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FAMILY POULTRY PRODUCTION: THE POTENTIAL CONTRIBUTION OF INTERNATIONAL RESEARCH*

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Summary: Development practitioners are using smallholder poultry as a tool for poverty alleviation. Prospect of smallholder poultry is also discussed within the context of industrialisation of the poultry sector and problems of smallholders to access markets. A smallholder poultry development model for poverty alleviation has been developed and applied in Bangladesh. Parallel development of the concept has occurred in several other countries and further dissemination is underway. Limited evidence from a few impact studies on several poultry projects show positive results in terms of the number of beneficiaries reached, their increased income, consumption, nutrition, expenditure, savings and empowerment of women. They also show varying degrees of performance of the input supply and services, e.g. credit, day old chicks, research, training and capacity building. But these studies and results suffer from major methodological deficiencies, so can't be relied upon fully to guide and back up the approach and required investment in the field. Empirical evidence on efficiency of large versus small-scale operations also indicate that small commercial poultry may face problems of survival in a competitive market environment unless appropriate institutional mechanisms for their market participation are developed. There is a need to support development efforts in smallholder poultry with research and capacity building including development and adaptation of vaccines against major diseases, feeding and nutrition management, efficacy and economics of alternative production and service delivery models, competitiveness with commercial poultry in the context of market liberalisation, globalisation and economies of scale in commercial poultry, and pathways of impact of interventions among the poor. Public research can play important role in these research issues. Given the diversity of ecological, production systems, socio-economic and cultural contexts across developing countries where this concept needs to be tested and applied, highly decentralised participatory adaptive research is needed using diverse approaches to exchange experiences for mutual learning and reduce duplication of efforts. Such exchanges can be facilitated by creating platforms or networks where the main stakeholders in the field can regularly come together to develop a shared vision and identify effective ways to influence policy makers to ensure that research findings are incorporated into policies for poverty alleviation. ILRI needs to carefully examine how it can complement efforts of other players in the field with its many years of experience in conducting participatory, multidisciplinary, systems oriented livestock research and training in partnership with national research institutions in sub-Saharan Africa and Asia. ILRI's excellent laboratories are a potential resource to back up field oriented research where needed. ILRI's experience in conducting policy dialogues may also help to create a poultry-focused platform for bringing together various stakeholders.

Key words: poultry, smallholder, commercialisation, poverty, impact

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Introduction

In this paper, we summarise some of the experiences related to smallholder poultry development in Bangladesh and some other countries. The experience in Bangladesh has relatively longer history as a structured model has been developed there over many years. We also summarise some of the recent evidences on the sources and consequences of the growing scales in commercial poultry production and their implications for small-scale poultry in the developing countries. Then we identify the policy and research gaps, which could be addressed by public funded research, and outline what ILRI might offer in response to those needs.

Scavenging poultry is a common enterprise in the rural areas of developing countries. In the 1960s and 70s, several unsuccessful attempts were made by donor and national agencies to develop the system through backyard poultry projects and cockerel exchange programmes. These initiatives did not produce sustainable technical and institutional mechanisms to support scavenging poultry development. Moreover, assuming smallholder livestock production as 'backward' and 'inefficient' and emergence of large-scale commercial production as inevitable, research and policy makers also ignored the true potential of smallholder livestock for widespread poverty alleviation (Delgado, 2004). More recently, the research and development communities are discussing the role of smallholder livestock including poultry from two different but partly overlapping approaches. First, considering that many of the poor, especially ultra poor, throughout the developing world either do not have any livestock or have a few chicken and small animals, development practitioners implementing food security and poverty reduction programmes have been searching for ways in which chicken or other small animals could be used as a vehicle to assist the poor get out of poverty and ensure food security. The reasons for the appeal of the concept are: (a) there is a dire shortage at donor project or programme levels for effective interventions to address poverty and malnutrition, (b) gender is a major focus in development and poultry is an obvious starting point to reach poor women, and (c) livestock research and development workers find it appealing as this approach allows them to reach out (complying a and b above) to a much larger population, majority of whom are poor, than when they confine themselves to cattle or any other large animal (Ashley et al., 1999; Dolberg, 2001).

