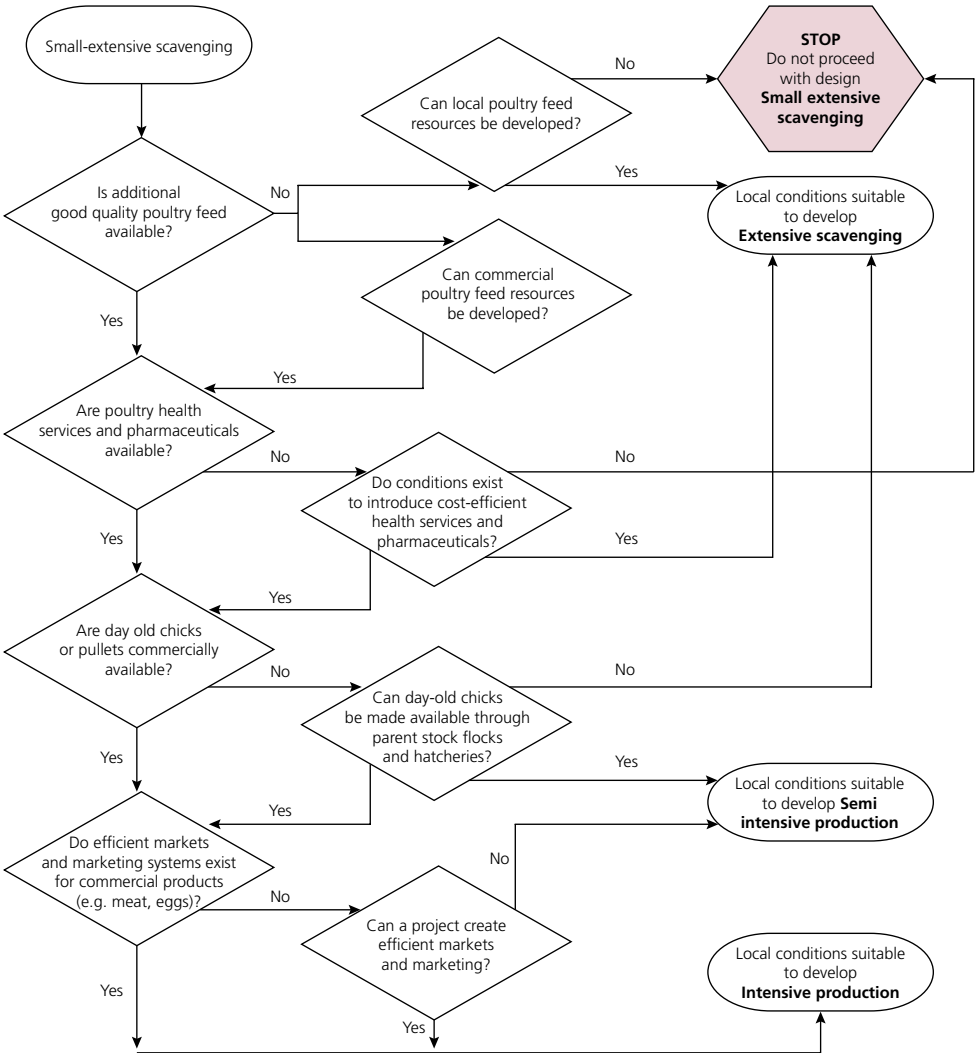
The characteristics of poultry systems, the problems identified and the availability of inputs will determine the strategy of the intervention, the type of training, the programme timeframe and the project funds required (Table 10).

Single vs. multiple interventions

Project designers have to take into due consideration all aspects of the production system. A holistic approach is recommended, looking at the production system as an integrated whole, rather than investing in only one of the technical components of poultry production (feeding or housing or management or health). For instance, a project can reduce poultry mortality by introducing vaccination against ND; however, such an intervention would be in vain if producers cannot ensure adequate feed resources to sustain a larger flock. In addition, the likelihood of success is higher with a comprehensive approach that involves technical aspects, but also motivation of producers, group organization, and intensive training and marketing.

[18] For full insights on how to incorporate effectively beneficiary participation in agricultural and rural development projects, see Participatory development: Guidelines on beneficiary participation in agricultural and rural development" (FAO, 2003).

FIGURE 11
Family poultry project algorithm[19]



Multi-sectoral vs. poultry specific projects

Poultry interventions can be components of larger development projects (e.g. agricultural development projects) or poultry specific projects. In small extensive scavenging, extensive scavenging and semi-intensive poultry production systems, a multi-sectoral approach is recommended, as poultry is generally a valuable complement to other farming activities (e.g. crop production and aquaculture).[20]

[19] Developed together with the authors of Chapter 2

[20] There is a gender dimension here in terms of who controls which resources. A household may have crops controlled by a man, but poultry controlled by the women. Project designers should bear such situations in mind.

TABLE 10
Different development scenarios according to the different conditions that can be found in the field

	Remote rural villages (without road access)	Rural villages (with road access)	Peri-urban areas
Prevalent poultry system(s)	Small extensive scavenging	Extensive scavenging Semi-intensive	Semi-intensive Small-scale intensive
Main objective(s)	Household food security Small income generation	Household food security Income generation	Income generation
Expected main outputs	Increased household consumption of poultry meat and eggs through reduced mortality of birds; and Sporadic income from the sale of surplus birds in the village or local market.	Increased household consumption of poultry meat and eggs through reduced mortality of birds; and Increased income from surplus production through sale of meat, eggs and feathers in the village or local market and reduction of transaction costs.	Increased income from family poultry production from increased productivity; and Increased availability of quality poultry products to urban and peri-urban consumers.
Investment per household (US$)	5-20	20-50	>50
Timeframe (years)	3-5	>5 years in a phased approach	>5
Training	Formation of Village Poultry Producers Groups (VPPGs) or self-help groups Training of a trusted Village Group Leader (VGL) of VPPGs in charge of managing a minimum stock of poultry medicines, supply of feed and organizing marketing of products for the group Poultry health, focus on: - disease control: Newcastle disease, fowl cholera (in parts of Asia) - vaccination: 1-2 women/young persons in the village should be trained on poultry vaccination - training of para-veterinarians or community animal health workers	Formation of VPPGs or self-help groups Training of a trusted VGL of VPPGs in charge of managing a minimum stock of poultry medicines, supply of feed and organizing marketing of products for the group Poultry health, focus on: - disease control: Newcastle disease, fowl cholera (in parts of Asia) - vaccination: 1-2 women/young persons in the village should be trained on poultry vaccination Biosecurity measures Building and operating mini-hatcheries Programmed hatching, www.tandfonline.com/doi/pdf/10.3763/ijas.2010.0563	Formation of Poultry Producers Associations (PPAs), with an emphasis on management, accounting and marketing aspects

(cont.)

