PART 3

Poultry as a Development Tool

Poultry production for livelihood improvement and poverty alleviation

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SUMMARY

Millennium Development Goal Number One is to halve the number of poor people in the world by 2015. The present paper contains a discussion, based on the livelihoods framework, of how and under what conditions small poultry units can contribute to the achievement of this and other Millennium Development Goals. The paper presents the livelihoods framework along with its micro- and macro-level features. Subsequently, it discusses the role of poultry in asset creation and as an entry point to improved livelihoods. A series of cases are presented: from Afghanistan, Bangladesh, Egypt, the Lao People's Democratic Republic and Swaziland, which illustrate various arguments related to the use of poultry for livelihood improvement and poverty alleviation. Strategies that use poultry production for livelihood improvement and poverty alleviation will be most relevantly applied in the countries where it has been most difficult to get development moving. These countries are variously described by development agencies as low-income countries under stress (LICUS), highly indebted poor countries (HIPC), low-income food deficit countries (LIFDCs), or countries that are placed low on the UN Human Development Index. The smallholder poultry approach is biased towards poor women; one estimate is that it is relevant for 160 million women and their families. However, it will not be easy to reach these potential beneficiaries, as bad governance and weak institutions characterize many of the countries where they live. Against this background, it is concluded that international organizations and networks have a particularly important role to play as storehouses of knowledge and technical expertise. Awareness among planners and decision-makers of the potential of poultry as a tool in poverty alleviation seems to be low. Improving knowledge among these stakeholders and strengthening the human and institutional capacity needed to implement the concepts are priorities.

Key words: poultry, livelihoods, poverty, LICUS, HIPC, LIFDC.

1 CONTEXT AND BACKGROUND

In 2000, world leaders agreed to the Millennium Development Goals (MDGs), with Goal One being to halve the number of poor people by 2015. According to the World Bank (2005) there were 1.1 billion people subsisting on an income of less than US$1 a day in 2005. The MDGs Report for 2006 notes that there is still much to do to combat poverty; 824 million people in developing countries were affected by chronic hunger in 2003, with

the problem being particularly acute in sub-Saharan Africa and South Asia (UN, 2007).This situation challenges all sectors – including the poultry sector and the livestock sector more broadly – to reflect on the contribution they can make to poverty reduction.

A comprehensive review of 800 livestock projects (Ashley *et al*., 1999) concluded that there were many problems with regard to the impact of such projects in terms of poverty reduction and livelihood development. It was argued that livestock development professionals and governments were biased towards large animals and their owners, who typically are not among the poorest.

The United Kingdom's Department for International Development (DfID), in an effort to speed up the achievement of poverty reduction targets, has adopted the livelihoods approach[1] at a general level. Where livestock and livelihoods are concerned, there are experiences on record of attempts to use poultry as a tool in poverty alleviation work (Dolberg in FAO, 2003a). There have also been attempts to document the loss of livelihoods faced by poor people when a disease such as highly pathogenic avian influenza (HPAI) strikes (Geerlings, in FAO/UNDP/WFP, 2007).

HPAI is a cause of considerable global concern (Otte *et al*., 2007). By 29 June 2007 the disease had resulted in 191 human deaths, from 317 cases (WHO, 2007). However, contrary to the general assumption that smallholder backyard poultry flocks are at higher risk than confined flocks, the only analysis so far of empirical data from Thailand indicates that backyard flocks are at lower risk of HPAI infection than commercial-scale operations keeping broiler or layer chickens or quail. What has been overlooked in the discussion so far, according to Otte *et al*. (2007), is the capacity of microbes to enter and leave commercial operations despite the implementation of standard biosecurity measures. This observation, based on references to scientific work, is supported by the patterns of infection during the 2002 Newcastle disease epidemic in Denmark, which provided evidence that questioned whether smallholder backyard flocks are in fact at higher risk from epidemic diseases than commercial operations (Danish Veterinary and Food Administration, 2003).

Taking this background into consideration, the following sections present the basic livelihoods concepts and framework and illustrate how poultry can be used as a tool in poverty alleviation.

2 POULTRY AS AN ENTRY POINT TO IMPROVED LIVELIHOODS

Many poor women in developing countries are involved (and skilled) in poultry keeping. Thus, the link between poultry interventions and improvement of women's status – along with the associated improvements in terms of nutrition and other benefits for the entire family (Quisumbing and McClafferty, 2006) – seems to be direct. The scavenging poultry production system is the most common animal production system among poor households in rural areas of developing countries. It is a system in which the birds collect most of their feed free of cost, but it is not a system that generates a huge income. Interventions to improve these modest levels of production may be justified, as they can help women and their families to generate social capital (see below) and enter a positive spiral of events that may move them out of poverty (Jensen and Dolberg, 2003). The explanation for this is that

[1] http://www.livelihoods.org/info/info_linksevents.html

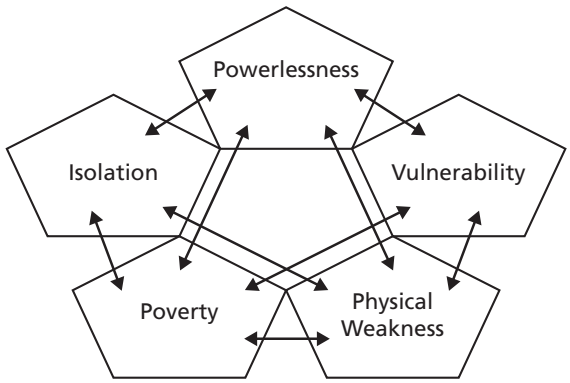
poverty is not only a question of money – the causes are frequently multidimensional. Figure 1 illustrates how several factors, including physical weakness, isolation, lack of power and vulnerability, may reinforce each other and deepen poverty.

Sen (1981) demonstrated a strong relationship between poverty, vulnerability and assets. Vulnerability may relate to risks such as bad weather (e.g. extended dry periods or floods) or to unexpected occurrences in the family such as sickness, loss of employment or death. In many countries, social networking entails meeting the high costs associated with events such as marriages and funerals; networks may be lost if these expenses cannot be met. There are also expenses associated with the education of children (Chua *et al.*, 2000). The many factors that lead to vulnerability may interact and reinforce one another in a downward spiral; Chambers (1983) has termed this the deprivation trap (Figure 1) or integrated rural poverty.

Processes that may lead to escape from the trap require an entry point. This is where poultry development may prove to be a useful tool, as keeping poultry is an activity in which many poor women are involved (see Table 1).

The data in Table 1 are from an impact study (Riise *et al.*, 2005) of twelve years of Danida experience with support to three smallholder poultry projects in Bangladesh: the Smallholder Livestock Development Project-1 (SLDP-1) 1993–1998 with donor support from the International Fund for Agricultural Development (IFAD) and Danida; the Participatory Livestock Development Project (PLDP) 1998–2003 with donor support from Asian Development Bank and Danida; and the second Smallholder Livestock Development Project 2000–2007 with Danida as sole donor. All projects focused on poultry, and it is therefore unsurprising that most households kept poultry. However, the widespread ownership of poultry, across many countries, is well known (De Lasson and Dolberg, 1985; see also Tables 3 and 4 and Box 3). Moreover, the impact study took place seven years and two years, respectively, after the closures of the SLDP-1 and PLDP projects (SLDP-2 was ongoing at the time of the study). All projects provided micro-credit. Studies, notably Seeberg (2003), have

FIGURE 1
The deprivation trap



Source: adapted from Chambers (1983).

TABLE 1
Entry point: presence of poultry, other livestock and non-livestock activities in a sample of households in Bangladesh

Project	Number of households (the projects were for the women)							
	In total sample		With poultry		With livestock other than poultry		With income from non-livestock activities	
	Number	%	Number	%	Number	%	Number	%
SLDP-1	232	100	223	96	98	42	58	25
PLDP	224	100	196	88	74	33	68	30
SLDP-2	211	100	205	97	39	19	74	35

Source: Riise *et al.* (2005).

documented that loans were used for investment in many items other than poultry. It is clear from the table that poultry keeping was the most common livelihood activity among the poor women and their families, and hence frequently offered an entry point for efforts to improve their livelihoods.

As well as an entry point, improving the livelihoods of women and their families requires a process, and access to assets and to organizations and institutions at both micro and macro levels. It is in mapping the stakeholders to involve and the paths to follow that the concepts of the livelihoods framework can be helpful – as will be discussed in the following section.

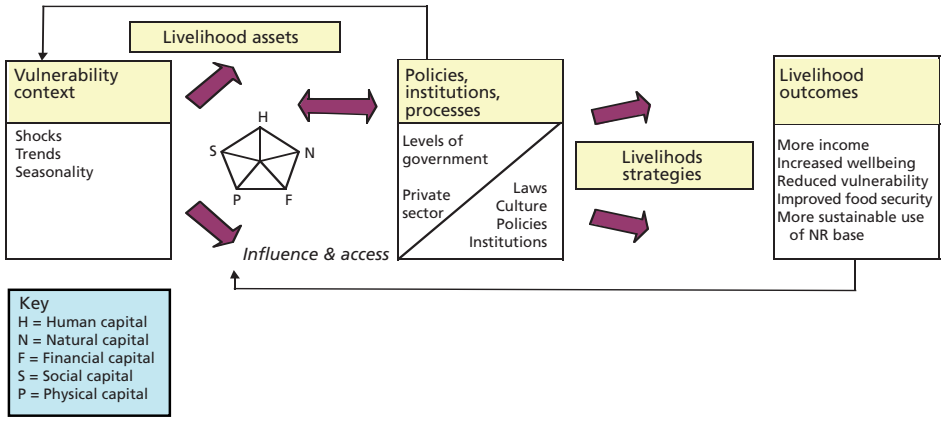
3 DEFINITION OF A LIVELIHOOD

The livelihoods concept gained prominence as a result of the report published in 1987 by the Brundtland Commission entitled *Our common future* (WCED, 1987). According to Chambers and Conway (1991) capabilities and equity are important components of the concept. In the view of the latter authors, a livelihood in its simplest form is a means of gaining a living; capabilities as well as equity are ends as well as being means that enable a better livelihood to be obtained. Accordingly, Chambers and Conway (1991) define a livelihood as comprising:

"The capabilities, assets and activities required for a means of living."

There is nothing in this definition that points towards a particular set of economic activities or institutions. However, as most poor people live in rural areas (FAO, 2006) and keep poultry, there is a case for considering the ways in which poultry can serve as a tool in poverty alleviation and add to the menu of tools (such as the housing index) (Simanowitz *et al.*, 2000) that are used in microfinance programmes to identify the poorest clients. The housing index is based on scores for the size of the house, its structure, roof and wall material, ownership of the house, cooking material, etc. To these criteria, it is suggested, could be added ownership/lack of ownership of animals or ownership only of scavenging poultry.

FIGURE 2
Sustainable livelihoods framework



Source: adapted from DfID (undated).

3.1 The livelihoods framework

The livelihoods framework (Figure 2) lists important factors that influence people's lives, such as the vulnerability context in which they live, and the assets to which they have access. These are important indicators according to Sen (1981). The framework includes policies, institutions and processes; it indicates how such factors shape livelihood outcomes, and how these components influence one another. In the present context, it is important that links between the micro level and the macro level are also included, as there is a tendency to neglect institutional and organizational analysis in discussions of the potential of smallholder poultry production as a tool in poverty alleviation and in associated areas such as food security and gender equality.

3.2 The micro level

At the micro level, the livelihoods framework utilizes the concept of livelihood assets. It involves going beyond a narrow, conventional concept of capital that is limited to financial capital, to a more inclusive concept that also encompasses human, natural, physical and social capital, i.e. five types of capital (see the pentagon in Figure 2). Each type of capital has a set of indicators; examples are provided in Table 2.

The indicators can be used to identify entry points for development interventions at household level (where poultry production is one option). In the best-case scenario, the first intervention will stimulate other initiatives within a household and the production of other types of capital. Women involved in poultry programmes often mention the importance of the opportunities they acquire for gaining social capital in the form of networking. This stimulates self-confidence and may lead to an expanded set of activities and accumulation of other forms of capital. This accumulation of capitals may, in turn, create opportunities to access and influence the processes that affect policies and institutions at the macro level.

TABLE 2
Types of livelihoods capital and indicators

Type of capital	Examples of indicators
Natural	Food security situation, ownership or rent of land, homestead and livestock
Physical	Living: house or no house, quality of house and clothes
Financial	Access to funds: money lender, relatives, microfinance or formal bank
Human	Confidence, motivation, education, nutritional status, health and fitness
Social	Family, social network outside family, membership of groups and organizations

Source: adapted from Dolberg (in FAO 2003a).