The second approach is derived from the concept of the 'livestock revolution'. In recent decades, the demand for livestock products in developing countries increased rapidly propelled by income, population and urban growth. From the beginning of the 1970s to the mid 1990s, the market value of the increase in meat and milk consumption in the developing countries was approximately US$155 billion (in 1990 dollars), more than twice the market value of increased cereals consumption under the green revolution. The demand growth for livestock products in the developing world is expected to continue for several more decades, creating the opportunity for a veritable livestock revolution if the increased demand can be met from increased domestic production.. Producers may gain through increased income and employment and consumers through access to cheaper livestock products. The question is whether rural poor will benefit from the potential livestock revolution and how. The question arises because the growing demand was mainly met by large-scale urban/peri-urban production. Small-scale/poor producers captured an insignificant share of the expanding markets due to their inability to produce high quality products at competitive cost, lack of access to information, skills, technologies and other infrastructure to reach urban markets (Delgado et al. 1999). Public policies often supported and subsidized industrial livestock

production, promoting economies of scale, but ignored its equity, environment and health consequences (de Haan et al, 1997). Rapid industrialization of livestock production for the wrong reasons, could harm the mechanism of employment and income generation for the poor. There are undoubtedly large economies of scale in processing livestock-origin food products, but possibly less in production once market distortions favouring large producers are either removed or otherwise balanced for smaller farmers through market-oriented means.

Thus, both approaches are being considered within the general context of the livestock revolution, globalisation and market liberalisation but the strategies for smallholder livestock development are somewhat different. The first approach primarily looks at the possibilities of using small livestock as a livelihood strategy that works directly with the poor to enhance the contribution that the animals or birds can make to alleviate poverty and malnutrition. Market access is implicitly assumed to be needed for success of this approach but is not considered a major constraint. The second approach considers market access as the key for smallholdings to benefit from the livestock revolution and so primarily looks at the smallholders' challenges of overcoming the market competition from large producers to capture a significant share of the growing consumer demand.

Whether looked from a livelihood strategy or market access approach, the livestock revolution can provide enormous opportunities to relieve poverty and hunger worldwide, and could increase the ability of millions of poor people to move out of a subsistence existence provided their competitiveness can be increased through appropriate technological, institutional and policy support. Public funded national and international research can play important roles in this respect as otherwise, left to the forces of market, the livestock revolution may create significant negative consequences for human and livestock health, and for welfare of the poor (Sere, 2003).

Scavenging Poultry for Poverty Alleviation

Evolution and application of poultry models

Following the livelihood strategy approach, smallholder poultry as a tool for poverty alleviation has been developed and widely applied in Bangladesh, one of the poorest countries in the world with over 40% of the population lying below the poverty line. Parallel development of the concept has taken place in a number of countries and adaptation of the Bangladesh model is also underway in a number of other countries with support from various donor agencies. Scavenging poultry is common in the rural areas of most developing countries and in some countries there are efforts to support its development though such efforts have not been structured into formal models as in Bangladesh. The evolution and structure of the semi-scavenging poultry model of Bangladesh is briefly discussed below as it has a longer history of development compared to the other countries where such models have been applied, and some of the typical elements of smallholder poultry development projects, models or other less formal initiatives are illustrated by this model (Islam and Jabbar, 2003).

The Bangladesh Department of Livestock Services (DLS) and the Bangladesh Rural Advancement Committee (BRAC), an NGO, developed a poultry model for poverty alleviation through a series of field trials in the late 1970s and 1980s. The basic model consisted of a supply chain of 7 enterprises - Model Breeders, Mini Hatchery, Chick Rearers, Key Rearers, Poultry Workers, Feed Sellers and Egg Collectors (Figure 1):

- **Model Breeder-**Small low cost parent farms with a breeding stock of 54 Fayoumi hens and the requisite number (6) of RIR cocks received either from the project site or directly from Government Poultry Farms. The birds are raised under a semi-scavenging system with balanced rations for producing quality fertile eggs to be used for hatching. The fertile eggs were to be sold to Mini Hatcheries but a substantial amount of the fertile eggs would be sold to the Key Rearers who would hatch them under local broody hens.
- **Mini Hatchery-**Small low cost hatcheries operated with solar energy and kerosene stove. Black pillows filled with rice husk were heated in the sun or by means of kerosene and the eggs were placed into a cylinder between two pillows for hatching. Each hatchery had a capacity to hatch 1000 chickens per month. The day old chicks were sold to the Chick Rearers but Key Rearers also would purchase day old chicks to be reared by the broody hens.
- **Chick Rearer-**Small rearing farms, each with a capacity of 200-300 chickens per batch and 4 batches per year. The chickens were reared in low cost houses from day-old to 8 week of age. The chickens were fed with balanced feed. The 8 week-old birds were mainly to be sold to the Key Rearers within the same village development committee.