TABLE 10 *(cont.d)*

	Remote rural villages (without road access)	Rural villages (with road access)	Peri-urban areas
Training (cont.d)	Basic poultry husbandry and management, focus on: - supplementary feeding: introduction of techniques for supplementing poultry with insects (e.g. termites, maggots), dried blood, crop residues, green leaves and seeds from leguminous trees, etc. - improved simple housing using local building material - strategies to reduce predator losses (e.g. basket technique for chicks up to one month of life, overnight housing of birds) - egg management - Integrated farming practices (e.g. integrated crop-poultry systems).	Advanced poultry husbandry and management, focus on: - supplementary feeding: introduction of techniques for supplementing poultry with insects (e.g. termites, maggots), dried blood, crop residues, green leaves and seeds from leguminous trees, etc. - improved poultry housing using local and/or commercial building material - management of chicks during first month of life (e.g. brooding and basket techniques) - breeding - egg management - egg handling and storage Integrated farming practices (e.g. integrated crop-poultry systems).	Specialized technical training on poultry husbandry and management: - feeding - management - health and biosecurity measures - housing - breeding Building and operating hatcheries Quality and sanitary standards Financial management Egg handling and storage Facilitate the organization of seminars, workshops, conferences on thematic poultry production/health issues according to the local requirements.
Housing	Facilitate purchasing local building material Facilitate/support the construction of equipment to protect chicks up to one month.	Facilitate purchasing building material and small equipment (feeders, waterers, etc.) for VPPG members Facilitate purchasing of equipment to protect chicks up to one month.	Facilitate/support construction and operation of housing facilities and poultry equipment (feeders, waterers, etc.) for PPA members.
Feeding	Support formulating balanced diets based on locally available feed resources.	Facilitate/support for establishing small poultry feed production units Consider introducing low cost feeding strategies (e.g. feed dilution, skip-a-day feeding).	Facilitate negotiation between PPAs and poultry feed manufacturers for better price Facilitate/support for establishing poultry feed production units.

(cont.)

TABLE 10 *(cont.d)*

	Remote rural villages (without road access)	Rural villages (with road access)	Peri-urban areas
Health	Facilitate/support to establish channels for the regular supply of vaccines from the nearest village pharmacies and/or village pharmacies and VPPGs In the most rural areas: facilitate/support establishing mutual funds or revolving funds for purchasing a stock of essential poultry medicines to be managed by VGLs of VPPGs Facilitate/support community-led biosecurity initiatives (e.g. cleaning).	Facilitate/support establishing channels for the regular supply of vaccines and medicines between central vet products storing centres or wholesalers and village pharmacies and/or village pharmacies and VPPGs Introduction of the Poultry Health Calendar Facilitate/support the implementation of biosecurity measures (e.g. disinfection, segregation).	Facilitate/support establishing channels for the regular supply of vaccines and medicines between central vet products storing centres or wholesalers and/or village pharmacies and VPPGs Facilitate/support mutual funds or revolving funds for purchasing a stock of essential poultry medicines to be managed by VGLs of VGPs in rural areas Support establishment of animal health facilities Facilitate/support the implementation of biosecurity measures (e.g. physical barriers, access control, disinfection) Support disease surveillance networks.
Management	Improve access to services within the existing framework When appropriate, facilitate efficient integration of the different components of the farming system (poultry, crops and, eventually, fish).	Facilitate purchasing of brooding equipment When appropriate, facilitate efficient integration of the different components of the farming system (poultry, crops and, eventually, fish).	Facilitate purchasing of brooding equipment Facilitate/support establishing of biosecurity measures.
Breeding	Facilitate/support community-based breeding schemes through selection within local birds Facilitate establishing of mini-hatcheries.	Facilitate VPPGs access to crossbred birds Distribute max. 10-12 pullets and 1 crossbred cock Facilitate establishing of mini-hatcheries When appropriate, consider supplying improved cocks to selected or "champion" poultry farmers to produce crossbreed birds for distribution.	Consider supplying improved breed cocks to selected or "champion" poultry farmers to produce crossbreed birds for distribution Facilitate VPPGs access to crossbred/ commercial birds (day-old chicks, pullets, or hatching eggs) Facilitate establishing small broiler/layer parent stocks Facilitate establishing of hatcheries.
Financial services	Facilitate establishing credit/saving schemes (e.g. "tontine") Facilitate establishing of Rural Saving and Credit Cooperatives (RUSACCO).	Facilitate establishing credit/saving schemes for VPPGs, www.fao.org/Participation/english_web_new/content_en/Sector_doc/resource-en.pdf Facilitate access to credit for poultry input suppliers.	Facilitate access to credit for PPAs members for upgrading of poultry production facilities and working capital through micro-finance/ bank institutions (consider matching grants up to 25 percent) Facilitate access to credit for poultry input suppliers.

(cont.)

TABLE 10 *(cont.d)*

	Remote rural villages (without road access)	Rural villages (with road access)	Peri-urban areas
Policy dialogue	Foster interaction between family poultry producers and local authorities or other policy-makers.	Establish fora of stakeholders.	Facilitate establishing fora, innovative platforms, knowledge networks, etc. for poultry value chain stakeholders to enhance dialogue among them and decision-makers leading to the creation of a National Poultry Board (if not in existence) Establish links with family poultry networks (e.g. INFPD).
Marketing	Facilitate the sale of poultry products in the village, especially to women and youth Assist in group marketing When appropriate, support poultry traders.	Facilitate access to market (local and regional) and trade networks Assist in group marketing Facilitate transportation of poultry products. Build relationships among different chain actors (including commitment to cooperate on mutually beneficial actions/investments and contractual arrangements) Promote policies and strategies that: increase the ability of family poultry producers and poultry traders to compete in livestock markets reduce transaction costs (e.g. synchronization of product delivery) Consider creating niche markets and emphasize the added value of family poultry products compared with commercial products Consider supporting poultry traders and egg collectors.	Facilitate negotiation between PPAs and processors/retailers Consider establishing "out-growers" scheme for poultry producers (broilers/layers) Evaluate economic viability of establishing broiler slaughtering facilities and egg storage and packaging facilities (feasibility study) Consider branding of products Facilitate access to the technologies required to meet quality and sanitary standards Consider creating niche markets and emphasize the added value of family poultry products compared with commercial products.

Nonetheless, a development activity is more likely to be successful if attention is focused on specific outcomes. Project designers should therefore dedicate the required attention to family poultry in order to address the constraints of the production system, and not scatter project resources on different development objectives. Conversely, for small-scale intensive interventions, a more poultry-specific approach should be undertaken due to the more specialized nature of the production system.