Certain minimum levels of political, health and economic stability are preconditions for positive outcomes of this type.

A case with a negative outcome is provided in Box 1, which is drawn from the work of Geerlings (in FAO/UNDP/WFP, 2007) on the impact of HPAI in Egypt. The case demonstrates well the negative spiral of events that a woman and her family faced as a result of HPAI.

3.3 The macro level

Policies are decided at the macro level; their presence or absence influences all administrative levels in a country. They have a strong effect on the access that people have to various types of capital (Table 2) and on the links between the micro and macro levels. Policies may prescribe the sizes and roles of the public and private sectors, and the role of civil society. Policies may be formulated to promote or discourage particular economic sectors – such as different types of agriculture and livestock production – some of which will offer greater opportunities for the poor, while others will be less accessible. Policies may affect opportunities for the establishment of people's organizations or non-governmental organizations (NGOs) that work for the benefit of the poor. Sanitary standards may be set that poor producers cannot meet.

The following quotation, taken from a section on lessons learnt in hunger reduction in FAO's report *The State of Food Insecurity in the World 2006*, is relevant to this discussion:

"Agricultural growth is critical for hunger reduction. Some 70 percent of the poor in developing countries live in rural areas and depend on agriculture for their livelihoods, either directly or indirectly. In the poorest of countries, agricultural growth is the driving force of the rural economy. Particularly in the most food-insecure countries, agriculture is crucial for income and employment generation ... Combating hunger requires an expanded commitment to agriculture and rural development." (FAO, 2006).

In the present context, agriculture is taken to include poultry production and promotion of the smallholder poultry sector, as well as the organizations that create an environment

BOX 1

Impact of HPAI on a poultry producer in Egypt

Samira's family is composed of three sons and three daughters, five of them attend primary and preparatory schools; the youngest son is still under school age. Her husband is unemployed for health reasons. Samira is the only breadwinner in the household. Samira trades poultry and rabbits for the people in her village. She collects the animals on her rounds through the village and sells them at different village markets six days a week. The villagers and Samira agree on the minimum amount that they would like to receive for their animals, and any extra money above the minimum set price is hers to keep. Because of HPAI Samira is heavily in debt. Last year she borrowed 350 Egyptian pounds (EGP) – US$63 – from an NGO and invested that amount in poultry. Her small backyard poultry flock was composed of 32 chickens, 90 Pekin ducks, 16 Balady ducks and 2 turkeys. All these birds died of avian flu. Samira still has to repay the debt, topped-up at a high interest rate. Because business was so bad last year with hardly any birds to trade, she had to get a second loan of EGP450 (US$82) from another NGO to cover part of the interest of the first loan and to restock. Her restocked flock comprised 11 Balady ducks, 9 Pekin ducks, 11 geese, 9 chickens, 3 turkeys and 24 pigeons. For the second time, her flock was infected and the birds died. Now she has three loans from different NGOs. The third loan amounted to EGP 400 (US$78) to cover part of the interest of the two loans and to buy a blanket for the winter season. Although the flock died, this woman has an outstanding debt to pay to the NGOs. In order to be able to pay this debt, she obtained a loan from a private moneylender with less interest and less paper work than the NGOs. Samira's household can be considered extremely vulnerable; six children and one husband depend entirely on Samira's income. Poultry is the main source of income and food, with no alternative sources. The family was not able to restock again. Samira is heavily in debt and cannot afford to take another risk. She stopped producing poultry at home, but kept trading in poultry. This is in spite of the restrictions imposed on the transportation of poultry between villages – not without risk because last year Samira almost got caught by the police for illegally transporting live birds. She was trying to get in a taxi with all her wooden cages containing birds. The police saw her and chased her. Samira dropped her cages and ran away, but in doing so she fell and seriously hurt her hip. She had to stay home for a couple of months. She couldn't earn any income in those months and depended on charity. The food consumption of this family was relatively moderate and the HPAI adversely affected their consumption pattern. Poultry consumption was halved, with almost no eggs being eaten. She cannot afford to buy eggs for her six children. The family now depends more on frozen sources of animal protein (e.g. fish and meat) because of their reasonable price.

Samira continues to trade poultry for the villagers and business slowly seems to pick up again. She says that this is the only thing she knows she can do well, and that the villagers know her and trust her to do a good job.

Sources: Geerlings (in FAO/UNDP/WFP, 2007).

that is conducive for the sector to flourish. The formation of marketing infrastructure and financial and veterinary services will, in the terminology of Figure 2, influence people's livelihood strategies, which in turn might promote income opportunities for poor women and their families. Subsequently, this may promote the formation of other types of capital. For example, the physical capital embodied in the living house might be improved, as might human capital as better food is bought, children are sent to school and health services are accessed. This may, given time, influence the vulnerability context by diminishing unfavourable social trends or mitigating harmful seasonal factors such as lack of employment in the dry season. Combined, the enhanced resources and influences may lead to better livelihood strategies and livelihood outcomes for the household.

4 THE ROLE OF POULTRY IN ASSET CREATION IN COMPARISON TO OTHER ANIMALS

Utilizing the livelihoods concepts presented above, this section compares the role that rural scavenging poultry plays in asset creation to that played by other animals. The International Livestock Research Institute (ILRI) published in 2002 a report commissioned by DfID entitled *Investing in animal health research to alleviate poverty* (Perry *et al*., 2002)[2]. This study includes a summary of how animal species contribute to household asset creation in developing countries. It should be noted that the study is based on the livelihoods perspective, and accordingly assets are categorized according to the five-capital classification shown in Figure 2.

According to Perry *et al*. (2002) all animals contribute to financial asset formation through sales of produce such as milk, meat, eggs and live animals and services (mainly transport). Animals also contribute to human capital formation through the positive influence that consumption of food of animal origin has on poor people's health (see Box 2).

According to the interpretation put forward in the above-mentioned report, only large animal species such as camels, buffaloes, cattle and yaks contribute to physical assets – in the form of working animals (ibid.). They are also associated with prestige. There is no prestige attached to keeping small animals like goats, sheep, pigs and poultry. Both small and

BOX 2
Nutrient content of food of animal origin

Poverty normally leads to a diet that is predominantly vegetarian, which studies show may be low in vitamin A, vitamin B-12, riboflavin, calcium, iron and zinc, and which may lead to anaemia, poor growth, rickets, impaired cognitive performance, blindness, neuromuscular deficits, and in the worst cases death. Foods of animal origin are particularly rich sources of all six of these nutrients, and relatively small amounts of these foods, added to a vegetarian diet, can improve the quality of the total diet substantially (Murphy and Allen, 2003). Note that this positive effect at the low end of the income scale should not be confused with the negative impacts of excessive consumption of food of animal origin seen in many rich countries today.

[2] http://www.ilri.cgiar.org/InfoServ/Webpub/Fulldocs/InvestAnim/Book1/index.htm

TABLE 3.
Animal species and their contribution to household assets

Species	Type of assets				
	Financial	Social	Physical	Natural	Human
Cattle, buffalo and yaks	Sales of milk, meat, hides, animals, draught power services, transport and savings instrument	Networking mechanism and social status indicator	Draught power for crop cultivation and transport.	Manure for maintaining soil fertility	Household consumption of milk and meat.
Camels	Sales of milk, meat, hides, animal, transport services. Savings instrument.	Networking mechanism. Social status indicator.	Draught power for transport.	-	Household consumption of milk and meat.
Donkeys and horses	Sales of animals, draught services, and transport (especially water).	-	Draught power for crop cultivation and transport (especially water).	Manure for maintaining soil fertility.	Provision of household water supplies.
Goats and sheep	Sales of milk, meat, hides and animals.	Networking mechanism.	-	Manure for maintaining soil fertility.	Household consumption of milk and meat.
Pigs	Sales of meat and animals.	-		Manure for maintaining soil fertility.	Household consumption of meat.
Poultry	Savings instrument. Sales of eggs, meat and birds.	Networking mechanism.	-	Manure for maintaining soil fertility.	Household consumption of eggs and meat.

Source: Perry *et al.* (2002).

large animals, importantly, contribute to social capital by facilitating human networking. The role of small animals, such as poultry, as entry points into a process aimed at creating a positive spiral of asset creation is not discussed in the report (ibid.).

5 GENDER

Neither the ILRI study (Perry *et al.*, 2002) nor the livelihoods framework (Figure 2) mention the role of small animals such as poultry as an entry point for poverty alleviation; moreover, both are silent on gender aspects. Accordingly, it is useful to note some points made by Quisumbing and McClafferty (2006) in an International Food Policy Research Institute (IFPRI) publication which summarizes the organization's considerable body of research on gender. Salient observations include:

- increasing resources controlled by women has beneficial effects on agriculture, health and nutrition; and
- increasing women's resources helps achieve successful development outcomes.

Small animal production, and especially smallholder poultry production, is in many countries overwhelmingly controlled by women. Linking this fact to the IFPRI findings implies that the benefits that can be derived from small animals are much larger than their inherent economic value would suggest, as they contribute disproportionally to human capital formation.

Indirect support for this conclusion can be found in data from Namibia. Matsaert *et al*. (1998) clearly indicate that ownership of cattle is associated with relative wealth – cattle owning households had an annual cash income of more than US$1 000, while households without cattle earned around US$200. Hans Askov Jensen found a similar trend in Malawi (personal communication), as did Charlotte Vesterlund Pedersen in Zimbabwe (personal communication).

6 THE PLACE OF POULTRY AS AN ASSET: EXAMPLES FROM DEVELOPMENT PROJECTS

In visiting country after country (not least as a member of missions by IFAD[3]) the author of the present paper has observed that among the poorer sections of the rural population, poultry are among the few assets that households have. This is illustrated in the following with examples from Swaziland and the Lao People's Democratic Republic. With regard to these two examples, it should be noted that many national statistical departments have problems collecting accurate data on rural poultry, and that therefore the results of the project surveys presented here may not always agree with national statistics; in some cases they represent the first careful collection of data on rural poultry undertaken in these particular areas. Following these two examples, the use of poultry as an entry point will be illustrated with a case from Afghanistan. Finally, the income-generating potential of indigenous birds will be illustrated with a case from Bangladesh.

6.1 Swaziland – poultry are widely owned

The data presented in Table 4 clearly show that poultry were the most widely owned animals among rural households – 92.5 percent kept poultry, as compared to 50 percent, 46 percent and 16 percent, who kept cattle, goats and pigs, respectively.

TABLE 4
Ownership of animal species in rural Swazi households

Species	Cattle	Goats	Pigs	Poultry
Percentage of households	50.0	46.0	16.3	92.5

Source: IFAD (2001).

[3] http://www.ifad.org/governance/index.htm

6.2 Lao People's Democratic Republic – with increasing wealth the trend is towards larger animals

Surveys in Bangladesh (Dolberg in FAO, 2003a) and the author's visits to rural areas in many countries have shown that poultry keeping is also widespread among the rural poor in Asia. The data in Box 3 illustrate that with increasing wealth, households move towards larger animals such as cattle and buffaloes. The data are from the IFAD-sponsored *Xieng Khouang Agricultural Development Project* in the Lao People's Democratic Republic. The strength of this documentation is that it is based on data covering a 23 year period from 1975 to 1998.

6.3 Afghanistan – poultry as an entry point

FAO has had livestock projects in Afghanistan since 1995. These projects had a poultry component. The following discussion is based on an interview with Dr Olaf Thieme[4], who worked for FAO in Afghanistan during the period 1997 to 2005. In brief, experiences in Afghanistan offer a number of important lessons that connect to the above arguments related to the use of small poultry units as a tool in human development. Relevant conclusions include:

BOX 3

Change in the animal species kept by farmers in a Province in the Lao People's Democratic Republic from 1975 to 1998

According to the Xieng Khouang Provincial Livestock Section's survey data, in 1975 there were 9 037 buffaloes, 8 575 cattle and 118 207 poultry in the province. In other words there were 13.1 head of poultry for each buffalo and 13.8 head of poultry for each head of cattle. In 1975 the economy was in poor shape as a result of the bombings that had taken place during the recent war. By 1998 the number of poultry had risen to 441 126, or by a factor of 3.7 as compared to 1975. However, over the same period, the cattle population had increased disproportionally, meaning that by 1998 there were only 5.5 times more poultry than cattle. The number of cattle increased to 79 260 in 1998, or by a factor of 9.2. The number of buffaloes went up to 38 897 in 1998, or by a factor of 4.3. This increase is less than that for cattle because buffaloes, used for work in lowland agriculture, were under competition from tractors, while cattle retained their role as a store of wealth for upland farmers. These relationships between poultry numbers and cattle and buffaloes numbers illustrate that vulnerable and poor households tend to keep poultry rather than large ruminants (assuming the households were more vulnerable during the war and poorer in 1975 than in 1998). This conclusion is supported by the findings of the IFAD Interim Evaluation's socio-economic survey of the Xieng Khouang Agricultural Development Project, which showed that buffaloes and cattle tend to be kept by the more well-to-do; the richest 2 percent of households kept as many buffaloes and more cattle than the poorest 27 percent of households. By contrast the poorest households kept more pigs and much more poultry than the well-to-do households (based on Dolberg, 1998).