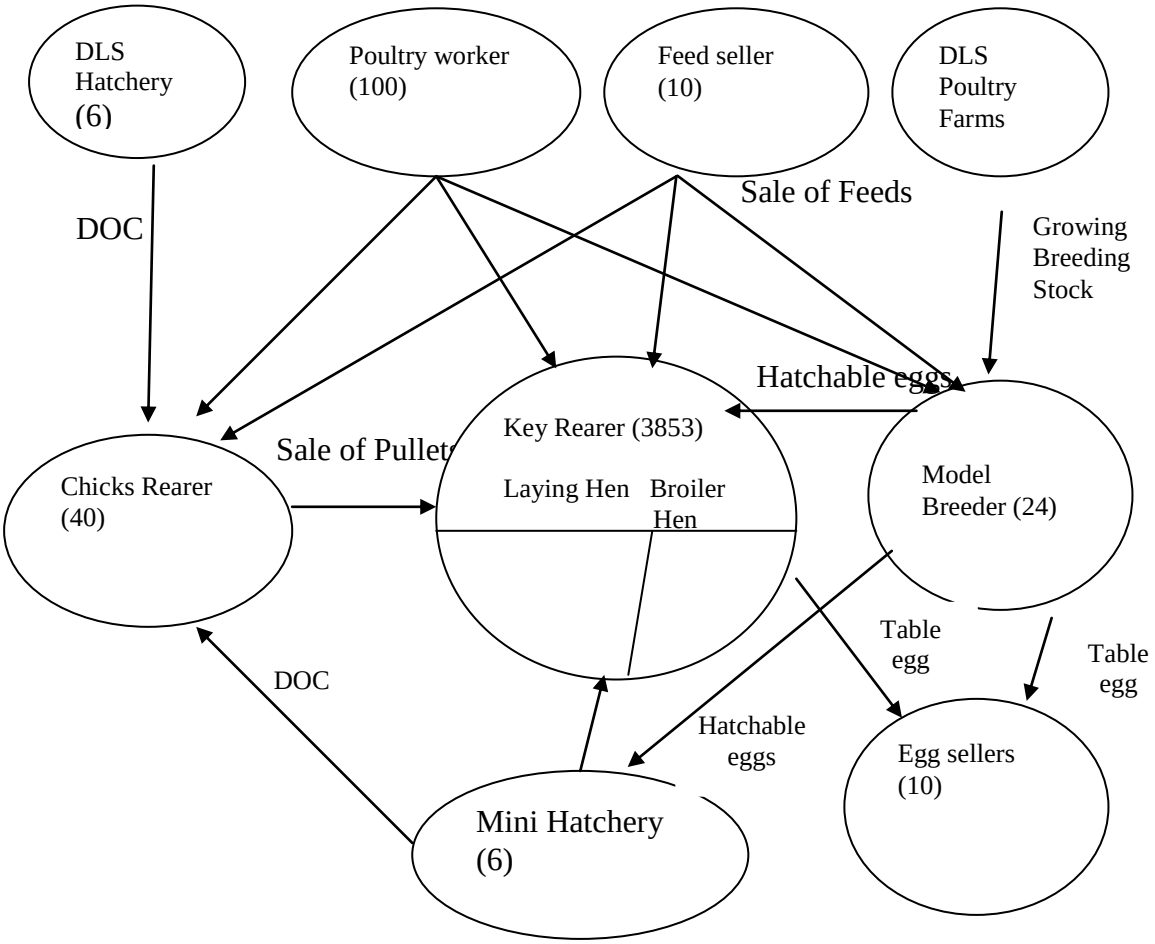

Figure 1: The Bangladesh poultry model in SLDP I including the number of each enterprise per Unit of Area to be served by an Area Office of the implementing agency

- **Key Rearers-**Small farms with only around 5 crossbreed layers for the production of table eggs. The primary outputs were eggs and culled birds. The hens were kept under semi-scavenging conditions with 30-70% supplementary feed. Additionally 4 local hens were kept to hatch preferably eggs from Model Breeders and rear chick from Mini Hatcheries.
- **Poultry workers-**A numbers of poultry workers were trained to vaccinate the birds to control diseases. The vaccine was supplied free by the DLS through the Area Office of BRAC and the Poultry Workers charged a vaccination fee for providing the service.

- **Feed Seller-**The feed sellers were trained to mix feed or sell pre-mixed feed as supplementary feed to the poultry keepers. They prepared balanced chicken rations from locally available feed materials supplemented by purchased nutrients.
- **Egg Collectors-**Table eggs were collected from the Key Rearers by Egg Collectors to be supplied to a community sale center or to the wholesaler at the nearby market.

Apart from the above technical components of the model, there was an organizational support system component including training in various aspects of poultry rearing, organizing target participants into groups, provision of credit, input, extension and health services. Several of these inputs and services required access to the DLS, and these were obtained through informal collaboration with the DLS staff and offices.