Scale of the project

The scale (national, regional or local) of the project is a key factor in determining the sustainability and effectiveness of the intervention. The project should have sufficient scale to attract service providers (feed, medicines, transport) and to support sustainable outcomes. Nonetheless, project designers should be careful not to be overly ambitious and overextend the scale of the poultry intervention. The law of diminishing returns applies and over-investment can ruin the cost/benefit of the intervention.

Develop a realistic timeline

A calendar of activities has to be developed when planning a project. The timeline should give the best estimate of the time needed to carry out the activities of the project. Many project designers tend to be optimistic when developing the schedule of activities, but it is crucial to be realistic and allow flexibility for possible unexpected problems. Keeping the project on schedule is important primarily to prevent cost overruns.

Gantt charts are useful graphical representations of the duration of the phases and activities of the project.

Ensure that the implementing organization and Project Management Unit (PMU) have the technical capacity to implement the family poultry project

Projects should be built on a deep understanding of the family poultry sector. The team responsible for project management and implementation (Project Management Unit, PMU) and the implementing organization should have a strong technical capacity and experience in family poultry and extensive knowledge of lessons learned from previous projects.

The selection of staff should be based on their family poultry experience and their capacity to maintain a continuous local presence. Competent and motivated local experts should be used whenever possible, given their knowledge of the local conditions and lower costs. When local specialists are not available, consider building local capacity in family poultry or, alternatively, contracting regional/international consultants or international consulting firms with expertise in family poultry.

Define exit strategy

An exit strategy, or phase-out activity, is a specific plan to ensure the handover of results, outputs and deliverables of the project to the respective beneficiaries, so that the sustainability of the project is guaranteed without further inputs from donors. Success in applying an exit strategy depends upon ensuring that a fully integrated self-sustaining system is operational and sufficient notice is given for participants to adjust to the change. Arrangements should be in place for winding up all activities including sale of assets and collection of debts.

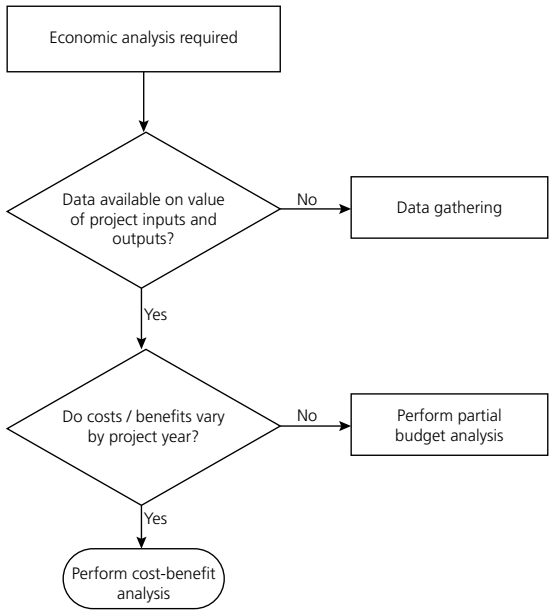
Conduct a cost-benefit analysis[21]

Development projects frequently require the investment of significant funds in the short term, in order to reap sustained benefits in the long term. A cost-benefit analysis, when applied to a project proposal, provides a means of assessing the balance of future benefits accrued against the investment requisite to realize those benefits (Figure 12). In the context of poultry systems, this could mean that initial capital investment is recouped over multiple production cycles. Thus a cost-benefit analysis recognises the time-value of money. That is to say, benefits received now have a greater value than benefits of the same amount received in the future. Likewise, costs incurred now have a higher value than costs incurred at some point in the future.

Cost-benefit analysis utilizes a partial budgeting framework (see Rushton, 2009). Partial budgeting assesses the value of a change in a single time-step (e.g. one year or one production cycle) by assessing four components:

Costs	Benefits
New costs	Costs saved
Revenue foregone	New revenue

FIGURE 12
Decision tree for performing cost-benefit analysis



[21] This section was prepared by William Gilbert and Jonathan Rushton.

The sum of benefits (costs saved + new revenue) minus the sum of costs (new costs + revenue foregone) provides a net value of a project at a single time-step. By combining the net value with a discount rate, the time value of money is incorporated into this formula. Discounting is a process that reflects the fact that money invested in a project could be invested elsewhere to yield a return over the same time period. This process allows costs and benefits that occur at different time-steps to be compared at present value. Thus, for cost-benefit analysis, it is necessary to identify all the costs and benefits of a project, as well as the point in time at which they are accrued.

When performing economic cost-benefit analysis, it is also necessary to identify and evaluate any externalities arising from the proposed investment (e.g. environmental impact) and, where possible, convert these to monetary values. Alternatively, the marginal change in non-monetizable externalities can be examined to provide a means of assessment.

When beginning a cost benefit analysis it is important to proceed through a series of steps related to the above table. Identify the:

I. COSTS
   A. Capital costs
      - Buildings
      - Land
   B. Recurrent costs
      - Replacement animals – fertile eggs, day-old chicks or ducks, point of lay pullets
      - Veterinary and medicine and miscellaneous costs
      - Feed
      - Labour and fixed costs.

II. BENEFITS
   A. Sale of livestock for breeding and production
   B. Sale of livestock for slaughter
      - Fattened
      - Cull birds.
   C. Sale of products for consumption or further processing
      - Eggs
      - Feathers.

An analysis of the costs and benefits of a change over a short time period allows one to compare these figures directly to work out the economic profit of a change. However, if the costs and benefits occur in different years, as discussed above, there is a need for a method to compare the costs that occur early in a project with the benefits generated in future years. Economists have developed a method to do this called "discounting", where future values can be converted into present values. These can then be used to generate different measures of the economic value of a change:

- net present value
- benefit-cost ratio
- internal rate of return.

Interpretation of results

Cost-benefit analysis produces three indicators of investment value, which should be interpreted together. These are:

Net present value (NPV): the difference between the present value of the benefits and the present value of the costs. If NPV is negative, an investment is not worthwhile. It is calculated using the following formula: Where B_t is the value of benefits in year t, C_t is the value of costs in year t, r is the discount rate and t is the time in years from the present date.

$$NPV = \sum \frac{B_t}{(1 + r)^t} - \sum \frac{C_t}{(1 + r)^t}$$

Benefit-cost ratio (BCR): the ratio of the present value of the benefits divided by the present value of costs. This indicates how many units of output are expected per unit of input. The benefit-cost ratio is calculated using the following formula:

$$BCR = \frac{\sum \frac{B_t}{(1 + r)^t}}{\sum \frac{C_t}{(1 + r)^t}}$$

Internal rate of return (IRR): the discount rate at which NPV is equal to zero. If the IRR is greater than the minimum acceptable discount rate, the project represents a worthwhile investment.