[4] Animal Production Officer (Avian Influenza), FAO, Rome.

When the focus is on technical matters like poultry keeping, it is possible, in very religiously conservative areas, to work with women and contribute to their empowerment. The women appreciate the opportunity to participate in a poultry programme as it provides opportunities to meet and network with other women. In other words, they do not only benefit in economic terms, but they earn social capital in livelihoods terms.

Understanding with the government is needed in order to reach out to the women. Once this precondition is met, there will remain a need for the programme to create institutional mechanisms that facilitate the organization of groups of women for training and ensure supply of inputs and sale of outputs. Outreach may be through NGOs or producer organizations or – something that did not happen in this experience and remains a challenge in Afghanistan and other countries – a federation of village women's poultry groups.

Government veterinary and animal husbandry staff are more interested in big farms and big animals – this reflects the findings of the review by Ashley *et al*. (1999). Government staff need to be exposed to, and trained in, the poultry concepts; however, cannot be expected to lead the process as they lack training, experience and motivation. Process leadership may be an important role for FAO in similar programmes in Afghanistan or other countries in the future.

The successes were: (i) sale of eggs; (ii) vaccination and increased survival; (iii) the social capital formed through networking; (iv) four months of training for individual vaccinators and group leaders; and (v) it was realized that there was a need for a two-year follow-up for group leaders. New ideas included the women's request that the programme develop savings schemes. In the terms of the livelihoods framework, the women wanted to expand their activities into other types of income generation and capital accumulation.

7 CONDITIONS FOR USING POULTRY FOR POVERTY ALLEVIATION AND LIVELIHOOD IMPROVEMENT

The great advantage of egg production is that, although output may not be large, the household is provided with frequent if not daily provision of nutrients of high biological value (see Box 2 above); ideally this is consumed by pregnant or lactating women and young children. In economic terms, eggs are highly divisible and less lumpy than meat, and when marketed they can provide important small earnings that can be used to cover daily needs such as food to improve and diversify the diet, or other household items such as soap.

7.1 Without interventions there is little surplus for human consumption

Without intervention there are few eggs to eat or sell. Several studies document that in the absence of interventions most eggs go into the reproduction of the flock, with some birds used for meat or used in a social context as a gift or for a ceremony. This point is made by Smith (2001) on the basis of a study by Matthewman in Nigeria that was published in 1977; the tendency is confirmed by studies published in recent years.

While more than 75 percent of the households in a study in Ghana reported sale of chickens for meat, only 8 percent of the men and 7 percent of the women reported any sale of eggs (Aboe *et al*., 2006). A majority of the households – more than 60 percent –

reported that they consumed only 25 percent of the eggs, as most were used for hatching. A study in Zimbabwe showed that 38 percent of eggs were eaten in the producing household, but less than 1 percent were sold (Muchadeyi *et al*., 2005). A study in Senegal showed that all eggs produced were used for hatching and none for human consumption in the producing household or for sale (Missohou *et al*., 2002).

Tadelle *et al*. (2003b) report more positive results from a study in Ethiopia – 50 percent of the eggs going for hatching, 23 percent for consumption and 27 percent for sale. Tadelle *et al*. (2003a) found that following improvements to the traditional system, the farmers in the area covered by the study were in the habit of using methods to shorten the broody period; thus increasing egg production by 80 percent. This may explain the higher proportion of eggs available for human consumption and sale. However, it is not known how widespread the practice is, as it is only reported by this one study. Earlier Hossain (1993) had shown, on station, that when chicks were removed at four weeks of age, egg production in local breeds in Bangladesh went up by 60 percent. There are real possibilities for increased egg production based on these practices, as will be shown below.

7.2 Can the scavenging system be improved?

The question that will be addressed in this section is that of what may be achieved on the basis of applying simple interventions to the traditional, scavenging system with indigenous chickens. Vaccination against Newcastle disease is the first step. A large survey of Danida projects in Bangladesh (Riise *et al*., 2005) indicated that this is generally accepted even if the vaccination has to be paid for. Other possible interventions include weaning of chicks at an early stage of life to reduce the brooding period of the mother hen, and creep feeding in low-cost baskets or houses to increase the survival rate of the chicks. Such interventions may often be talked about, but they have rarely been tried in practice. If they have been tried, they have been poorly documented. Nevertheless, the studies by Hossain (1993) and Tadelle (2003a) indicate that there is a potential for increased egg production through early weaning; such interventions were recently used in the Danida supported SLDP-2 project in Bangladesh (Sarkar and Bell, 2006).

The project's approach was derived from the

"… common perception among poultry specialists that the production potential of indigenous chicken is very low due to its inherent genetic characteristics, and consequently their contribution to income generation and household nutrition security is obviously not efficient and satisfactory. But results from field studies reveal that indigenous or deshi chickens are able to contribute efficiently and economically, if small interventions are made in a few aspects of their traditional husbandry practices. In the traditional management system, hens are over-burdened with a wide range of activities and tasks. They lay a clutch of eggs, hatch chicks, brood and rear them for a considerable period of time and thus accomplish a production cycle within 125–130 days. Altogether only 3 production cycles can be achieved from a hen in a year. In a production cycle, a hen is able to contribute less time for productive purposes and spends much time undertaking tasks like brooding and rearing of chicks." (Sarkar and Bell, 2006).

The rationale was that minimum balanced feed supplementation, along with weaning and creep feeding in a low-cost house, helps to reduce the length of production cycles and

to maximize the laying performances of scavenging hens. Higher chick survival rate and more eggs per hen per year increase income and provide more eggs for human consumption in the households that raise chickens. Table 5 shows the consumption levels of chicken eggs and meat for a sample of participant households in the SLDP-2 project and compares these figures to the national averages.

According to Table 5, the potential, relatively speaking, for increasing production is highest for eggs, where the average increase is from one to six eggs per capita per month, while meat output is almost doubled from 310 to 584 grams per capita per month. The study also showed that out of a total monthly average poultry production value of US$21, sales represented US$13, while the average value of the domestic consumption was US$8. In other words, 62 percent of the production was sold and 38 percent consumed in the producing household. The question remains: for what is the income from the sales used?

The answer may be found in other studies from the same series of poultry projects in Bangladesh, which show that sales may have an important effect in terms of human nutrition. Alam (1997) studied 1 000 households that had begun project activities one to two years previously. The study found the main nutrition effect to be indirect. Most of the eggs were sold and the income used to buy other food items such as fish, rice, milk, beef and goat meat. From a human capital perspective, the increased consumption of different types of food of animal origin is important for young children and for pregnant and lactating women in particular, as these foods are rich sources of essential amino acids like lysine and methionine which are found only at low levels in plant foods. The other point to make is that increased income in the hands of poor people increases the demand for animal products like milk, mutton, beef, fish, in addition to poultry eggs and meat.

Following the study by Alam (1997), a study covering another 1 082 households broadly confirmed the results (DARUDEC and DANIDA, 1997). The latter study found an increase in vegetable consumption as a result of the purchases enabled by the income from the poultry. The study also looked more closely at who within a household gets to consume the eggs. It found that children have more eggs than the adults; among children, boys have more eggs than girls; and children above five years have more eggs than children below five. However, these trends varied depending on which NGO was responsible for field implementation – indicating the importance of the nutrition education given by the NGOs. The data suggest that more can be done through education to stress the benefits that expectant mothers, and young children of both sexes, can derive from the regular consumption of eggs and meat.

TABLE 5
Monthly per capita consumption of eggs and chicken meat

Items	National average	Results from 168 sample project households		
		Minimum	Maximum	Average
Eggs (number)	1	2	10	6
Meat (grams)	310	374	1 103	584

Source: Sarkar and Bell (2006).

Both Alam (1997) and DARUDEC and DANIDA (1997) report that the women invested in their children's education, including the girls' education, and in assets like rickshaws for their husbands, bicycles, sewing machines and in some cases even land. They confirmed the trend for investments to go from chicken and ducks to goats and cattle, with cattle being the most prestigious livestock investment.

7.3 The need for external inputs and actors that can provide them

As mentioned above, Newcastle disease vaccine is a critical external input needed to improve small-scale poultry production. Australian scientists have developed vaccines, and manuals and procedures for field application (Alders and Spradbrow, 2001). So far this has relied mainly on government or donor funding, and on government veterinary services for implementation. Groups based in France have worked on the supply of Newcastle vaccine mainly to African countries, with a strong commercial emphasis (Fermet-Quinet, undated) for several years. However, although there are procedures established to achieve this, there remains a need for government funding in the early stages, not the least for communication and awareness raising. It can be concluded that, while there are these established procedures and techniques from which lessons can be learned, large-scale, routine application of Newcastle disease vaccination of poultry belonging to poor women and remains far below the level required. There is urgent need for regular vaccination programmes in many countries, with the main challenge being to identify a viable institutional form to ensure implementation. This could involve private, commercial supply chains and village vaccinators (Riise *et al*., 2005; Fermet-Quinet, undated) to enhance long-term viability.

There will also be a need for other inputs such as training and extension services. This will involve – to stay with the examples used in this paper – making people aware of the ways in which they can protect their young chicks and feed them when they are weaned early, and conveying the idea of improving egg production by cutting the brooding period. There may also be a need for some loans to finance activities, at least in their early phases. However, in most developing countries, the smallholder systems have a low priority among government professional livestock staff – there has been little change since the analysis published by Ashley *et al*. (1999). The priority is also low among NGOs and commercial companies (Dolberg, in FAO, 2007a).

However, there are actors that have worked with the concepts and approaches needed to use poultry as a tool for poverty alleviation. These include FAO and the International Network for Family Poultry Development (INFPD), Veterinarians without Borders, the LAPROVET laboratory which is involved in work on Newcastle disease vaccination, and increasingly private veterinarians from West African countries. There is also the Australia-based International Rural Poultry Centre (IRPC), which is now the repository of experience gained by Australian scientists and development workers with Newcastle disease vaccination research and development. During the past ten years the Danish Network for Smallholder Poultry Development has worked on the subject from a multidisciplinary perspective, which has generated important insights (Riise *et al*., 2005; Kryger *et al*. in FAO, 2007b). Manuals on village poultry keeping can be downloaded from the site of the Network (in English and some in French).[5] The development NGO BRAC from Bangladesh has several years of

[5] http://www.poultry.kvl.dk/Information_resources/Manuals.aspx

experience with poultry programmes for poor women in that country. It is now involved in programmes in other countries such as Afghanistan, India, Sri Lanka, Uganda, the United Republic of Tanzania and Sudan; the number of countries is likely to increase. The commercial company Kegg Farms, in India, has been inspired in its approach by BRAC's key component, the Chicken Rearer, who serves an important role in enhancing the survival rate of young chickens. Dolberg (in FAO, 2007a) presents a more detailed analysis of the roles of these actors.

Although there are actors at the international level, and a few at the national level, who can provide inputs and support to small producers, the situation is institutionally and technically fragile in most countries where implementation of a smallholder poultry programme would be relevant. It is hard to avoid the conclusion that the biggest challenge for the future in these countries is in the institutional sphere. The challenge is to create organizations with sufficient administrative and technical capacity and with the necessary political support to implement poultry programmes as tools in human development. A first step may be to raise awareness among decision-makers in national governments and donor agencies. This would seem to be logical in view of the close match that exists between several of the Millennium Development Goals and the gains that can be achieved through smallholder poultry production.

7.4 Constraints and opportunities for future smallholder poultry production

In the future, poultry production for livelihood improvement and poverty alleviation will be needed in countries and regions of the world where there are comparatively large numbers of poor people. Paul Collier, former director of Development Research at the World Bank and now leader of the Centre for Studies of African Economies at Oxford University, in his book *The bottom billion,* (Collier, 2007) analyses the situation in about fifty states with a total population of about a billion people, where it has proven very difficult to get development moving. He describes the states as "failing", as most of them suffer or have suffered from extended periods of bad governance or civil war, with mismanagement of revenues from natural resources such as oil; or they may be landlocked with few natural resources. While the situation is bad, Collier argues that it is in these countries that the real development challenge lies. It is typical for these countries that most of the population is rural, and that many women and their families would benefit from interventions in support of smallholder poultry production. If it is assumed that out of the one billion people, 80 percent live in rural areas, that an average household consist of 5 people including an adult woman, and that adult women are the primary target group for this type of intervention, it can be estimated that 160 million women and their families would stand to benefit.