The development process got momentum through implementation of three large national smallholder poultry development projects in partnership with the DLS and a number of NGOs. The projects were known as SLDP I (1992-98), PLDP (1998-2002) and SLDP II (1999-2003) and were supported by DANIDA, IFAD, ADB, the Government of Bangladesh and several NGOs, though not all of them were involved in all the projects. These three projects were implemented respectively in 80, 89 and 26 Thanas (sub-districts) with targets to reach 400,000, 364,000 and 109,000 poor households, especially women. Some changes were introduced in the pure scavenging poultry model in PLDP and SLDP II including the use of Sonali crossbreed instead of only local breeds, the hatching and rearing of Sonali chicks by the Key Rearers instead of government hatcheries alone, and de-emphasise the role of Mini-Hatchery in the model as it did not appear to be competitive in the market (Islam and Jabbar, 2003).

Several smallholder poultry development projects have been implemented in Cameroon, China, Egypt, Indonesia, Lesotho, Malawi, Nepal, Pakistan and Sri Lanka in the 1980s and 1990s. These projects evolved in parallel with the Bangladesh model and they are not replications of the Bangladesh semi-scavenging model *per se*, but it is likely that some lessons from the early experiences of the Bangladesh model were used in the design of these projects**.** The parallel development of the concept of smallholder poultry for poverty alleviation targeting women somewhat resembles the concept of multiple sources of innovation model of agricultural research and technology development (Biggs, 1989). More recently, adaptation of the Bangladesh model has been made in some countries, e.g. Benin, Kenya, Mozambique, Tanzania. Although these projects vary in size, composition and organizational mechanism for implementation, all are targeted to the poor, especially women. An analysis of 12 projects in nine countries by IFAD show that eight projects support semi-intensive system based on confinement or semi confinement, and three support scavenging system. These projects promote exotic/improved breeds or local breeds. In five projects, poultry and eggs are sold within the project areas, and in three cases outside the project areas. With regard to the remaining four projects, there was either no information available, or the

intervention was not directly related to marketing. Among the types of support provided for poultry development, 10 projects provided credit support, 7 provided support for veterinary services, one poject in Egypt provided facilities for the production of the pathogen-free eggs that are used for the production of Newcastle Disease vaccine. This project also provided beneficiaries with improved and vaccinated day-old chicks (Nabeta, 2002; Islam and Jabbar, 2003).

Evidence on impact of smallholder poultry

The development projects in Bangladesh and elsewhere were supposed to establish rigorous monitoring and impact assessment mechanisms but in almost every case no effective monitoring and impact assessment system was established. Most of the project outcomes and reports on the progress of implementation came from participating institutions including NGOs as a part of their routine programme report without detailed analysis and donor evaluation mission reports. Only a few specially designed studies have been conducted to assess the impacts of the poultry models or projects. These impact studies differ widely in terms of the stage of project implementation when the impact was measured, geographical and subject area coverage, the size, distribution and stratification of the sample, the indicators of impact or benefits measured, the approaches used in attributing benefits to the projects and the beneficiaries.

The impact studies on the smallholder poultry projects in Bangladesh show positive results in terms of the number of beneficiaries reached, and their increased income, consumption and nutrition, expenditure and savings and empowerment of women. They also indicate varying degree of performance of the supply and delivery services including credit, day old chicks, research, training and capacity building (Table 1). However, these findings need to be interpreted with a high degree of caution because most studies suffer from one or more of the following methodological deficiencies: size, distribution and stratification of the samples; approaches used in attributing benefits to the projects and their beneficiaries. Two major limitations are illustrated further.

Most studies were based on fairly small samples in relation to the population drawn from observed high performing locations thus creating a bias. A systematic sampling frame has been rarely used if at all. Some studies included dropouts in the sample while others did not and in most cases the depth of analysis remained low. Technology adoption is not a one-off static decision rather it involves a dynamic process in which information gathering, learning and experience play pivotal roles particularly in the early stages of adoption. The adoption pathway may involve a process in which farmers move from learning to adoption to continuous or discontinuous use over time. Inclusion of drop outs in the sample and analysis of their profiles are very important where high drop out rates, permanent or temporary, are observed, as apparently was the situation in all three poultry projects in Bangladesh and in other countries.

Nearly all the Bangladesh impact studies reviewed used simple before-after comparisons to assess impact of the projects. In reality, the projects operated under a dynamic socio-economic environment where poor peoples' conditions might have changed to some degree without the poultry projects. Therefore, to assess the net effect of the projects at household, community or national levels, both before-after (for participants) and with-without (including both participants and non-participants) comparisons should have been done. The before-after comparison also should have addressed the time path of adoption (as not all participants joined the project in the

beginning or at the same time), and the problem of using constant or current prices for valuation of products and inputs (Islam and Jabbar, 2003).