CASE STUDY 8

Cost-benefit analysis for poultry development in Rakai district, Uganda

A cost-benefit analysis was performed on a project to improve chicken production through programmed hatching and cockerel exchange in Rakai district, Uganda. The project was financed by the Maendeeo Agricultural Technology Fund (MATF). The project, which ran for two years, aimed to improve productivity by cross-breeding local poultry varieties, train farmers in poultry management, provide financial support for infrastructure development, and improve farmer contact networks through establishment of breeder and farmer associations.

The analysis quantified the costs and benefits of the project over a ten-year period, and also explored qualitatively the impact of the project on intangible factors. Improvements in food security both on-farm, and indirectly through increased supply to local markets were noted. Increased income allowing the payment of school fees was noted by 21 percent of participants, as a significant contribution from the improved poultry production, and 28 percent of respondents claimed to have benefited by learning skills that were transferable to other enterprises.

Quantitative analysis of monetized costs and benefits yielded the following results after ten years:

- NPV of $4 549 per farmer
- BCR of 2.27
- IRR of 1 128 percent.

Source: Ewbank *et al.*, 2007

Design a detailed monitoring and evaluation system

The design of the M&E system should be integrated into the early stages of project design. An effective monitoring and evaluation system can assess the progress of the project and identify areas that need further attention. Furthermore, it can provide a mechanism to implement timely corrective actions.

Monitoring information has to be timely, reliable, relevant, objective, cost-effective to collect, and easy to gather, use and understand. Quantitative and qualitative indicators are complementary and both are important for effective monitoring. Sample indicators for poultry projects are shown in Box 11. A maximum of three indicators for each project outcome should be enough to measure effectively the results obtained.

Project designers have to develop an evaluation system that allows for objective assessment of the project, either in progress or completed. A well-designed evaluation system should answer the following questions:

- To what extent did the project reach its objectives?
- Did the project's ultimate beneficiaries benefit from the project (including women and men and particular vulnerable groups)?
- Were the necessary resources actually available?
- Did the project bring secondary benefits?
- Did the project remain within its budget?
- Was the project sustainable?
- Did the project produce any side effects (e.g. environmental impacts)?
- Were the benefits worth the costs in financial and other resource terms?

For more information, see Chapter 5.

Develop hands-on learning by-doing

Training, knowledge sharing and learning are significant inputs as important as housing, feed and vaccines. Training builds fundamental capacity within the family poultry sector, making contributions that will be sustainable after the project interventions end. Training is aimed at imparting knowledge about the opportunities offered to participants by the project, but should also aim to facilitate the acceptance and understanding of new technologies.

BOX 11

Sample indicators for poultry projects

- Percentage change in amount of animal protein consumed by household members.
- Percentage change in production and/or sale of poultry products.
- Percentage change in household incomes generated from poultry-related activities.
- Changes in morbidity and mortality of poultry.
- Proportion of family poultry producers with access to poultry services.
- Proportion of family poultry producers aware of the improved poultry management practices.
- Percentage change in the use of the recommended technologies and practices.
- Percentage change in family poultry producers' access to credit.

BOX 12

Training Programme of rural women on family poultry management in Afghanistan (FAO/USAID "Development of Rural Poultry Production" - GCP/AFG/030/USA)

In Afghanistan, village poultry is kept almost exclusively by women, and social and cultural conditions imply that any development activity with rural women can only be done through female staff. The adopted training approach included a combination of formal training and practical implementation of the learned messages. The training involved classroom instructions by female staff for groups of women and practical training in the houses of the individuals with one theoretical and practical session each week during the initial three months. The subjects of training included: Basics about Poultry Production (5 lessons), Feeding and Watering (10 lessons), The Chicken Coop and Equipment (4 lessons), Breeding Management (15 lessons) and Poultry Health (12 lessons). A manual for trainers was prepared complete with a set of drawings on the different aspects of rural poultry.

The initial step was to establish a team of four women trainers, led by a Group Leader, and to hold meetings, assisted by National Poultry Advisors or Poultry Coordinators, with village elders to explain the objective and purpose of the project. This activity was essential to receive their support for the programme and ensure the necessary security for the staff during their stay in the village.

The trainees were selected from resource poor households, especially female-headed households (mostly widows). All potential trainees had to accept the conditions of the programme, which included the willingness to contribute to the construction of a new chicken coop, the payment of a small contribution for the supplied pullets, and participation in group training.

Field experience shows that a two to three days training session for building the capacity of poultry producers is unlikely to be effective. A more "hands on learning by doing" approach is needed. In order to improve learning efficiency, training sessions should be brief and stimulate interest. Although more expensive, practical activities including demonstrations and technical follow-up are recommended.

A key for success is training of women and youth. Women are potentially among the main beneficiaries of poultry development projects. The design of the training programme should take into consideration the social and cultural context and women's workload. Youth are generally more open to new technologies and practices than adult poultry producers (FAO, 2004a), thus the likelihood of success of the training will be higher. For more information see Section 3.8.

Emergency projects

Emergency projects are triggered by natural and human disasters (e.g. earthquakes, floods, droughts and civil conflicts) or by the incursion of severe animal diseases. The intervention

should provide immediate assistance to crisis-affected family poultry keepers through the supply of replacement birds, feed, and/or veterinary medicines. The emergency intervention should attempt to rebuild the conditions existing before the disaster in a sustainable and viable manner, not to improve the system.

In emergency responses it is crucial to conduct a thorough assessment of the operational environment, the type and stage of the emergency, the role of poultry, the importance of poultry losses and the impact on livelihoods of the emergency intervention. As in development projects, albeit on a tighter timeframe, it is vital to appropriately target beneficiaries, coordinate with other projects, conduct participatory M&E, incorporate and share lessons learned, and involve stakeholders. Moreover, particular attention should be placed on vulnerable groups (women, children, elderly people, malnourished people, etc.), gender roles and on the ability of clients to carry out activities under emergency conditions.

During a post-crisis situation, restocking is often the best poultry-related intervention to restore the livelihoods of affected households. Restocking with poultry supports families by sustaining their immediate nutritional needs, through eggs, and by providing long-term livelihood security, through breeding animals. The poultry used to reconstitute the lost flock of family poultry keepers should preferably be purchased in locations close to the target area. This strategy should reduce costs (especially transportation), the risk of introducing new diseases, stress-related losses and facilitate poultry adaptation to the new environment. A veterinarian should inspect the poultry purchased to check for signs of disease or wounds. The design team should consider the possibility of organizing a poultry fair to enable clients to select their own birds.

The success of restocking emergency interventions is determined by the following elements (IFAD, 2009):

- timing
- quality and breed of the birds provided
- provenance of the stock
- suitability of the stock for the target area
- avoiding any need for further interventions (e.g. training)
- availability of necessary inputs, especially poultry feed.