7.5 Opportunities, number of people and categories of countries

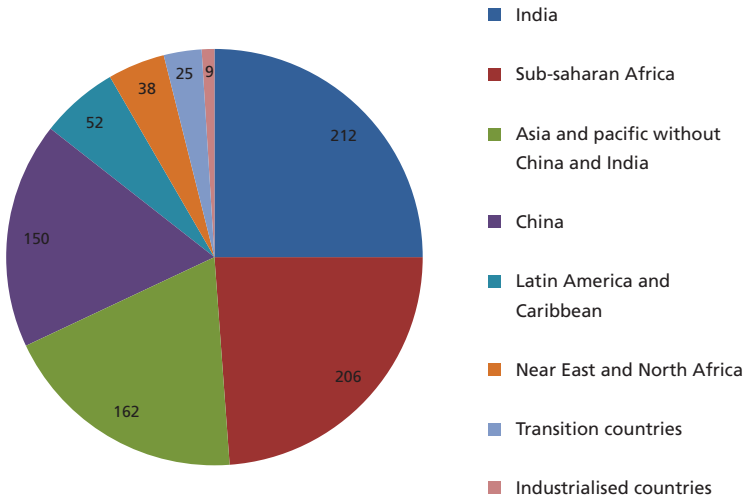
Development organizations are aware of the problem that Collier (2007) presents, although they may use other words to describe the situation. In World Bank terminology the difficult countries are called low income countries under stress (LICUS)[6] or highly indebted poor

[6] http://www.worldbank.org/licus

BOX 4
Countries for smallholder poultry in human development

The following countries – the list is not exhaustive – are among those that for some time will have large proportions of poor people. In Asia: Afghanistan, Bangladesh, Cambodia, the Democratic People's Republic of Korea, India, Indonesia, the Lao People's Democratic Republic, Nepal, Pakistan, the Philippines, Viet Nam; in Africa: Benin, Burundi, Central Africa Republic, Chad, Cameroon, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Eritrea, Ethiopia, Ghana, Guinea, Guinea-Bissau, Guyana, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe. In Latin America there will not be many such countries, but Bolivia, Honduras and Nicaragua may need attention.

FIGURE 3
Distribution of undernourished people in 2001–2003 (millions)



Source: FAO (2006).

countries (HIPC)[7], while they are placed low on the UN's Human Development Report's Human Development Index[8]. FAO uses the expression low-income food-deficit countries (LIFDCs)[9].

The number of undernourished people is estimated to be above 854 million by FAO (2006), while the World Bank (2005) estimates the number of people living in the LICUS countries to be more than 400 million. The majority of people in either of these categories live in South Asia and sub-Saharan Africa. These countries are listed more fully in Box 4.

In all regions, wars and other disasters will very likely add new countries to the list set

7 http://www.worldbank.org/hipc
8 http://hdr.undp.org/
9 http://www.fao.org/countryprofiles/lifdc.asp?lang=en&iso3=LIE

out in Box 4, while stable and good governance combined with economic growth may remove countries from the list.

The distribution of the 854 million undernourished people in the world in 2001–2003 is shown in Figure 3.

7.6 Constraints

One important constraint is that – if Poverty Reduction Strategy Papers (PRSPs) are any guide – there appears to be limited awareness among planners and policy-makers about the possibility of using smallholder poultry production as a development tool. The HIPC countries are required to produce PRSPs to obtain concessional lending from the World Bank for their development. Yet, from the perspective of the present paper, there is much that needs to be improved. As poultry and other small livestock are kept particularly by poor people, it would be reasonable to expect that PRSPs allocated a role for livestock development; but this has not been the case in most instances. In the first working paper published by the FAO Pro-Poor-Livestock Initiative (FAO, 2003b), 61 countries were examined with regard to the degree to which livestock (not to mention poultry) had been included in PRSPs. The conclusions drawn in this paper include the following:

- that livestock is generally under-represented in PRSPs;
- that greater attention is given to commercial operations than to species and structures relevant to the poor;
- that recommendations are far too general, and therefore unlikely to lead to improved outcomes;
- that often the format of the PRSP process will not lead to accurate descriptions of the situation of livestock producers;
- that despite attempts at a participatory and consultative process, recommendations are mostly central and top-down; local opinion may therefore be sought but not incorporated; and
- that the joint staff assessment procedure does not lead to any increased representation of livestock.

In the introduction to this paper, a reference was made to Ashley *et al*. (1999), who in their review of 800 livestock development projects showed that there was a bias towards large animals in development work; on the basis of the evidence provided by the analysis of the PRSPs (FAO, 2003b) the situation has not improved. In view of the lack of consideration given to livestock in the PRSPs, the situation may in fact have become worse.

7.7 The market situation

The marketing situation with regard to smallholder poultry production has recently been reviewed by Kryger *et al*. (in FAO, 2007b). The market situation will be closely linked to developments in the economy, which in turn is linked to the political situation in a country or region (Collier, 2007); extreme forms of political unrest, war and mismanagement lead to economic stagnation and depletion. Conversely, economic growth will lead to an increase in the demand for poultry products, and that demand boost will be particularly strong in the lower income groups. Raha estimated this effect for Bangladesh (Table 6).

It is interesting to note that according to Table 6 the income elasticity of demand is

TABLE 6
Income elasticities[10] of demand for poultry products and distribution of income groups

Income group (in Bangladesh Taka per household)	Percentage of households by income group (national figures)	Percentage of households by income group (figures for rural population)	Elasticity of demand	
			Eggs	Chicken for slaughter
<4 000	55.0	61.5	1.627	2.887
4 001–6 000	19.7	19,1	1.168	2.575
6 001–8 000	9.3	7.8	1.127	2.552
8 001–10 000	5.5	4.7	0.651	1.172
>10 000	10.5	6.9	0.496	0.294

Note: US$1 = 68.7 Bangladesh Taka on July 18, 2007.
Source: Raha (2003) as quoted in Riise *et al.* (2005).

much higher for chicken meat than for eggs, but that for both eggs and meat the elasticity is particularly high at the lower income levels. The conclusion that increases in income lead to an increased demand for food of animal origin reflects the findings of the study on the "livestock revolution" produced by Delgado *et al*. (1999).

Meat from indigenous birds commands a premium price in many countries. In the case of Bangladesh, Riise *et al*. (2005) found this premium to be 60 percent. There was no price difference for eggs – although it may be argued that a 40 gram egg from an indigenous hen traded at the same price as a 60 gram egg from an exotic bird is 50 percent more expensive on a weight basis.

7.8 The political and economic situation decides whether there is a niche or a major market

At times price differences between the eggs and meat of indigenous and exotic birds lead to discussions about possible niche markets for some products. The question of the size of such a market then has to be considered. According to the comprehensive review by Kryger *et al*. (in FAO, 2007b), reliable data on the volume of this niche market is unavailable "and the relation to the broiler meat market in terms of price elasticities appear[s] not [to be] being researched".

In countries where economic development has difficulty to take root – home to 1 billion people according to Collier (2007) – there is another dividing line. Poultry production based on the traditional scavenging system will be the dominant form until economic development begins to take off, at which point, commercial types of poultry production will begin to supply a predominantly urban market which will grow with time.

Factors that influence farm gate prices include distance to the market, population density, transaction costs and marketing structures. There will, for example, be differences in the share of the consumer price that an intermediary will expect (and hence the price that

[10] The income elasticity of demand measures the increase in the quantity demanded of a good that results when people increase their income.

the farmer will get) between a country such as the United Republic of Tanzania that has a low population density (41 people per square kilometre) and long distances to markets, and a country such as Bangladesh, where a very high population density (985 people per square kilometre) will provide a much more ready demand and access to the market.

While there have been studies of aspects of smallholder poultry marketing (Mlozi *et al*., 2003; Riise *et al*., 2005; Kryger *et al*. in FAO, 2007b), there seems not to have been any that have studied whether, under a range of marketing conditions, the prices charged by intermediaries are "fair" or whether there is any need for interventions in this area.

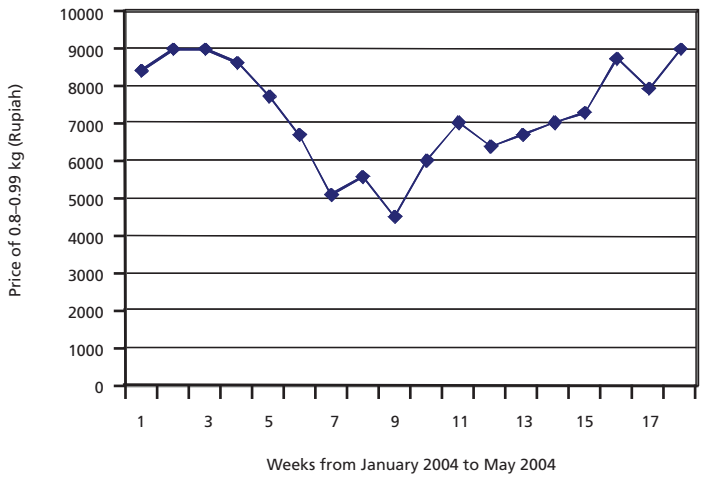
In conclusion, the question of marketing needs more detailed studies with regard to the influence that the political and economic situation in a country or region has on poultry production systems and the chain from the producer to the consumer. This will help to inform decisions about the most appropriate interventions.

8 THE MARKET RESPONSE TO HPAI

The HPAI problem is expected to last for some years. Poultry producers have to expect that consumer reaction to the problem will, from time to time, influence the marketing situation – although demand can be expected to recover after some time. This effect is illustrated in Figure 4. The figure is based on data from the first outbreaks in Indonesia in 2004, but the pattern of consumer reaction has been the same in other countries in later outbreaks (McLeod, personal communication).

Small poultry producers will also face problems when governments decide to restructure markets as a result of HPAI. This effect was being seen in Viet Nam at the time of writing.

FIGURE 4
Jakarta broiler prices from news of outbreak in January till May 2004



Source: Dr. Hartono, Indonesian Poultry Information Centre.

9 CONCLUSIONS

As this paper has outlined, the particular purpose of using poultry production for livelihood improvement and poverty alleviation is to benefit poor women and their families. Increases in egg and meat production are significant, but this is not the most important measure of success. Important evaluation criteria (Figures 1 and 2) include whether the women and their families have enhanced their capabilities to cope with the difficulties that poor people typically meet (diseases, hidden hunger, pressure on their assets, etc.), whether they have stronger social networks, and whether they are better able to feed their children and keep them in school. Poultry production in the sense that it is discussed here is only one of the tools that can be used, but it adds to the menu of options available to livelihood improvement and poverty alleviation projects or programmes.

The rationale – based on the evidence provided in the paper – for a poverty alleviation strategy that embraces smallholder poultry production is that it will reach, more successfully than cattle-based projects, the people that pro-poor development is meant to benefit. The evidence is that this leads to a situation of greater food security, in which people consume more of their own produce, and exchange – via the market – the remaining high-value poultry meat and eggs for milk, other meat, fish, cereals or vegetables. This results in several benefits. Poor people take their first steps into the development mainstream, they and their children become better nourished and the demand for all animal products increases. In short, poultry production offers a means to distribute more equally the benefits of development as defined within the livelihoods approach (described in Section 3 above).

The primary constraint to up-scaling poultry production for livelihood improvement and poverty alleviation is institutional and organizational. It is poor women and their families who run the smallholder poultry production system, but they are not organized and most government veterinary and extension systems do not reach out to them. They are, therefore, left in an organizational vacuum with poor guidance from the national governments. Taking into account Collier's (2007) analysis of the general economic and political conditions in many of the countries where the smallholder poultry approach would be relevant, this situation will not be easily remedied.

10 RECOMMENDATIONS

The need for smallholder poultry work in the future will be in the countries in the World Bank's LICUS or HIPC categories, FAO's LIFDC category, those placed low on the UN Human Development Index, or in the countries that are home to what Collier (2007) calls "the bottom billion". In none of these countries can a strong organizational capacity to reach out to poor women and their families be expected. Accordingly, the most important challenge is to find the organizational means to reach these poor people. This may be through government extension programmes, producer organizations, community-based organizations, NGOs, private companies, or a combination of these actors. A decade ago, Ashley *et al*. (1999) documented the problems that livestock projects had in reaching poor people; such problems will persist for some time in the countries where the smallholder approach is relevant.