Table 1. Impact of the smallholder poultry projects in Bangladesh and some limitations of results

Impact indicator	**Result and comments**
Type of beneficiaries	Poor have been reached; not enough evidence that ultra poor, real target of the projects, have been actually reached, or reached adequately
Drop out	Most studies did not include in samples; several project monitoring reports indicated 35-40% participants in one project dropped out before project finished, in another project 50% dropped out after the project ended.
Profitability of poultry enterprises	Generally positive; definitions are not always the same across studies to enable comparison
Income of the beneficiaries	Generally positive, significant in some cases; definitions are not always the same across studies to enable comparison
Consumption, saving, expenditure	Generally increased consumption of animal products, better savings, investment in education of children especially girls, house improvement, diversification of economic activity. Some effects may be confounded with other sources of income.
Empowerment of women	Positive in terms of access to income and expenditure, decisions on family matters. Some outcomes may be the result of other programmes.
Credit access	Easy access to credit for participants; repayment poor in some cases, diversion to non-poultry activities also common, implying drop out from poultry and participation as a means to access credit.
Training and technical support	Not adequately provided as planned and budgeted; reasons are not clear.
Research and capacity building	Some good initiatives and achievements; several areas need further research to support smallholder systems.
Stakeholder participation and sustainability	Supply driven, donor funded projects without enough demand driven stakeholder participation; actual project performance poor; donor concern about sustainability

Source: Islam and Jabbar, 2003

The original idea of using scavenging poultry as a tool for poverty alleviation in Bangladesh has been significantly modified in the process of developing models/packages, and what is in practice now is no longer pure scavenging rather semi-intensive systems requiring better breeds, feeds, health and other technical services to support it. The viability of such semi-intensive systems and the economics of investment to provide support services from both public and private points of view are still unclear to guide policy and investment decisions.

The analysis of impact of poultry projects in nine other countries by IFAD identified some common features such as poor credit repayment trends, limited marketing options, high mortality rates and high feed costs. The marketing constraints include competition with large commercial producers. High mortality rates resulted from poor management and inadequate vaccination. High

prices for feed are usually attributed to marketing problems and are the main cause of poor credit repayment. These features had a bearing on the overall performance of project interventions in terms of reaching the target population, i.e. poor especially women, and enabling them to increase their income and welfare. The study concluded that there was a need for development projects to continue introducing new technologies especially in health management and feeds through which an increased level of profit could be achieved from smallholder semi-intensive poultry-rearing. In view of the observed shift in emphasis from scavenging to semi-intensive systems, there was an urgent need for research to study alternative systems of management and to develop the most appropriate systems for the poor, IFAD's target group. The introduction of exotic or improved breeds is a useful tool for the genetic improvement of local birds in terms of both productivity and viability if the conditions required for health and nutrition are met. The introduction of such breeds can represent a good incentive for farmers to participate in projects. However, the promotion of improved breeds should be conditional on the provision of intensive training for farmers and improved health services. The problems experienced often relate to the management skills and the husbandry practices needed by farmers for unconventional types of production. Therefore, farmer training is considered to be of primary importance (Nabeta, 2002).

Smallholder Poultry in the Context of Livestock Industrialisation

Structural change in the livestock industry and possible causes

An important feature of the structural change in the commercial livestock sector in the developing countries is growing scales of operation, especially in poultry and pigs and more in post-harvest operations than in production units. Other changes are growing intensities in terms of use of inputs, geographical concentration of production in certain areas, especially in peri-urban areas where there is already concentration of other economic activities, and vertical integration and longer food chains involving supermarkets and the decline of traditional markets. The number of livestock producers has been rapidly decreasing and average size of operation has been increasing by squeezing out small operators from the market, resulting in loss of income and employment. Larger operations also likely have negative consequences for public health and the environment due to the absence of or poor enforcement of proper regulations in most developing countries (Steinfeld, 2004). However, there is very limited empirical evidence on the social, health and environmental consequences of these structural changes, on how much of the process of growing scales is due to true economic efficiency and how much due to policy distortions or other reasons.

Theoretically, in a competitive market environment, more efficient users of inputs eventually drive less efficient ones out of the market. In general, smallholders need to be more efficient in the use of inputs and make higher profits per unit of output to survive and earn a living due to low volume of business. Larger producers may survive with low unit profit because of larger volume of business; in fact such producers may deliberately push unit profit to low levels to squeeze out smaller producers from market (Delgado, 2004). Evolution of the industrialisation of poultry production in Brazil, Thailand and India also shows that public policy supported technology transfer, joint venture investment and other incentives to the private sector may enhance the process of intensification and scaling–up of the industry (Farrelly, 1996).