Projects that have attempted to restock households or smallholder farmers in rural disaster affected areas (especially those located in remote locations) with packages including "improved" breeds and an initial stock of commercial feed have essentially failed.[22]

[22] For more information on livestock emergency projects, please refer to the Livestock Emergency Guidelines and Standards (LEGS) available at: www.livestock-emergency.net/userfiles/file/legs.pdf

Chapter 5

Conducting participatory monitoring and evaluation

Brigitte Bagnol

Key objectives

- To understand the advantages of participatory methods.
- To be aware of the most common participatory methods.

Introduction

This chapter deals with monitoring and evaluation (M&E) issues related to the development and management of poultry projects that should be incorporated during the design phase. Although several different methodologies may be applied (e.g. the use of questionnaire-based survey to evaluate the impact of activities and the analysis of regular data produced by the ongoing collection of indicators) this chapter deals specifically with participatory M&E.

Why use participatory M&E instead of conventional M&E methods?

Involving project stakeholders in impact assessment promotes the development of a learning partnership comprising male and female poultry producers, community representatives, poultry traders, livestock officers, extension workers, veterinarians, government officials and project staff. It creates space for dialogue to assess the results and discuss how future activities and allocation of resources can be improved. It takes into consideration aspects that are often neglected and can only be identified by the stakeholders themselves, such as ways to overcome barriers to risk reduction. The more people discuss the nature and causes of the problems and their possible solutions, the more they organize themselves to carry out and analyse the results of their activities.

Timing

Monitoring of activities should occur at regular intervals to enable timely adjustments to be made. The timing of monitoring depends on the activity itself. For example, if vaccination is the focus, the community vaccinator should confirm that birds are healthy one week to one month after vaccination.

Definition of indicators

In an M&E system, an "indicator" is something that can be measured. Indicators should be easily quantifiable and collected. They can measure short and long-term changes, such as:

- short-term changes in:
  - household chicken numbers
  - number of households involved in vaccination campaigns
  - number of chickens dying
- medium term changes in:
  - number of chickens sold or traded
  - number of chickens and eggs consumed.

Participatory approaches and methods

Participatory approaches such as participatory rural appraisal (PRA), participatory epidemiology (Catley, 2005) and participatory impact assessment (Catley *et al.*, 2013) come from a long tradition of participatory practices initiated at the end of the 1980s for implementation in development activities. Participatory rural appraisal (PRA), participatory learning methods (PLM), participatory assessment monitoring and evaluation (PAME), and participatory learning and action (PLA) are some of their fields of application. Participatory methodologies are based on the notion that people learn and retain better when their own knowledge and experience is valued, and when they are able to share and analyse their experiences in a safe collective environment. PRA aims to change the relationship between researchers and poor people. Gender studies and the development of the Harvard Framework[23] (Overholt *et al.*, 1985; Moser, 1993) also contributed to the development of gender sensitive methodologies that address issues of access, control and benefit over resources, and roles of men and women (Williams *et al.*, 1994). Participatory action research and action learning also influenced the development of tools and instruments and their use in highly varied contexts.

BOX 13

The steps of participatory M&E

- Define the questions to be answered.
- Define the geographical and time limits of the project.
- Identify and prioritize locally defined impact indicators.
- Define which methods to use, and test them.
- Decide who to interview and which sampling methods and sample size to use.
- Assess project attribution.
- Triangulate.
- Feed back and verify results with the community.

Source: adapted from Catley *et al.*, 2013

[23] The Harvard Analytical Framework is one of the earliest frameworks for understanding differences between men and women in their participation in the economy.

Participatory methods emphasize the importance of peoples' knowledge for the understanding and transformation of any situation. They privilege all forms of oral and visual communication to generate and share information, and promote cooperative learning. Group dynamics are also employed to create collective knowledge and empower people to take responsibility. Many forms of interviewing, especially focus group discussion, are employed to collectively produce and transmit knowledge, perceptions, beliefs, opinions and attitudes, and develop consensus. Most of these methodologies are based on a common set of principles that include participatory attitudes, learning attitudes, transparency and flexibility.

Participatory rural appraisal (PRA)

Typically, a participatory rural appraisal aims to involve all stakeholders in the process of analysis and decision-making, for example, male and female community representatives, traditional leaders, traditional healers, poultry traders and livestock officers, through the use of participatory methodologies.

Participatory epidemiology (PE)

"Participatory epidemiology is the systematic use of participatory approaches and methods to improve understanding of diseases and options for animal disease control" (Catley *et al.*, 2012). The table 12 shows methods used in participatory epidemiology.

Participatory impact assessment (PIA)

Participatory impact assessment combines quantitative and qualitative data. The use of participatory ranking and scoring methods produces qualitative indicators, often based on opinions or perceptions, to be presented numerically. Standardization and repetition of participatory methods is possible, where necessary.

TABLE 11
Example of a matrix for a participatory impact assessment of project activities related to disease prevention

Expected output	Indicators	Methodologies
Clinical signs of disease X known	Percentage of signs listed relevant to the case definition of disease X Percentage of participants knowing the clinical signs relevant to disease X.	Listing of clinical signs of disease X Scoring exercise to identify when animals are suspected of having contracted disease X.
Forms of transmission of disease X known	Percentage of relevant routes of transmission known by participants Percentage of participants knowing the relevant forms of transmission.	Listing of transmission known by people Scoring of the transmission route for disease X.
Preventive measures against disease X known and adopted	Percentage of relevant preventive measures known by participants Percentage of participants knowing the forms of transmission Percentage of people declaring that they have changed practice in relation to the defined main preventive measures.	Listing of preventive methods known by people Scoring of the preventive practices related to disease Scoring of adoption of measures.