10.1 Identify the roles and responsibilities of the public and private actors

The poultry sector, whether commercial or based on a scavenging village system is a private sector. It would not make sense in countries with a weak public sector – including weak veterinary and livestock services – to allocate to the public sector responsibilities that can be handled equally well or better by private companies, producer organizations or NGOs. A relevant analysis of the roles of public and private sector actors in the provision of livestock services is provided by Ahuja (2004). Ahuja's analysis draws a distinction between public and private goods, and uses this distinction to identify the appropriate delivery channels for various livestock services. According to this analysis, public goods include surveillance, prevention, control and eradication of highly contagious diseases with serious socio-economic, trade and public health consequences; emergency responses; wildlife disease monitoring; food-safety tasks; and compliance monitoring. Research, extension and training are classified as having both public and private good characteristics. Disease investigation and diagnosis, and production and distribution of drugs and vaccines are among the activities placed in the private good category.

10.2 Roles of international organizations and networks

International organizations such as FAO have a clear role to play as providers of technical expertise. The countries for which the smallholder approach is relevant will be short of technical expertise, so there is a role for an international technical organization like FAO to act as a storehouse of knowledge, as a provider of technical assistance, and through support to INFPD. An immediate task is to create awareness among decision-makers in the relevant countries about the potential of the smallholder poultry approach as a development tool. The same role is foreseen for the other organizations that focus on smallholder poultry as a tool in poverty alleviation such as the Veterinarians without Borders, the LAPROVET laboratory that is involved in the work on Newcastle vaccination, the Australia-based International Rural Poultry Centre and the Danish Network for Smallholder Poultry Development. The expansions of the development NGO BRAC from Bangladesh into other countries is likely to involve work with poultry and should be followed and supported as appropriate, not least to learn from the institutional modalities that may be applied. Knowledge about the use of small stock in development is stored in the Smallstock Toolbox, a Web site supported by several donors (http://smallstock.info).

10.3 Roles of NGOs, community-based organizations and membership organizations

The limited outreach of government veterinary and extension services in the countries where the smallholder poultry approach is relevant allocates an important role to NGOs and community-based or membership-based organizations, which should be supported as far as possible. However, this is easier said than done for the following reasons: (i) the number of NGOs with interest in using the approach is limited (Crafter in FAO, 2004); (ii) many of the countries for which the smallholder approach is relevant are not democracies and they may not allow the freedom to organize that is required to create NGOs, community-based or membership-based organizations. However, these constraints should

not prevent support to such organizations, where this is possible. One option may be collaboration between international organizations and networks and international NGOs, as international NGOs are sometimes permitted to work in countries that do not allow the existence of national NGOs or other types of civil society organization.

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Smallholder family poultry as a tool to initiate rural development

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SUMMARY

Smallholder family poultry (SFP) straddles production systems 3 and 4, as defined by the Food and Agriculture Organization of the United Nations (FAO), and makes up about 80 percent of the total poultry population in most developing countries. There are various models of the use of SFP as a tool for development. Examples of scavenging models tested over several years are the Smallholder Semi-Scavenging Poultry Model in Bangladesh and the *Projet pour le Développement d'Aviculture Villageois in Burkina Faso*. An example of a small-scale intensive model is the Nigerian Union of Local Government Employees model, which has been tested for only a short period.

Highly pathogenic avian influenza (HPAI) is the greatest current biosecurity threat, the management of which requires incentives, compensation and education of the producers to create prevention awareness. The carrying capacity of the range, concerns about food safety, and the policies of governments and institutions are other threats to SFP in the twenty-first century. Reports show that the realization of SFP as a tool for poverty alleviation and social development brought forth innovative and supportive policies for SFP from governments and international development institutions. While all the four FAO-defined poultry systems can co-exist within the same locality and remain viable, it is the development of SFP that is the most pro-poor option.

The most important lesson learned from all the models is that training and advocacy are key to the initiation of sustainable development through SFP. The need for training is widespread: from government officials through service suppliers, NGO officials, smallholders, intermediaries and consumers. Such training must be sustained in quantity and quality through the use of information and communication technology to record, store and reproduce or remotely offer training modules via, radio, television, CD, DVD, MP3 or the Internet. Such a training tool kit is an international public good that is the responsibility of various international organizations and governments.

Key words: poultry, tool, rural, development

1 INTRODUCTION

Smallholder family poultry (SFP) can be defined by the production system, input source, output allocation, flock size and location. SFP is raised extensively or semi-intensively in

relatively small numbers (usually less than 100 in any flock); there is minimal investment in inputs, with most being generated in the homestead; labour is drawn from the family, and production is geared essentially towards home consumption, income and savings (Sonaiya, 1990a). In many developing countries, small flocks of poultry (especially commercial hybrid chickens) are raised in complete confinement in suburban, peri-urban and urban areas (classified as FAO poultry production system 3) while scavenging poultry (system 4) is the type held by most farm families. Hence, SFP straddles poultry production systems 3 and 4 (FAO, 2004a) and accounts for 30 to 80 percent of the total poultry population in most developing countries.

This paper discusses the linkages between SFP and general development of rural areas in developing countries, and the action required from donors and international agricultural research and development institutions to support SFP as a tool for rural development.

2 THE ECONOMIC IMPORTANCE OF SFP PRODUCTION TO THE RURAL POOR

The World Bank defines poverty as "a pronounced deprivation of well-being related to lack of material income or consumption, low levels of education and health, vulnerability and exposure to risk, and voicelessness and powerlessness." Mitchell and Shepherd (2006) differentiated the rural poor into three categories: "small producers for global markets", "workers" and "marginal producers for domestic markets" to reflect their differing productive strategies, access to assets and engagement with global economic processes. SFP producers fall into the third group – marginal producers for domestic markets. Their contribution to general community development may be better assessed by the use of the value chain analysis approach. Value chain activities bring a product from its conception to its end use and include production, marketing and distribution, which may be confined to a single geographical location or spread over wider areas (Porter, 1985).

The value chain approach contributes to reducing poverty when it supports the role of the poor within the value chain by fostering associations, skills development and learning, or by facilitating contract arrangements and supporting information and service delivery. Often, it is necessary to combine value chain promotion within a livelihoods perspective, with local economic development or with vocational training so as to enable the poor to enter (and stay in) commercial markets. The first role of economic importance that SFP performs in general rural development is that it creates market access, an obligatory step in value chain development.

2.1 Provision of market access to the vulnerable

SFP provides marginal producers – the poor, the weak (due to diseases like HIV/AIDS), the displaced and refugees, and other disadvantaged people (such as widows, former child soldiers and militants) – with access to the market. Chickens are usually the first livestock to establish themselves in refugee camps, in resettlement camps or after natural disasters. The fact that women own a large proportion of SFP emphasizes its importance as a means of improving their livelihoods. SFP easily integrates into the main occupation (crop agriculture) of the rural poor, who are more likely to keep poultry than larger livestock (IFAD, 2004) because poultry require little in terms of land area and other production factors. In

countries where a proportion of the rural people are landless, these landless people can still keep system 4 SFP, which depends purely on scavenging and so provides the landless poor with an output – birds or eggs – that can be marketed. The role and limitations of SFP in creating market access is illustrated in the following case reports from Myanmar, Bolivia, Solomon Islands, the United Republic of Tanzania and Uganda.

Myanmar, an economy dominated by agriculture, with 75 percent of the population or 36.6 million people living in the rural areas, has 52 million village chickens which are raised predominantly for income and household consumption. Improving the general welfare of the rural SFP producers requires identifying and reducing the constraints to village chicken production and enhancing their production, quality and marketing, i.e. increasing the value of the SFP products in the local markets (Henning *et al.*, 2007).

In Bolivia, the commercial poultry sector is well organized around the cities of Cochabamba for broilers and Santa Cruz de la Sierra for layers. The market prospects for SFP would be expected to be restricted because there are efficient market channels for broilers and layers to other cities and small towns in the country. SFP, however, is found in most rural areas, but is much more important in the valley areas where the traditional food crop is maize, and scavengeable feed resources are available. With an average SFP flock size of 20, rural households can afford a few birds to be sent to the urban markets, where birds from the backyard systems are sold for about US$2 each, a price that is stable and uniform throughout the large country of 1.1 million km^2 (Rushton and Viscarra, 2005).

More than 80 percent of the 400 000 people of Solomon Islands live in the rural areas. There have been ethnic conflicts which resulted in a number of students dropping out of school to join the militias; these individuals are now demobilized, jobless and without employable skills. For this vulnerable group, SFP birds and eggs that are surplus from home consumption provide valuable marketable goods and help to rebuild self-confidence and encourage a return to studying (or, in the case of other demobilized militia men, the uptake of new studies) (Parker, 2004).

In Dar es Salaam, United Republic of Tanzania, the Mama Mkubwa (respected elder aunt) programme looks after orphaned and street children in the homes of women volunteers. These women are helped to set up backyard chicken flocks, which the children look after. They sell the eggs and birds in the market and use the cash income to buy food (Macha, 2005).

Community Integrated Development Initiatives, a non-governmental organization, implemented a SFP project in Rakai, a rural district of Uganda where the care of HIV/AIDS orphans is a big challenge. Within two years, the project had achieved an increase in flock turnover; an increase in egg sales, with some households able to sell about 6 000 eggs in a year; and an increase in chicken sales, with households able to sell 200 growers and 30 adult birds in a year (Kyarisiima *et al.*, 2005).

In country after country, it has been demonstrated that selling SFP eggs and birds provides market access to the hard core poor, enabling them to develop market linkages, though these linkages are often hampered by the low production output of individual SFP households. On the positive side, prices of SFP chickens are often higher than those of commercial broilers, creating a great incentive for SFP producers and reflecting consumer preferences for local chickens raised on the free range. While imports and commercial poul-

try products sometimes saturate the urban markets with devastating effects on prices for domestically produced commercial broiler and eggs; the prices for SFP are often relatively stable throughout the year although prices may peak during festive seasons.

2.2 Contribution to household income

Though SFP is not seen as a primary occupation by any of the producers, it is a source of small but significant income to rural families throughout the developing countries. A major comparative advantage of SFP for poorer, more remote, rural communities is the conversion of labour into cash in a shorter time, with less capital requirement and with less risk than is the case with other livestock species or other uses of labour. The following discussion is illustrated with the reports of SFP contribution to family income in Bangladesh, Burkina Faso, Nigeria, Senegal and the United Republic of Tanzania.

In Nigeria, none of the women surveyed in southwestern Nigeria by Sonaiya *et al*. (1992) using participatory rural assessment techniques viewed SFP as a main occupation; but they recognized it as a source of significant income. Atteh (1990) reported that in the western middle belt zone of Nigeria, 10.5 percent of SFP keepers stated "source of income" as their sole objective in keeping chickens, but 65.7 percent had "source of income" as one of their objectives.

Among the Yoruba people in southwestern Nigeria, women marketers (called Alarobo) who collect eggs (and other collectibles such as plastic and glass bottles, and tin containers) from chicken-keeping households and sell them in urban markets, earn some income from this activity. Ouandaogo (1990) calculated that the export of eggs of guinea fowl eggs from Burkina Faso to Côte d'Ivoire earned about CFA 2 billion annually for SFP producers in Burkinabe villages. Kushi *et al*. (1998) reported that the 94 women SFP owners they surveyed in Bauchi State, Nigeria earned an average income equivalent to about US$3 per month from poultry keeping, which accounted for about 9.5 percent of their total monthly family income. Chitukuro and Foster (1997) calculated that in central United Republic of Tanzania an SFP flock comprising five adult chickens enabled women to earn US$38 annually, which amounted to about 10 percent of their annual income.

Alabi and Aruna (2005) used econometric models to investigate the contribution of SFP to the total income of women in the Niger Delta area of Nigeria. The econometric analysis indicated that wages, trade and SFP were the significant determinants of income of women in the area studied. SFP contributed 18 percent of total annual income and was rated third in terms of its influence on women's income in the study area.

In the Sahelian area of Thies, 70 km from Dakar, Senegal, Missouhou *et al*. (2005) studied system 3 SFP. With an average of 16.5 birds per household managed by women, and with the birds fed a 4 percent supplement based on maize, sorghum, millet or cereal brans, even with 44 percent mortality, poultry's contribution to household incomes was 21 percent of total annual income.

The 10 percent increase in the contribution of SFP to African rural family income within a decade may be indicative of the worsening economic opportunities for vulnerable rural dwellers. The capital investment required to start the smallest enterprise has continued to rise sharply with the general cost of doing business at any scale in most African countries. SFP may, therefore, have increased its comparative ability to generate income for a very small outlay of investment.