However, 'efficiency' conventionally measured in terms of farm financial profits ignore many hidden transactions costs, market distortions due to policy and externalities that may not be scale-neutral (Delgado, 2004). Transactions costs are costs of obtaining and processing

market information, negotiating contracts, monitoring agents and enforcing contracts for market exchange (North, 1989; Hoff and Stiglitz, 1990). Transactions costs are often intangible, linked to asset, information, market power and reputation of a firm. That is why such costs are unique and specific to an individual production or marketing unit, so each unit conducts exchanges on the basis of its own transactions costs. However, larger farmers' ability to push unit profit to low levels may sometimes be derived not from their true efficiency and market power but from policy distortions, e.g. subsidies, tax concessions, import facilities and externalities, e.g. pollution without penalties. Even in a competitive market environment a large and a small farm from the same locality may produce products of similar quality but the large farm may be able to sell the product to upmarket high income consumers at higher prices while the small producer may sell at local markets or to low income consumers at low prices. This difference may arise because the large producer may have better access to market information and the means to provide consumers with information about its products, may have acquired the trust of the consumers about the quality of its products and the reliability of supplies while the small producer may not have the means to cover all these costs of transactions on its own. The small producer may overcome some of these constraints and reach the high price market by joining a cooperative or other form of organisation or as a contract producer of a large-scale integrator, who will do the processing and marketing under a reputed brand name, thereby reducing transactions costs for individual smallholder producers (Farrelly, 1996; Runsten and Key, 1996).

These hypotheses have been tested in a number recent studies conducted by IFPRI , FAO-LEAD and ILRI in collaboration with national institutions on poultry (as well as pigs and dairy) industries in India, Bangladesh, Brazil, Thailand and the Philippines. Sample small poultry farms in Bangladesh had <1000 birds and <10000 in the other countries. In these studies, a three-step methodology has been applied. First, unit profits of small and large farms have been compared. Second, for each farm relative profit inefficiency has been calculated by using frontier profit function and average efficiency of small and large farms have been compared. Profit inefficiency is defined as actual performance in relation to an ideal that can be achieved with current technology, knowledge and resource bundles. The most efficient farm(s) may achieve 100% efficiency. Third, differential profit inefficiency across individual farms has been explained in terms of access to asset, information, scale of operation, policy subsidies (that influence transactions cost) etc by running a regression ((Islam et al., 2002; Delgado, 2004; NaRanong et al., 2004). Because of different levels of economic development, stages of poultry industrialisation, market conditions and sizes of poultry enterprises in the study countries, inter-country comparison of results is not intended, instead the results of each country will be interpreted for the given context and some general lessons for wider relevance will be derived.

Empirical evidence on the determinants of structural change in the poultry industry

The results of the case studies on poultry in a number of countries in terms of profit per unit output (without taking into account cost of family labour and environmental externality) and average profit efficiency are summarised in Table 2. In case of broiler production, profit per kg for small and large farms was not significantly different in Brazil and the Philippines; in Thailand large farms earned significantly more profit than small farms and in India large farms earned slightly less profit. Where contract farming is practiced in broiler production, the contract appeared to be more important than size in profit per unit output. In the Philippines, contract farms earned more profit than independent farms irrespective of farm size. In India, the opposite was the case. In case of layer farming, profit per unit was higher for small farms

in both India and Thailand; in Brazil, average profit was negative for all farms but the degree of loss was smaller for larger farms.

Table 2. Indicative comparison of profit per unit and average profit efficiency of small and large poultry farms in selected countries

Enterprise and performance indicator	Brazil	India	Thailand	Philippines	Bangladesh
Broiler					
Profit per unit output	S=L	S>L I>>C	S<<L	S=L I<<C	S<M<L
Profit efficiency	S<<L		S<L	S<<L I<<C	S<M<L
Layer					
Profit per unit output	S<<L	S>L	S>L		S<M=L
Profit efficiency	S<<L	S<L	S<L		S<M<L

S = small farm, M= medium farm, L= large farm; I= independent farm, c= contract farm; , = no or very minor difference, > or < modest difference, >> or << difference very large.
Sources: Delgado, 2004; NaRanong et al.; 2004; Islam et al., 2002.

Average profit efficiency among broiler farms was slightly higher for large compared to small farms in Thailand, significantly higher for large farms in Brazil, Bangladesh and the Philippines. In the Philippines, average efficiency was higher for contract farms compared to independent farms. In case of layer farming, average efficiency was higher for large farms in all the countries and in Brazil the magnitude was very large.

Analysis of the determinants of profit inefficiency differences in poultry production indicates that there are major differences across farms in profit efficiency performance. Among small farms, transactions costs faced by certain farms are major reasons for inefficiency while factors other than transactions cost are more important reasons for inefficiency in large farms. In case of small farms, inadequate access to working and fixed capital and reliable supply of inputs, especially genetic stocks, feed and veterinary drugs are major reasons of inefficiency. These barriers to market entry result in low trust and reputation of smallholder output, which translate into 10-15% lower profit compared to large farms. Access to better information, inputs and services enable larger farms to establish practices that create trust and reputation for quality of output for which higher prices are received (Delgado, 2004).