TABLE 12
Methods used in participatory epidemiology

Method	Information
Informal interviews	
Semi-structured interviews	Used in combination with visualization, ranking and scoring methods. Also used as a stand-alone method. Same sex focus groups are used to identify specific needs of men and women.
Timeline	The history and timing of disease events.
Walking tour	Used by interdisciplinary team of technicians and male and female farmers to develop maps locating main infrastructures, scavenging areas and biosecurity issues, and to understand the farming systems.
Family roles and access, control and benefits	Used to identify ownership, control over benefits of poultry production and activities carried out by male and female adults and children in relation to breeding specific species.
Dreams realized or visioning	Used to identify indicators and to discuss how to measure the benefits and changes expected by men and women.
Visualization methods	
Participatory mapping	Used to look at each specific agro-ecological and social situation and discuss the implications of these situations for biosecurity.
Seasonal calendars	Used to establish seasonal variation in disease incidence in line with seasonal variation in human livelihoods (e.g. consumption of livestock products and livestock trade, seasonal variation in contact with disease vectors, neighbouring livestock and wildlife, seasonal variation in vector populations).
Proportional piling*	Used to establish the age structure of poultry flocks, disease incidence and mortality estimates by age group, impact of vaccination on livestock mortality, and case fatality rates.
Radar diagrams	Used for analysis of disease control strategies.
Venn diagram	Well-being stratification exercise and analysis of community structures. Helps to understand who will be affected by proposed development activities.
Ranking and scoring	
Counting	Identification of consumption and sale of chickens and eggs.
Simple ranking	Analysis of disease control strategies; ranking of activities according to their contribution to household income.
Simple scoring	Prioritization of livestock diseases or impact of project activity according to defined indicators.
Matrix ranking	Analysis of disease control options.
Matrix scoring	Local characterization of the clinical signs and causes of disease; local characterization of disease vectors; comparison of clinical diagnoses of livestock keepers and veterinarians; and analysis of veterinary service providers.
Before-and-after scoring	Impact of veterinary services on the livelihoods impact of diseases; impact of project activities.

*Proportional piling is a visualization method, but the results are recorded numerically.
Source: adapted from Ahlers *et al.*, 2009; Catley *et al.*, 2012.

A combination of participatory methods can be used as a baseline, and to assess the impact of the project. Participatory M&E also contributes to continuous improvement of poultry production activities.

CASE STUDY 9

Example of a PIA exercise for the evaluation of ND control through vaccination campaigns

The KYEEMA Foundation implemented the "Regional Newcastle disease control project" in Malawi, Mozambique, Tanzania and Zambia with the support of AusAID. In January 2012, a PIA was carried out in three villages of Thyolo District in the southern region of Malawi to evaluate the impact of vaccination campaigns against ND. All the male and female farmers interviewed had had chickens vaccinated three times by community vaccinators in March, July and November 2011.

The first question asked was: *Since the first vaccination did the number of chickens in the flock increase, stay the same or decrease?* Each participant was asked to respond by placing a stone on one of three possible answers written on a flip chart on the ground. The answers were used to generate the following table.

	Beula 12 women	Beula 10 men	Maganize 7 women	Maganize 8 men	Ndalama 16 women	Ndalama 7 men
Increased	11 (92%)	8 (80%)	7 (100%)	6 (75%)	12 (75%)	7 (100%)
Stayed the same	1 (8%)	0	0	0	2 (12.5%)	0
Decreased	0	2 (20%)	0	2 (25%)	2 (12.5%)	0
Total	12 (100%)	10 (100%)	7 (100%)	8 (100%)	16 (100%)	7 (100%)

The same exercise also included the following questions:

- Since the first vaccination did the number of birds that died increase, stay the same or decrease?
- Since the first vaccination did the number of chickens sold increase, stay the same or decrease?
- Since the first vaccination did the number of chickens consumed increase, stay the same or decrease?

To evaluate the increase in size of household flocks since vaccination in 2011, the participants were asked to state the number of chickens they had in January 2010, and later the number of chickens they had in January 2012. By analysing the median and the average or calculating the average percentage increase per household, it is possible to see the evolution of flock size. Similarly, it is possible to evaluate the number of chickens sold and consumed.

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Glossary

Backyard poultry	Small numbers of poultry kept in urban and peri-urban areas. If they are housed all or most of the time, the system is often called "backyard production".
Biosecurity	Actions taken to prevent the introduction and/or spread of disease. These steps may include isolation or quarantine, use of personal protective equipment (PPE), decontamination and vaccination.
Breed	A group of animals that, through selection and breeding, have common traits and pass those traits uniformly to their offspring.
Breeding improvement	Improvement based on selecting parent stock for next generation that has better production parameters than the average.
Broody	Showing a readiness to sit on eggs and hatch them (as in broody hen).
Broiler	Chicken raised for meat production.
Cold chain	The system used to keep and distribute vaccines within the safe temperature range of +2 °C and + 8 °C.
Cross	The offspring of two (or more) parent organisms produced by mating or other means. The offspring of a hen and a rooster of different breeds or lines
Culling	The humane destruction of animals for disease prevention or other reasons.
Community-based management (CBM)	CBM is a bottom-up style of organization, which can be facilitated by an upper government or NGO structure, but aims for local stakeholder participation in planning, research, development, management and policy-making for a community as a whole (Wikipedia).
Decontamination	All stages of cleaning and disinfection done to remove, inactivate or destroy infectious agents on a surface or items such as tools, equipment, clothing, structures or premises.
Disease	The clinical and/or pathological manifestation of infection.
Endemic (or enzootic)	The continuing presence of disease or an infectious agent in a population or defined area at a rate of occurrence that does not change significantly over a period of time.[24]
Epidemic (or epizootic)	The occurrence of cases of disease in a population or region in excess of normal expectations.
Extensive production	A system of poultry production where the flock is not confined and can scavenge for food over a wide area. Rudimentary shelters may be provided or the birds may roost outside, usually in trees, and nest in the bush. The flock may contain birds of different species and varying ages.

[24] Strictly speaking "endemic" refers to disease in human populations, while "enzootic" refers to disease in animal populations. However, in practice both terms are used to describe the occurrence of disease in animal populations

Family poultry	The term used to describe the full variety of small-scale poultry production systems that are found in rural, urban and peri-urban areas of developing countries. Rather than defining the production systems per se, the term is used to describe poultry production that is practised by individual families as a means of obtaining food security, income and gainful employment.
Flock size	The number of poultry owned by the households. It includes day-old-birds as well as all-age male and females.
Free-range	Unconfined; permitted to graze or forage.
Genetic improvement	Improvement of a breed/population due to breeding work that has been done.
Germplasm	Semen, male or female germ cells or genetic material taken from a male or female germ cell for the purpose of producing a zygote; includes embryos but does not include a hatching egg.
Hatchability	The number of chicks hatched from a number of fertile eggs, usually expressed as a percentage.
Hazard	A physical or biological agent or a substance that has the potential to have a harmful effect on health.
Heritability	The proportion of observed variation in a particular trait that can be attributed to inherited genetic factors in contrast to environmental ones; values between 0 and 1.
Heterosis	Increased growth rate, fertility, yield in a cross between two genetically different lines that exceeds the average of the parent lines.
HPAI A (H5N1)	A subtype of the Influenza A virus that is capable of causing illness in many animal species, including humans. A bird-adapted strain of H5N1, called HPAI A (H5N1) for "highly pathogenic avian influenza virus of type A of subtype H5N1", is the causative agent of H5N1 flu, commonly known as "avian influenza" or "bird flu", which is currently endemic in some SE Asian countries. H5 stands for the fifth of several known types of the protein haemagglutinin and N1 stands for the first of several known types of the protein neuraminidase that are found on the surface of the virus.
Hybrid	An offspring resulting from the cross between parents of different species or different populations within species.
Hybrid vigour	Increased vigour or other superior qualities arising from the crossbreeding of genetically different plants or animals. Also called heterosis.
Inbreeding	Reproduction from the mating of parents who are closely related genetically.
Indigenous or local chicken	Bird reared over centuries by people, or an introduced bird that has been adapted to an environment over many generations and has socio-economic and cultural value. Indigenous poultry represent an important reservoir of genetic variation.
Infection	The entry and development or multiplication of an infectious agent within a host where it may or may not cause disease.