In Bangladesh, the three SFP projects supported by Danida, the International Fund for Agricultural Development (IFAD) and the (Asian Development Bank) ADB (SLDP-1, PLDP and SLDP-2) over 12 years included up to 1 million women beneficiaries and reached out to approximately 5–6 million people. Evaluation of the project showed that the level of monthly income from SFP eggs sale among beneficiaries, though low ($4 per month) was for the majority of the women the only income source, and had a positive impact on the livelihoods of the beneficiaries (Kryger *et al*., 2005).

2.3 Meat and egg supply

In 2005, close to 60 percent of the 900 million people in Africa lived in the rural areas; they had available to them 1 356 million chickens, 16 million ducks, 12 million geese and guinea fowls, and 9 million turkeys, producing 2 180 125 tonnes of hen eggs, 7 143 tonnes of other poultry eggs, 3 257 292 tonnes of chicken meat, 56 619 tonnes of duck meat, 55 340 tonnes goose and guinea fowl meat and 66 252 tonnes of turkey meat (FAO Statistics cited by Guèye, 2007). On average, 80 percent of all poultry classes are in the SFP sector.

Because SFP is available in such a large number, it makes a notable contribution to the nutrition of both the rural and the urban populace in Africa. The SFP contribution to animal protein supply in developing countries is decreasing in urban areas but remains quite strong in rural areas. The edible products of poultry (meat and egg) are always in high demand in rural areas because they are widely accepted in virtually all cultures as they suffer no or few taboos. Although some cultures influence who in the family consumes the poultry products, they are nonetheless a cheap and ready source of animal protein for the family.

The International Food Policy Research Institute (IFPRI) forecasts that by 2015 poultry will contribute about 40 percent of the total animal protein consumed globally (IFPRI, 2000). In the villages of developing countries SFP becomes a source of meat when the chickens are slaughtered during festivals, celebrations and sacrifices. Fresh eggs are seldom eaten, they are kept to be hatched, but unfertilized egg are harvested and eaten by the family.

Mbugua (1990) reported that in Kenya, although SFP produced 71percent of both the eggs and the poultry meat in the country, only 10 percent and 40 percent of the eggs and meat, respectively, are marketed, the rest is presumably consumed by the family. Kabatange and Katule (1990) demonstrated the value of SFP in meat production in the United Republic of Tanzania. They calculated that if a family has two hens, the two hens lay 60 eggs in a year, and there is 50 percent hatchability of the eggs, at the end of a five-year production period, the meat production from the flock that derived from the original two hens will be far in excess of meat from a range-fed cow, which usually takes 5 to 7 years to reach slaughter. Boki (2000) reported that the poultry meat and egg demands in the rural areas of the United Republic of Tanzania were met entirely by SFP which also supplied 20 percent of the poultry meat and egg demands of the urban areas.

3 STEPS AND PROCESSES IN REALIZATION OF THE POTENTIAL OF SFP

SFP is everywhere in developing countries and has economic and social significance in the rural areas. Hence, it can be used as a tool in the eradication of poverty, as a means of economic empowerment, as a way of ensuring food security for rural families, as a vehicle

for demonstrating the appropriate application of science and technology to solving problems, and as a unique opportunity for technical cooperation among developing countries. A report from the Consultative Group on International Agricultural Research (CGIAR, 2004) provides concrete examples of how scientists in industrialized and developing countries are producing new technologies to boost crop yields, increase rural incomes and reduce the use of pesticides. SFP is an ideal tool for the CGIAR to deliver international public goods to the developing countries in livestock production sciences.

If the potential and importance of SFP is to be realized, it must be protected from diseases and epidemics like Newcastle disease (ND) and highly pathogenic avian influenza (HPAI). With this protection comes an increase in the sizes of family flocks, which must be managed in a sustainable way for higher output. The requirements for this enhanced performance include development of appropriate simple technology for the health and husbandry of family flocks, improved management and productivity of the birds, acquisition of appropriate market skills by the SFP producers, and a viable microcredit scheme for SFP development.

3.1 Animal health

There is a consensus that if SFP is to thrive anywhere, the control of ND is the number one priority (Thitisak *et al*., 1989; Sonaiya, 1990a; Alexander, 1991; Spradbrow, 1993; Copland and Alders, 2005). ND control programmes that allow SFP owners to be trained in vaccine delivery become a means of economic empowerment for those who are trained to do this work (GRM International, 2005). Reduction in mortality is achieved both through vaccinations conducted by trained community vaccinators (Ouandaogo, 1990; Alexander *et al*., in FAO, 2004b; GRM International, 2005) and through improved management that protects young chicks for the first six to eight weeks of their lives. The study carried out by Sonaiya *et al*. (2002) showed that for greater productivity, vaccination (against ND) must be accompanied by improvements in other management practices (such as supplementary feeding). This implies a holistic system approach to SFP development.

Currently, the control of HPAI has become the greatest priority for all poultry production systems including SFP. A reduction of overall mortality in village poultry by vaccination against endemic killer diseases such as ND, fowl cholera and duck plague, with rapid and effective disposal of dead birds, points the way to a cost-effective approach to the long-term prevention and control of HPAI (Alders *et al*., 2007).

3.2 Housing and hatching

The state of the housing available to SFP exposes the birds to accidents, predation and theft, resulting in an annual loss estimated at 852 million birds in Africa (Sonaiya, 1990b). Simple predator deterrents can be constructed to protect the chickens when they are sleeping during the night and when they are scavenging during the day (Sonaiya, 2000a). Such improved housing may also protect them from the spread of HPAI.

Low-technology incubators such as the Chinese rice-husk incubator allow day-old chicks to be produced within the locality of the SFP producers. The advantages of such technology include generating self-employment for some SFP producers in the rural areas and reducing the down time for the hens which results in greater egg production and, hence, increased income.

3.3 Nutrition and management

System 4 SFP depends on scavenging the feed resources available on the free range. Estimating this scavengeable feed resource base (SFRB) and making the most economical use of it is very important to the productivity of SFP (Roberts., 1992; Gunaratne *et al*., 1993; Olukosi, 2002; Sonaiya *et al*., 2002; Sonaiya, 2004). In order to increase productivity, it is invariably found necessary to provide supplemental feed. Sometimes, selective supplementation (e.g. of laying hens alone) is adopted as well as the use of creep feeders which allows the chicks preferential access supplemental feed and affords them additional protection against predators.

Supplemental feeding is better based on locally available feed resources (which may be unconventional to the intensive poultry system), especially agricultural by-products and by-products of homestead food preparation (Prawirokusumo, 1988). The assessment of the quantity and nutritive value of such unconventional feed resources is a continuous process (Musharaf, 1990; Sonaiya, 1995).

While chickens are the main poultry in the villages, there are advantages in keeping other poultry species in SFP production. For example, in the savannah or dry-land areas of Africa, where guinea fowl are kept, there is better usage of the SFRB, as guinea fowl are better scavengers than chickens. In the lowland rice-based farming systems of Asia, ducks predominate in SFP. Ducks have better mothering abilities than chickens and can utilize the rice paddies more effectively, thus increasing the gains from scavenging systems. Under the threat of HPAI, there is need to separate poultry species to avoid cross infection and virus evolution.

3.4 Market development in the value chain

There is need to shift the focus of SFP production from simply increasing the number of chickens in the flock to profit maximization (Sonaiya, 1996). The flock size of SFP in the villages more often than not exceeds the carrying capacity of the range in terms of feed resource base and this leads to competition and heavy mortality, particularly of the chicks and growers (Roberts, 1992). The SFP owners need to learn flock management and hatch dynamics, including regular harvesting of excess eggs (beyond the number that the brooding hen can cover) for family consumption or sale, and the sale of grower chickens rather than only the older chickens. If profit maximization becomes the focus, then marketing development skills such as record keeping, egg grading and branding, as well as egg processing become important (Sonaiya, 1996). The work of Conroy *et al*. (2005) shows that there are low-technology approaches to the proper management of hatchable eggs in the rural areas.

4 MODELS OF SFP AS A TOOL FOR DEVELOPMENT

4.1 Scavenging family poultry production models

Outstanding success has been achieved in the long-term use of family poultry for rural development through the Smallholder Semi-Scavenging Poultry Model in Bangladesh and the *Projet pour le Développement d'Aviculture Villageois* (PDAV) in Burkina Faso.

The Bangladesh Semi-scavenging Poultry Model (2002)

The concept behind the Bangladesh Semi-scavenging Poultry Model was developed during the 1980s by the government of Bangladesh's Department of Livestock Services (DLS) and

the non-governmental organization Bangladesh Rural Advancement Committee (BRAC). Extensive validation of the model took place under the first Smallholder Livestock Development Project (SLDP-1) supported by Danida and IFAD, the Participatory Livestock Development Project (PLDP) funded jointly by Danida and the ADB and the second Smallholder Livestock Development project (SLDP-2) in southern Bangladesh funded by Danida.

The basic principle of the Bangladesh Model is to provide the poorer segments of society with the possibility of generating an income and improving the status of women through rearing improved hens to produce table eggs. To ensure regular supply of birds and feed and to reduce mortality due to diseases by vaccinating the birds, beneficiaries were selected, trained and encouraged to provide the standard services available under intensive systems of poultry production.

The Bangladesh Model focuses on small holdings of chickens as a vehicle for poverty alleviation and socio-economic development for rural peoples. It has been reported to reduce the number of poor beneficiaries by 32 percent per year among the poorest of the landless poor (Jensen, 1996). The Model used in the PLDP, as depicted in the Appraisal Report, is essentially a value chain involving the following elements:

(a) Primary producers

Model Breeder: small low-cost parent farms with a breeding stock of 18 Fayoumi hens and two Rhode Island Red (RIR) cocks received either from the project site or directly from government poultry farms. The Model Breeders are to produce quality fertile eggs to be sold to the Mini Hatcheries. (36 Model Breeders per Area Office).

Mini Hatchery: small low-cost hatcheries operated with solar energy and kerosene. Each hatchery has a capacity to hatch 700 chickens or ducklings per month. The day-old chicks are sold to the Chick Rearers. (9 Mini Hatcheries per Area Office).

Chick Rearer: small rearing farms, each with a capacity of 200–300 chickens/batch and 4 batches per year. The day-old chicks are supplied by the Mini Hatcheries, and at eight weeks of age the chickens are sold to the Key Rearers. (57 Chick Rearers per Area Office).

Key Rearer: women having five cross-bred layers for the production of table eggs. The hens are kept under semi-scavenging conditions and fed with 30–70 percent supplementary feed. This group constitutes 95 percent of the beneficiaries. (about 5 716 Key Rearers per Area Office).

(b) Market-oriented support services

Poultry Workers: women trained and equipped to vaccinate poultry against the most common poultry diseases. The vaccine is bought either through the Sub-district (Upazilla) Livestock Office, NGO Area Office or on the local market. (100 Poultry Workers per Area Office).

Feed Sellers: procure various feed ingredients (including pre-mixes) available on the local market or supplied by the supporting NGO and sell compound feed or feed ingredients to the poultry keepers. (10 Feed Sellers per Area Office).

Egg Seller: buy eggs from the producers and sells them to the market. She is also expected to be the marketing link between the Model Breeder and the Mini hatcheries. (10 Egg Sellers per Area Office).

(c) Technical support

Non-Governmental Organization (NGO): the NGO forms poultry producer groups, arranges the training of members and provides technical support to, and credit for, the various operations.

DLS: the DLS staff provides technical support during training and operation, particularly for the Model Breeders, Chick Rearers, Poultry Workers and Feed Sellers. The government poultry farms supply Fayoumi pullets and RIR cocks to the Model Breeders and Sonali pullets to areas where these hybrids are not being produced in the villages.

The model has been recognized globally as an excellent tool for income generation among poor farmers/destitute women and for stimulation of private enterprise development. Stakeholders from several countries have visited Bangladesh to study the model for possible adaptation and adoption.

Assessment of the impact of the Model on the beneficiaries who were involved as various poultry cadres showed that the project had a positive impact on overall household income and that there was a positive increase in food consumption, clothing, school expenses and savings (Alam, 1997; Nielsen, 1996). On the whole, the Egg Sellers are the beneficiaries that benefited mostpersonal communication. They were among the poorer segments of the group, but they understood the benefit of buying eggs from individual households and selling them on the market.

The majority of households reported that they had increased food consumption in general and quite a number of the beneficiaries actually increased the number of meals from two to three per day. For all households the main increase in food intake has been through eggs and chickenpersonal communication, and whereas red meat was previously an occasional diet in most households it has become a more regular item in the weekly diet.