The impact of policy subsidy in terms of environmental externality was also assessed for poultry. It was found that large farms load more nutrients per unit output than small ones but they do not pay any compensation for creating more pollution, thus enjoy a financial advantage. However, this advantage was not found to be large enough to explain the rapid scaling-up of poultry operations.

Based on profit per unit output and average profit efficiency, it appears that in general smallest backyard poultry operations are least efficient and may not survive on a commercial basis though many of them will continue practicing poultry at a small scale as long as opportunity cost of family labour and household residues is low. Further it appears that only slightly larger market-oriented smallholdings are relatively profit efficient. Within the range from market-oriented smallholdings to medium commercial farms, there appear to be constant technical returns to scale, consequently very small farms will have problems of

survival in a competitive market environment but modest size market-oriented operations may remain viable enterprises. Better environmental regulations and enforcements evenly applied across farm sizes may confer additional small advantage to smallholders (Delgado, 2004).

Researchable Issues and Role of Public Research

Development is about expanding the frontier of choice of technologies, institutions and policies. Generating options for choice making can be enhanced by research. Public national and international research is required for several reasons. First, market failure: individual producers, especially smallholders, are incapable of making the required investment on their own to generate all required new knowledge, those who can afford to make some investment may refrain from doing so because of the externality of knowledge products and their inability to derive the full benefits of their investment through the market mechanism. Second, at the country level, free riding behaviour of some countries, the tendency to derive benefit from somebody else's investment, leading to sub-optimal investment in research. Third, the policies of developed countries to share their experiences with developing countries in order to solve problems of poverty and underdevelopment, and support for research capacity building is a major vehicle to achieve that goal. Thus,, public research enables adaptation of technologies, institutions and policies for the benefit of common good, especially under conditions of rapid change .

Limited empirical evidence on the performance of scavenging or smallholder poultry projects in Bangladesh and a number of other countries indicate that the project participants have benefited positively in terms of income, nutrition, employment etc but the real extent of benefits and the degree of success of the Bangladesh model and other experiences under diverse socio-economic and production conditions remain fuzzy. Adequate and systematic impact studies are required to assess the actual beneficiaries reached by various projects, the impacts made (where, how, why), the indicators of success or failure, types of investments and support services required to make such models sustainable and viable. Such knowledge is essential to guide policy and investment strategies for extensive use of smallholder poultry as a tool for poverty alleviation (Islam and Jabbar, 2003).

Understanding the potential of smallholder livestock production, especially poultry, will require conclusive evidence on a number of issues. First, the nature and extent of smallholder competitiveness under changing demand and technology options, especially with respect to breeding stock, feeds and diseases control; under what conditions scavenging poultry may be viable as a livelihood strategy; possibilities and constraints to scaling up of scavenging poultry (how small is small under what conditions); how responsive are these systems to prices and markets, even though they may be otherwise resilient; role of diversification out of poultry to get out of poverty; what kind of policy and institutional support are needed to make scavenging poultry a viable tool for poverty alleviation.
Second, problems of access to domestic market and mechanisms to overcome them. Options available to the poor for greater participation in input and output markets, e.g. contract farming, cooperatives, other trust building institutions, and true costs and benefits of alternative options for reducing transactions cost barriers to greater market participation.
Third, the implications of changing market structure beyond the farm, especially supermarkets and integrated supply chains, which require uniform and high quality products. Transactions costs and value additions along these chains are quite different than under traditional market structure.

Fourth, the implications of changing global market needs and opportunities. Three major concerns here are animal health, food safety and environmental pollution. High geographical concentration of livestock (especially with small and large producers present) increases risk of disease outbreak in animals, and elevates risk of human health, as illustrated by several recent outbreaks of Avian Influenza in Southeast Asia. Environmental pollution enhances these risks further. These problems may affect small and large producers through different pathways: large exporting producers may face difficulty in exporting due to international food safety and quality requirements, and small producers may face extinction (mass culling) to save large producers.

What Can ILRI Contribute?

Current literature provides partial answers to some of the issues raised above. Clearly more elaborate evidence from more diverse conditions needs to be generated through systematic investigation in which public research has important role to play. What can ILRI contribute in this regard?