Institution	Formal and informal rules and regulations that influence stakeholder behaviour as well as organizations, such as the government or non-governmental organizations.
Liveability	Survival expectancy or viability, used especially of poultry and livestock.
Morbidity	The level of disease in a population.
Mortality	The number of deaths occurring in a population.
Outbreak (of disease or infection)	The occurrence of one or more cases of a disease or infection in a group of animals that share approximately the same likelihood of exposure to a pathogen.
Pandemic	An epidemic involving many countries or continents, usually affecting a large number of individuals.
Participatory epidemiology	An evolving branch of veterinary epidemiology that uses a combination of practitioner communication skills and participatory methods to improve the involvement of animal keepers in the analysis of animal disease problems, and the design, implementation and evaluation of disease control programmes and policies.
Pathogenic	Capable of causing disease.
Policy	A set of government decisions and actions oriented towards a long-term economic and/or social purpose in a broad subject field. A policy consists of a policy objective and one or more policy instruments that serve the objective, including one-off investments and/or laws, rules and regulations, which change only when a new policy is designed and implemented.
Prevalence	The proportion of cases of a given disease or infection that exists in a population at a specified point in time. It is measured by counting all the cases of disease present in a population on a single occasion.
Rearing farm	A closed farm dedicated to growing poultry from day-old to sexual maturity.
Risk	The probability that an event will occur, e.g. that an individual will become infected or develop a specified disease in a defined time period.
Semi-scavenging	A system in which poultry flocks are under a partly controlled management and where the scavenged feed accounts for a significant part of the total feed eaten. (Supplied feed typically comprises one-third or 30-40 g of grain per day.)
Semi-intensive	A system of production with a shelter house and an outside run enclosed by a fence to confine the chickens and keep them safe from predators.
Scavengeable feed resource base (SFRB)	Comprises material from two sources: household food waste and leftovers (HHL), and materials from the environment, i.e. crop by-products and the gleanings of gardens, fields and wastelands.
Scavenging	Searching for locally available feed (such as organic matter including insects) in the environment. The feed scavenged by poultry is frequently not considered edible by humans.
Stakeholder	Anyone who has interests in or is affected by a development activity.

Supplementary feed	Extra feed given to birds in addition to the amount they receive from scavenging.
Surveillance	The systematic ongoing collection, collation, and analysis of information related to animal health and the timely dissemination of information to those who need to know so that action can be taken.
Thermotolerant	The ability of a vaccine and the parent virus to retain a level of infectivity after exposure to heat. For I-2 ND vaccine it is defined by the length of time the vaccine will retain an infectivity titre sufficient to induce a protective immune response, at a particular temperature.
Transmission	The process by which an infectious agent passes from a source of infection to a new host.
Two or four-way cross	A two-way cross is a bird with parents from different breeds or lines. A four-way cross is a bird that has parents that were different two-way crosses.
Vaccination	Inoculation of healthy individuals with a vaccine in order to elicit a protective immune response. Vaccination can help protect against the clinical signs of disease, but does not prevent exposure of an individual to the infectious agent.
Vaccine	A preparation containing weakened, dead (inactivated) or genetically altered strain(s) of disease-causing agent(s) that, when inoculated into an individual, stimulates an immune response and helps provide protection from disease. Vaccines may be live or dead (inactivated). Live vaccines are usually attenuated versions of the pathogen. Dead (inactivated) vaccines do not multiply in the host and are usually administered in multiple doses to induce a full immunological response.
Vector	An organism such as a mosquito or tick that carries and transfers infectious agents from one host to another.
Village poultry/ chickens	Small numbers of poultry kept for home consumption, occasional sales and various socio-cultural uses. This practice was termed "village poultry" production, as it was originally concentrated in villages. It usually involves the raising of local breeds that scavenge for most of their feed. They may or may not be housed at night.
Wet markets	Live bird markets.
Zoonosis	Any disease or infection that is naturally transmissible from animals to humans (adjective: zoonotic).

Annex 1

Sample project budget[25]

Capital costs						
Item	**Unit**	**Quantity**	**Unit cost**	**Year 1**	**Year 2**	**Year n****
Poultry shelters	Sqm					
Equipment						
Feeders	No.					
Waterers	No.					
...						
Total capital costs						

[25] The capital and recurrent costs are shown in different tables in order to give a more detailed explanation of budget components.

Recurrent costs									
Item	**Unit**	**Total quantity**	**Unit cost**	**Year 1**		**Year 2**		**Year n****	
				No.	*Cost*	*No.*	*Cost*	*No.*	*Cost*
Poultry	**No.**								
Feed	**Kg**								
Health									
(a) Vet services	Lump sum								
(b) Drugs	No.								
(c) ...									
Labour									
(a) Staff	Pers/day								
(b) Consultants	Pers/h								
(c) ...									
Training/workshops									
(a) Trainers	Pers/h								
(b) Material	No.								
(c) ...									
Project administration									
(a) Transportation									
(b) Monitoring and evaluation	Lump sum								
(c) ...									
Other expenses									
Contingency* 10%									
Total recurrent costs									
Total costs									

* Provision for unexpected expenses (e.g. shortages, delays).
** The budget generally covers the period of time necessary for project interventions to be completed and become self-sustaining.

Annex 2
Poultry project assessment and design checklist

GENERAL

- ☐ Define clear project goals and objectives (immediate and development objectives) that are easy to measure and communicate.
- ☐ Set start and end dates for the project.
- ☐ Define expectations, priorities, knowledge, resources, roles and responsibilities for all stakeholders.
- ☐ Determine if the project fully utilizes locally available resources (human, organizational, economic, natural, material and technological).
- ☐ Identify other projects carried out in the area and projects with similar objectives carried out in other locations.
- ☐ Determine if the project should include a public awareness campaign.
- ☐ Consider the agro-ecological context (e.g. suitability of climate).
- ☐ Define the project's comparative advantage in the given region.
- ☐ Determine the comparative advantage of other projects and identify possible synergies.
- ☐ Communicate regularly with other donors on project design, progress and other developments.
- ☐ Determine if the changes proposed with the project are socially and culturally acceptable.
- ☐ Ensure the financial and economic viability of the project (financial and/or economic analysis, cost/benefit analysis).
- ☐ Determine if the government is willing to cooperate with the project.
- ☐ Identify capacity-building needs.
- ☐ Determine if the project will require the development of infrastructure.
- ☐ Determine if the project is consistent with national development plans and policies.