The Bangladesh Semi-scavenging Poultry Model is an appropriate tool for poverty alleviation and general development. For the hard core poor, the size of the microcredits is manageable and the technology promoted is simple and adaptable. In areas where the service providers are performing according to expectations, Key Rearers can relatively quickly initiate investments in other income-generating initiatives while maintaining the small flock of hybrid birds.

Loans have been a key element in the success of the Model. The beneficiaries have highly appreciated having a technological package attached to the loan, even though 50 percent or more of the loan was used for other initiatives (Alam, 1997; Nielsen, 1996).

Projet pour le Développement d'Aviculture Villageois (PDAV) in Burkina Faso

The famous *Projet pour le Développement Aviculture Villageois* (PDAV) in Burkina Faso, funded by Coopération Francaise, concentrated on the training and placement of "*vulgarisateurs villageois volontaires*" (VVV) although its broad objective was to improve the hygiene, housing and feeding of family poultry (guinea fowl) and the transport and marketing of its products (Ouandaogo, 1990). In ten years (1979 to 1989), 1 821 VVV were trained; they administered 13 million ND vaccinations and 1.2 million antihelminth treatments, among others. It is estimated that in three years, the programme resulted in the production of 1 million additional poultry. The last years of the programme were devoted to training and retraining of VVV, publicity campaigns through slide shows in the villages,

debates in schools, pamphlet distribution, VVV meetings, farmers' visits to livestock centres and technical conferences of livestock agents. This large programme covered 15 provinces (out of 30 in the country), 4 378 villages (out of 7 500) and 5 646 125 beneficiaries. A major factor responsible for the success of the programme was political will and the commitment of the government to rural development in general and agriculture in particular (Sonaiya and Aklobessi, 1991; Sonaiya, 1992).

4.2 Small-scale Intensive Poultry Production Model

Most government employees in Nigeria live in the urban and peri-urban areas. Among the largest group of government employees in Nigeria are those in the service of the 774 local government areas (LGA) in the country, who are members of the National Union of Local Government Employees (NULGE). With an average of approximately 300 employees per LGA, NULGE has a membership of about 240 000 Nigerians. The average family size in Nigeria is 6, and hence intervention at this level will benefit about 1.4 million Nigerians.

The NULGE leadership in Osun State requested a programme designed to use poultry for income generation (i.e. poverty reduction). A subsidiary of the union, the NULGE Cooperative, financed the smallholdings of its members, while the Obafemi Awolowo University's Family Poultry Research Project (FPRP) (Sonaiya, 2005) provided consultancy and support services free of charge. Through the NULGE Cooperative, a loan was made available to individual members who had shown sufficient motivation and interest in smallholder poultry enterprise. The loan was given in kind and in cash and consisted of provision of cages, point-of-lay pullets and a take-off grant for the purchase of feed and veterinary drugs for 60 layers. In the first pilot phase, which started in November 2002, there were a total of 39 beneficiaries which included nine women. The second phase, which started in April 2003, had 72 beneficiaries. The third phase, which started in November, 2003, had 120 beneficiaries. It has since been running without recourse to the university.

In order to ensure quality of feed, cages and birds, FPRP identified a local poultry-inputs supplier, who was then contracted by the NULGE to supply cages, point-of-lay pullets and feed to the beneficiaries in the outreach. A training programme in poultry production was organized for the beneficiaries. The training covered general poultry and health management, handling and marketing of products, and sustainability issues. The training was held at the Teaching and Research Farm of Obafemi Awolowo University. The training included instruction in the farm classroom and practical training at the farm's Poultry Unit. A 16-page training manual/workbook was prepared for each of the beneficiaries.

After the training but prior to stocking of the beneficiaries' cages, a team of technicians visited the proposed sites to ensure their conformity to the standard recommended by the FPRP and to offer suggestions and recommendations to the beneficiaries. Point-of-lay birds that were supplied by the contractor achieved 30 percent hen-day production within the first month of lay. FPRP continues to receive feedback from the beneficiaries about the satisfactory performance of the birds and the economic benefits of the enterprise.

Periodical visits are made to all the beneficiaries to monitor the progress they have made and to address the challenges facing them. Refresher courses are mounted on request to address new challenges and provide pertinent information.

5 SFP STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

An analysis of the two types of model and a few of their adaptations in various countries is presented below to demonstrate lessons learned, requirements for success and the limitations of the models and their adaptation.

5.1 The biosecurity threat

According the FAO classification, SFP, which straddles systems 3 and 4, has low to minimal biosecurity at the farm level. At the local, national and regional levels, the low biosecurity becomes a threat to SFP and non-SFP production in relation to all epidemic diseases such as ND and HPAI. Scavenging is a necessary condition for SFP in system 4 which makes the implementation of biosecurity virtually impossible. The current disposition towards the eradication of SFP is a great threat to the very existence of this production system. What is required includes incentives, compensation and producer education for prevention. This awareness is critical for the survival of the SFP producers themselves in the event of a HPAI pandemic (Rushton *et al*., 2005).

5.2 The scavengeable feed resource base (SFRB) carrying capacity.

The scavenging imperative which makes biosecurity near impossible also places a limit on the expansion of SFP production within a village or settlement. Whenever the carrying capacity of the SFRB is exceeded, morbidity and mortality ensue, particularly among the chicks and growers. The logical step is to provide supplements to supply the nutrient shortfall or to cull the excess birds (Roberts, 1992; Gunaratne *et al*., 1993). Research into the development of unconventional feedstuffs that are available in SFP localities is a step in the right direction (Idowu, 1992; Sonaiya, 1995).

5.3 Dual- or single-purpose production

SFP producers, particularly in system 4, raise mixed species of poultry some of which are better egg layers while others are raised mainly for meat. The lack of specialization is deliberate in many cases, but it also constitutes a constraint to the scale of SFP production. The threat of HPAI could be used to nudge SFP towards specialization in either egg or meat production especially as it relates to mixed species for the different purposes.

5.4 Genetic source of birds

Genetics has not been established as a factor in SFP production. Indigenous poultry races are well adapted to the SFP production systems and are the dominant genotypes all over the world. Whenever hybrids have been introduced either deliberately or accidentally, they have done well under system 3 conditions but not so well under system 4 (de Vries, 1995). Where indigenous races have been improved by selection and crossed with exotic races, there has been improved productivity if the management level has been similarly improved (e.g. Fayoumi in Egypt and Sonali in Bangladesh). Indigenous races have been selected for production under systems 3 and even 2, but all such efforts have not been able to remove the advantage of commercial hybrids (Nwosu, 1979).

5.5 Concerns about food safety

There are concerns about food safety related to salmonella and other bacteria on eggs produced under FAO poultry system 1 conditions. Such concerns become even graver in the case of products from systems 3 and 4. Fortunately, many tropical cuisines require meat and eggs to be very well cooked before eating. With access to more urban markets, SFP products could become a source of food infection to consumers more used to poultry products from systems 1 and 2 which are usually broiled. The danger of HPAI comes mostly from people eating undercooked meat from infected poultry (Rushton *et al*., 2005). Hence, with regard to food-safety concerns, the requirement for clear labelling is very important. While not all SFP products can qualify as organically grown, system 4 products are free range products and can be so labelled and treated by the consumer the same way as commercial free range products are treated.

5.6 Policies of governments and institutions

Driven by rural and urban consumer demands and donor preference, the policies of governments and institutions towards SFP are, with some notable exceptions, generally lukewarm. Some officials in some developing countries seem to be less interested in SFP and regard it as backward and archaic. A few conspiracy theories have been floated to the effect that SFP is being supported by western donors as a way to prevent competition for the system 1 products that are "dumped" on the local markets through unfair trade. Such thoughts arise when SFP is treated simply as having the sole aim of producing meat and eggs for the urban consumers, a job for which it is not well suited. It is the realization of SFP as a tool for poverty alleviation and social development in the rural areas that brings forth innovative and supportive policies for SFP by governments, as in Bangladesh and Burkina Faso, and by international development institutions such as FAO, IFAD, the Australian Centre for International Agricultural Research (ACIAR), AusAid and Danida.

6 CONCLUSION AND RECOMMENDATIONS

6.1 Specific need to promote SFP

As long as there are villages, SFP will survive. If it is to be saddled with the additional responsibility of placing "the poorest of the poor" on the first rung of the ladder of development by giving them access to the market, then it must be given specific assistance through special programmes such as the Bangladesh poultry model. A lesson learned by all who have tried to replicate this model in other countries is that there is need for extensive adaptation to suit local conditions and realities. Chinombo *et al*. (2001) discuss the Malawi smallholder poultry production model which was a poverty reduction strategy but which failed at the adaptation stage. For example, Malawi has a much lower population density than Bangladesh and a less-developed NGO infrastructure.

To ensure success, there is need for basic, applied, action and participatory research all along the SFP value chain. The significant effect of Danida in Bangladesh and West Africa is a result of the implementation of specific programmes dedicated to SFP, which were coordinated by the Danish Network for Smallholder Poultry Development. A much fuller discussion of the imperatives for specific SFP programmes is available in the following workshop and conference proceedings: Dolberg and Petersen (editors) (1999) and Sonaiya (editor) (2000b).

6.2 Training, institutions and support services

Another lesson learned in virtually all the models is that training and advocacy are keys to sustainable SFP development. The need for training is widespread – from government officials through service suppliers including NGOs, to smallholders, intermediaries and consumers. More importantly, such training must be sustained in quantity and quality. To ensure this, it is necessary to employ information and communication technology to record, store and reproduce or remotely offer the training modules via, radio, television, CD, DVD, MP3 or the Internet. Development of such training tool kits can be most suited to international research and development institutions.

It has been fairly well established that most support services that are purely commercial (e.g. feed, vaccination, chicks, growers, sales) can be allocated to the private sector, while those with a high content of public good, such as development of genotypes, vaccines and housing prototypes, have to be provided by government, donors or international organizations. As pointed out above, close study of the Bangladesh model indicates that microcredit is vital to the success of the model. This microcredit is provided by the NGO that also provides training and other services. Without this credit support, most SFP producers will not adopt the innovations that are critical to the success of the SFP development programme.

Training and advocacy: an example

In August 2003, the FPRP was contracted by the FAO-supported Special Programme on Food Security in Nigeria (SPFS) to provide training in smallholder poultry production to farmers, extension agents and livestock policy-makers in the six geopolitical zones of Nigeria over a four-week period. A training manual was developed along with other illustrations, and all the training schedules were fulfilled. The trainees then trained others in their respective geopolitical zones.

The Cross River State government, one of the states in the south-south zone of Nigeria, sponsored the first national workshop on SFP in August 2004. The FPRP and the International Network for Family Poultry Development (INFPD) organized the workshop in collaboration with two NGOs – the Enterprise Nigeria Foundation, (ENF) and Poverty Reduction Initiatives Nigeria (PRIN) – and the organized private-sector organ, the Nigeria Economic Summit Group (NESG). The Danish Network for Smallholder Poultry Development sent its Director and three other resource persons to the workshop. Within the country, all relevant organizations, institutions and individuals were involved either as resource persons or delegates to the workshop. A national consensus was reached on some important SFP parameters, and modalities for implementation of SFP development programmes in a community-development scenario.

6.3 SFP development and pro-poor livestock production

Some countries (e.g. Brazil, Côte d'Ivoire and Thailand) seem to have little tolerance for SFP, although there may be site differences. In Brazil, the vast system 1 export-oriented poultry companies, though physically located in the suburban, peri-urban or even rural areas, are economically dislocated from their surroundings, as their products are hardly available in the local market. SFP not only supplies the poultry needs of the villages, but often that of the shanty towns around the big cities. In Côte d'Ivoire, consumer demand in Abidjan

for imported SFP guinea fowl provides a decent income for landlocked Ouagadougou in Burkina Faso. Thailand, as the fourth most important poultry meat exporter in the world, does not even present official figures for backyard poultry and the important fighting cock sector, yet it has the largest number of domestic birds per rural person. In 2004, of the five Southeast Asian countries, Thailand had the highest GDP per capita and urban GDP per capita and the lowest rural GDP as a percent of urban GDP per capita (Rushton *et al.*, 2005). In some countries, urban bias and rural aversion combine to obliterate any pro-poor livestock production support.

In most countries, the profile of poverty shows clearly that the development of SFP is the most directly pro-poor aspect of livestock production. Using SFP indices, such as very small flock size, a scavenging production system and low credit maximum, which is a much lower credit limit allowed to the poorest of the poor, helps to target accurately the poorest of the poor. It has been repeatedly demonstrated that all the four FAO poultry systems can co-exist within the same locality and remain viable – as, for example, in Bolivia (Rushton and Viscarra, 2005). In many countries, SFP products occupy a niche market into which poultry products from systems 1 and 2 cannot be admitted. Issues of taste, cultural value and medicinal purposes give SFP, especially system 4, products a price advantage because of the very low volume available to the market.