ILRI's goal is to position itself at the crossroads of livestock and poverty and along with its partners, bring to bear high quality science and capacity building to reduce poverty and make sustainable development possible for poor livestock-keepers, their families and the communities in which they live. ILRI's new strategy considers three pathways out of poverty: securing assets, improving productivity and increasing market access for the poor. ILRI intends to contribute to livestock asset security through the application of biotechnology, especially by developing vaccines for priority diseases of livestock of the poor, by using genetic markers to characterise and conserve indigenous livestock resources and by developing dual or multi-purpose food and feed crops. Improved productivity is a necessary condition for smallholder competitiveness, and research will be focussed on better farm management, genetic improvement of breeds, improving quality of feeds and cost-effective methods of controlling livestock diseases. Access to input and output markets are required for increasing competitiveness and long-term survival of smallholder livestock production. Research will be directed at identifying barriers to market participation, and developing policy, institutional and technology options for increased participation by the poor and disadvantaged in more remunerative livestock markets. In the past, poultry and pigs were not included in ILRI's mandate. However, the new strategy emphasises the need for a more inclusive agenda including a wider range of smaller livestock species because many of the poorest people keep only small animals and poultry. Moreover, a disproportionately large number of the poor are women, who also keep primarily poultry and small animals. Thus gender has to be mainstreamed into much of ILRI's research (ILRI, 2003).

ILRI research contributions to alleviate poverty falls into three categories: adoption of research products, including new and existing knowledge, technologies and policies; improvement or adaptation of existing tools, methods and approaches to make them better or more applicable to particular situations; and strategic research involving the development of new tools and approaches. In order to deliver these research outputs, five complementary and interrelated strategic research themes have been developed. These are: Targeting Research and Development Opportunities, Enabling Access to Innovation, Improving Market Opportunities, Biotechnology to Secure Assets, and People, Livestock and the Environment. ILRI has developed some core competencies in each of these areas.

Through these research themes and depending on ILRI's core competencies, some specific issues related to smallholder poultry may be addressed. ILRI's core skills include holistic approaches to livestock development issues and capacity to broker complex partnerships including NARS and advanced research institutions to address global public goods issues within a systems framework. It needs to be kept in mind that a lot of highly specialised institutions both in the public and private sectors have specific skills particularly in diseases, genetics, nutrition (though not always directly applicable to smallholder poultry in developing countries). ILRI can't and should not compete or duplicate these areas of research rather complement these with other expertise in which ILRI has comparative advantage. Some of these are briefly mentioned here.

First, In order to use poultry as a tool for poverty alleviation, better targeting of development projects where poor and livestock co-exist will be needed. Although it is generally known at the macro-level where poor and livestock are, more detailed analysis of the production systems and mapping will be required to target specific countries, regions and communities. ILRI's has significant experience in this field. Second, to use scavenging poultry for poverty alleviation implies that indigenous poultry genetic resources need to be conserved, productive ones identified and characterised, and possibilities of upgrading them to an extent through selection and breeding programs examined. ILRI's animal genetic resources programme is already engaged in this kind of activity and through extended partnership with FAO, national institutions and networks, the scope of this activity can be expanded further. Third, disease control will remain an important problem for making smallholder poultry more productive and profitable. ILRI's biotechnology research programme may be able to enhance diagnostic capacities of national institutions by providing training and tools and by developing vaccines. ILRI's excellent laboratories may be a potential resource to back up field oriented research where needed. Fourth, policy, market and commodity chain analysis, epidemiology and economics to assess disease control options, alternative forms of collective action by smallholders to overcome problems of transactions costs and diseconomies of scale in different socio-economic and cultural situations. These are some of examples of where and how ILRI may engage in partnership with other actors in the field of smallholder poultry.

Given the diversity of ecological, production systems, socio-economic and cultural contexts across developing countries where potential of smallholder livestock is to be assessed and applied, highly decentralised participatory adaptive research is needed using diverse approaches to exchange experiences for mutual learning and reduce duplication of efforts. Such exchanges can be facilitated by creating platforms or networks where the main stakeholders in the field can regularly come together to develop a shared vision and identify effective ways to influence policy makers to ensure that research findings are incorporated into policies for poverty alleviation. A number of poultry networks are currently performing this function to some extent. ILRI is carefully examining how it can complement these efforts with its many years of experience in conducting participatory, multidisciplinary, systems oriented livestock research and training in partnership with national research institutions in sub-Saharan Africa and Asia.

It needs to be stressed that ILRI is not mandated to promote smallholder poultry *per se* but to assess the ways to address sustainable poverty alleviation through livestock development, and in this framework poultry is seen as an option. ILRI may help better understand where, under what conditions this is empirically the case. This requires a holistic analysis of what is going on in the poultry and other animal protein markets (domestically and internationally), how smallholders and commercial producers interact and how this whole picture is affected by

rapid changes in markets including food safety, public health concerns etc. The fact that Avian Flue in Asia is leading to policy proposals of banning smallholder production is a typical issue of the ones that need to be assessed in a holistic manner taking into account commercial producers' interests as well as social and economic impacts on the poor producers and consumers both in developing and developed economies.

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