TARGET GROUP

- ☐ Consider the socio-economic conditions of the proposed target group (economic activities, tenancy, religion, taboos, staple diet, access to communal resources, ethnic groups, etc.).
- ☐ Consult the target group on their priorities and needs.
- ☐ Determine what the target group is willing to invest in change.
- ☐ Estimate the number of targeted clients and their location if appropriate.
- ☐ Describe the range of household typologies of the clients, with a brief description of each typology.

- ☐ Define the mechanism and process that will be used to implement targeting, and in particular any specific selection process where individuals have to be identified.
- ☐ Determine if the target group has the resources (particularly time and energy) and capacity to participate in the project activities.
- ☐ Determine if the target group has access to financial services (e.g. credit, savings).
- ☐ Determine if there are traditional differences in the roles of men and women in: handling and control of finances, social and community activities (e.g. access to community organizations and cooperatives), and political and decision-making activities.
- ☐ Identify the services available to the target group (e.g. transport, communications, power, education and extension, markets, savings and credit, cooperatives, etc.).
- ☐ Define main crops and livestock reared (type, earning values, quantities).

GENDER AND YOUTH

- ☐ Determine what are the roles and responsibilities of men and women in family poultry production.
- ☐ Determine who controls the possible income generated by family poultry production.
- ☐ Determine if women's access to poultry influences their decision-making power.
- ☐ Determine if access to poultry impacts women's access to other resources (e.g. credit).
- ☐ Determine the potential impact of the intervention on workloads.
- ☐ Define the project's potential impact on women's status and control over resources and property.
- ☐ Ensure that women receive a fair share of benefits from the intervention.
- ☐ Determine if the project affects the relations between men and women and decide who determines which members of the household, including children and the elderly, get what to eat.
- ☐ Determine to what extent project personnel should have expertise on gender.

FAMILY POULTRY PRODUCTION

- ☐ Identify the production system (small extensive scavenging, extensive scavenging, semi-intensive or small scale intensive).
- ☐ Describe the feeding regime.
- ☐ Determine to what extent poultry enhances food security.
- ☐ Determine if and to what extent poultry is a source of income.
- ☐ Identify the labour force engaged in family poultry production (family or hired labour, responsibilities, hours of work).
- ☐ Determine how much time clients spend on family poultry production.
- ☐ Determine the order of magnitude of the demand for poultry products.
- ☐ Describe the use of eggs (hatching, sale or household consumption).
- ☐ Identify the local poultry genetic resources.
- ☐ Identify the available poultry services (health, slaughtering facilities, etc.).
- ☐ Identify the main constraints to family poultry production (e.g. diseases, predators, scarce husbandry practices, lack of supplementary feed).
- ☐ Identify any seasonal variation in mortality or production.
- ☐ Consider indigenous knowledge and practices.

- ☐ Determine the existence and capacity of local poultry experts.
- ☐ Identify government policies that affect family poultry production.
- ☐ Identify what biosecurity measures can be put in place.

FAMILY POULTRY MARKETING (IF APPROPRIATE)

- ☐ Describe the marketing system for poultry and poultry products and current prices.
- ☐ Describe the level of access to input and output markets and estimate transaction costs.
- ☐ Determine the market demand for poultry and poultry products.
- ☐ Identify the constraints to successful market activities.
- ☐ Identify government policies that affect family poultry marketing.

TRAINING

- ☐ Define a training curriculum, (i.e. content of the training).
- ☐ Define who will carry out the training and whether an outside expert (e.g. consultant) is needed.
- ☐ Determine if training of trainers will be necessary.
- ☐ Define the location where the training will be carried out (e.g. on-farm, school) and be aware of the gender dimension (i.e. are women allowed to stay outside their house at night and at which times of day are they free to participate in training).
- ☐ Define what training material will be used (e.g. videos, pamphlets, slides) and carry out field-testing.
- ☐ Determine the best time to hold the training. For example, avoid holding training sessions during peak agricultural seasons.
- ☐ Assess the existing knowledge of the clients.
- ☐ Define practical activities including demonstrations and technical follow-up.
- ☐ Assess the feasibility of farmers exchange visits, learning routes, etc.

INPUTS

- ☐ Specify the type, amount and timing of the inputs needed.
- ☐ Determine where to purchase the inputs and locally available alternatives to imported products.
- ☐ Determine whether imported products can be manufactured, repaired and maintained locally.

MONITOR AND EVALUATION SYSTEM

- ☐ Define a budget for the monitoring & evaluation system.
- ☐ Describe key stakeholders, audiences (e.g. donor) and the type of information they each expect.
- ☐ Determine what (measure/indicator) will be monitored.
- ☐ Determine how and when to monitor.
- ☐ Define who will do the monitoring.
- ☐ Determine how and when the reporting will be done.
- ☐ Define how the project will be revised during the implementation phase.
- ☐ Identify the forums and methods that will be employed to involve stakeholders in project monitoring.

RISKS AND HAZARDS

- ☐ Determine the possible environmental impacts.
- ☐ Determine if the project interventions will increase the risks faced by the clients.
- ☐ Determine if any stakeholders will be disadvantaged by the project.
- ☐ Define the negative impact that risks might have on achieving objectives.
- ☐ Determine if the project will affect the input and output prices for family poultry producers.

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Family poultry encompasses all small-scale poultry production systems found in rural, urban and peri-urban areas of developing countries. Rather than defining the production systems per se, the term is used to describe poultry production practised by individual families as a means of obtaining food security, income and gainful employment.

Family poultry production is often perceived as an activity that can easily and quickly generate income and support food security for resource-poor households. However, the essential requirements for the efficient production of healthy and profitable poultry and eggs are frequently inadequately understood by those designing projects for resource-poor settings. This publication provides guidance for personnel in governments, development organizations and NGOs to better determine and plan development interventions for family poultry.

The decision tools address the situation of four distinct family poultry production systems and their development opportunities: small extensive scavenging, extensive scavenging, semi-intensive production and small-scale intensive production. They describe the poultry production systems, including their required inputs and expected outputs and the techniques and tools used to assess the operational environment, in order to design interventions suited to the local conditions. Practical technical information are provided about genetics and reproduction, feeds and feeding, poultry health, housing, marketing and value chain development, microfinance and credit, institutional development, training and extension, and creating an enabling policy. Guidance is then provided on how to utilize this relevant information to design and develop projects targeted at specific conditions.

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