Promoting SFP to initiate rural development

The aim of development is to reduce poverty, i.e. improve income and nutrition, increase levels of education and health, empower the vulnerable, reduce their exposure to risk, and give a voice to the voiceless. To promote SFP is to optimize the productivity of systems 3 and 4 without converting to system 2. Such promotion on a long-term basis will improve family food security and nutrition, create income and employment opportunities within the SFP value chain, conserve indigenous genotypes of birds and the natural ecosystem, and promote social equality by empowering vulnerable widows, orphans and physically challenged or weakened people who are able to raise SFP.

The promotion of SFP first requires that the entire farming system of the SFP producers be fully understood so that various aspects of the system can be carefully modified. For example, vaccination against ND can increase chick survival rates from 30 to 70 percent; simple housing and other predator protection reduce mortality among chicks and growers; supplementary feeds help to extend the carrying capacity of the range and the SFRB; different poultry species optimize different ecosystems. Priority must be placed on the development of appropriate technologies, the provision of training, credit, inputs and market supply (Sonaiya and Swan, in FAO, 2004c).

FAO used its Technical Cooperation Programme to support many SFP development activities between 1979 and 1993. In 1994, FAO launched the Special Programme on Food Security (SPFS) and in 1997 identified SFP as a major activity of the SPFS diversification component. The target coverage of SPFS is for 100 countries within which South–South cooperation in the field of SFP is encouraged through the use of Technical Cooperation between Developing Countries (TCDC) experts. In addition, individual countries are also supported by FAO's Telefood programme, which provides up to US$10 000 per group for small-scale projects (Branckaert and Guèye, 1999; Branckaert *et al.*, in FAO, 2000).

What is now required is collaboration between the various international organizations such as FAO, IFAD, the United Nations Development Programme (UNDP), IFPRI, the International Livestock Research Institute (ILRI), INFPD and the World Poultry Science Association (WPSA) to develop a long-term programme of promotion for SFP. The collection of reliable SFP data is absolutely crucial and is a task that INFPD and WPSA members in different countries can accomplish with logistical support from donors and international organizations. Data analysis and interpretation can be carried out with the facilities of the international organizations. Closely matching the SFP data with the rural poverty profile, country-specific programmes can be developed and implemented with involvement of all the stakeholders, while monitoring and evaluation can be carried out by the international organizations and the INFPD.

6.4 Conclusion

SFP is produced by both rural and urban dwellers because it requires little in space and investment. The development of SFP is threatened by HPAI, rapid urbanization and food-safety concerns. Results of family poultry research, development and outreach efforts should be made available to all the relevant stakeholders – government, non-government, organized private sector and SFP producers – for objective evaluation and implementation as may be necessary for general social development.

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Scope and space for small-scale poultry production in developing countries

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SUMMARY

In recent years there has been growing recognition among the development community of the role of small-scale commercial poultry production in accelerating the pace of poverty reduction and reaching out to the poorest of the poor. There is also growing evidence to demonstrate the role of small-scale poultry in enhancing the food and nutrition security of the poorest households and in the promotion of gender equality. At the same time, the market and production context of poultry production has been changing rapidly over the last two decades. Rapid economic growth and urbanization in developing countries has resulted in fast expansion of industrial, large-scale, vertically integrated, poultry production, especially in Asia. Opportunities have also expanded for small-scale poultry enterprises, resulting from improved market access and infrastructure, and a preference structure that may still favour free-range birds and eggs. As a result, there has been increased market orientation even among small-scale poultry enterprises. These changes have brought large and small production systems into overlapping competitive space, which has created both challenges and opportunities.

These changes have raised concerns about the sustainability of small-scale poultry production systems due to: (i) intensified competition from large-scale producers who can exercise significant control over the poultry value chain (including concentrated holding of genetic stock of industrial poultry by a few transnational corporations); and (ii) the public perception that small units of production may be dangerous reservoirs of diseases, specially in the wake of recent outbreaks of highly pathogenic avian influenza (HPAI). Against this background, this paper attempts to summarize the nature of small-scale poultry production, and brings together evidence regarding the viability of small-scale poultry production in the context of the expansion of large-scale production characterized by substantial economies of scale, well-organized and integrated supply chains and the ability to respond to various types of risk.

The paper argues that the main challenge for small-scale/rural poultry is organizational, not technical. Based on a review of available evidence, the paper concludes that it is important to continue to promote village poultry as a means to promote household nutrition security and livelihood support, but that concerted efforts must be made to find organizational solutions to minimize public-health risks and provide appropriate extension support on issues such as disease prevention, predation and improving hatchability. Unfor-

tunately, most government extension programmes in developing countries are not oriented towards addressing the needs of poor households. Some private-sector organizations (such as Keggfarms in India) have invested significantly in the development of fast-growing and more productive birds that do not require significant additional inputs, and have also made sufficient investment in developing the distribution network for the birds. However, extension and public health support systems remain a weak point, resulting in vulnerability to exogenous shocks. A well-orchestrated public policy response in support of small-scale poultry production is, therefore, required.

Key words: small, poultry, organizational, private, public

1 INTRODUCTION

Small-scale poultry production systems – in the form of small, semi- or fully scavenging, household flocks, or slightly larger more intensive units – have developed in a large number of developing countries around the world as a source of livelihood support for the rural poor. In recent years there has been growing recognition among the development community of the role of small-scale commercial poultry production in accelerating the pace of poverty reduction and reaching out to the poorest of the poor. There is also growing evidence to demonstrate the role of small-scale poultry production in enhancing the food and nutrition security of the poorest households and in the promotion of gender equality (Dolberg, in NDDP/FAO 2004a; NDDP/FAO, 2004b) (see also the Web site of the International Network for Family Poultry Development (INFPD) http://www.fao.org./ag/AGAInfo/subjects/en/infpd/).

The market and production context of poultry production has been changing rapidly over the last two decades. Rapid economic growth and urbanization in developing countries has resulted in fast expansion of industrial, large-scale, vertically integrated, poultry production, especially in Asia. Opportunities have also expanded for small-scale poultry enterprises due to improved market access and infrastructure, and a preference structure that may still favour free range birds and eggs (Conroy *et al.*, 2005). As a result, there has been increased market orientation even among small-scale poultry enterprises. These changes have brought large and small production systems into overlapping competitive space which has created both challenges and opportunities.

These changes have raised concerns about the sustainability of small-scale poultry production systems due to: (i) intensified competition from large-scale producers who can exercise significant control over the poultry value chain (including concentrated holding of genetic stock of industrial poultry by a few transnational corporations); and (ii) the public perception that small production units may be dangerous reservoirs of diseases, especially in the wake of recent outbreaks of highly pathogenic avian influenza (HPAI). Governments are already beginning to emphasize the possible public-health risks associated with small-scale (especially household) poultry and are discounting their contribution to income and nutrition support in poor households. A number of informed observers and researchers have, however, argued that our understanding of the epidemiological role of the different sectors is poor, and that, therefore, the emphasis on small-scale production as a source of risk may be exaggerated or misplaced (Branckaert, 2006; Rushton *et al.*, in FAO, 2005; Otte, in FAO, 2006a; Otte, *et al.*, in FAO, 2007). Such developments can have serious impli-

cations for poor peoples' livelihoods, as governments, in their search for politically feasible solutions, chose easier ways out.

This paper attempts to summarize the nature of small-scale poultry production, and brings together evidence regarding the viability of this type of poultry production in the context of expanding large-scale production characterized by substantial economies of scale, well-organized and integrated supply chains, and the ability to respond to various types of risk.

The paper is structured as follows. The first section presents a broad characterization of the stakeholders in small-scale commercial poultry production, including a brief analysis of the importance of this type of poultry production in different countries. The second section presents a few models of household poultry production that may be considered to represent good practice for small-scale commercial poultry production. The third section discusses emerging challenges for small-scale poultry producers and the policy response required; it ends with some concluding remarks.

It is important to point out that the paper is based primarily on documented literature that is in public domain. Although there is a moderate amount of literature now available on small-scale poultry production, there is unfortunately a real dearth of rigorous field-based evidence on aspects of ongoing structural change in global and regional poultry production. Without making the claim of being comprehensive, it is hoped that this paper can raise some pertinent questions and further the debate on the viability of small-scale poultry production systems.

2 CHARACTERIZATION OF SMALL-SCALE POULTRY PRODUCTION SYSTEMS

We begin with a broad overview of small-scale production systems. The Food and Agriculture Organization of the United Nations (FAO) has classified poultry production systems in four categories (sectors) based on the level of integration of operations, the marketing system and the level of biosecurity.[1] The scope of the discussion in this paper is limited mostly to Sector 4, with occasional references to Sector 3.

In a large number of low-income countries, backyard/household production (Sector 4) is the largest system of poultry production and a critical source of income and nutrition for poor households. In Ghana, for example, rural poultry accounts for 60–80 percent of the national poultry population (Aning, in FAO, 2006b). Kushi *et al.* (1998) reported that in northeastern Nigeria more than 70 percent of rural households kept chickens.[2] Information from Bangladesh and Nigeria, where detailed disaggregated data on the structure of poultry population is available, indicates that Sector 4-type production accounts for more than 90 percent of the poultry population. Even in countries with a relatively large modern industrial poultry production sector – India for example – free ranging chickens running around in the backyards of rural households are a common sight especially in areas with

[1] Sector 1 refers to the large-scale integrated commercial systems with high commercial orientation and high biosecurity. Sector 4, at the other extreme, refers to village-level production systems with households raising few birds for their own consumption or for local markets, and minimal levels of biosecurity. Sectors 2 and 3 fall in between these two extremes depending on the level of market linkage and the level of biosecurity.

[2] Cited in Sonaiya (2007).

high incidence of poverty, and account for a very large proportion of the national poultry population. Similarly, in Viet Nam, approximately half the households keep chickens in the backyard, with an average flock size of about 16 birds (Otte, in FAO, 2006a). Guèye (1998) and Rushton *et al.* (in FAO, 2005) provide approximate figures for the proportional contribution of birds kept under small-scale family production systems to the total poultry population in selected African and East Asian countries. The figures are presented in Table 1.

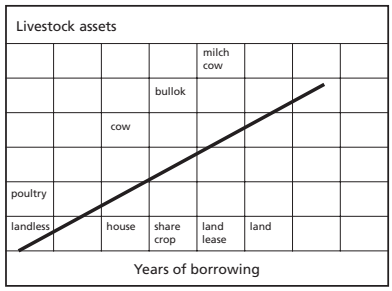
The majority of producers in Sector 4 comprise poor households with almost zero asset base, and highly vulnerable and insecure livelihoods. In India, for example, household poultry has found special favour with the poor (landless, marginal and small farmers) and among tribals, scheduled castes and other backward caste communities (Shinde and Srivastava, 2006; Mandal *et al.*, 2006). These households have traditionally relied on small-scale, low-cost, poultry production systems to supplement and enhance their livelihoods and to begin the process of asset accumulation to climb the poverty ladder. Todd (1999) inves-

TABLE 1
Proportion of national poultry flock accounted by family poultry production

Country	Percentage of national poultry population in family poultry production
Cameroon	70
Central African Republic	80
Côte d'Ivoire	73
Ethiopia	99
Gambia	90
Kenya	70
Malawi	90
Mali	90
Nigeria	93
Senegal	70
Sudan	75
Togo	70
Uganda	80
United Republic of Tanzania	70
Zimbabwe	25–30
Cambodia	90
Indonesia	64
Lao People's Democratic Republic	90
Thailand	10*
Viet Nam	70

*In the early 1990s, almost 99 percent of chickens in Thailand were in the backyard production system (Kehran, 1999)
Sources: Guèye (1998); Rushton *et al.* (in FAO, 2005).

FIGURE 1
Sequence of investments



Source: Adapted from Todd (1999).

tigated the relationship between years of borrowing and the type of livestock assets the households invested in, and found that households in early phases of borrowing, especially landless households with an extremely poor asset base, invested in poultry before moving on to other livestock enterprises (Figure 1). Thus, the households used poultry enterprise as an entry point to take the first step towards capital accumulation and poverty alleviation.

In general in this system, the poultry are kept under low-input, low-output conditions and managed by the women and children of the household (Shinde and Srivastava, 2006; Sethi, 2007). Typically, flock size ranges between five and fifty birds, with the birds being raised under a traditional extensive scavenging system without special inputs in terms of feeding, housing or labour. Mainly non-descript birds are reared, although in some specific areas, local breeds and cross-breeds derived from them are reared. There is little or no linkage with input and output supply chains, and the chicks are usually obtained by hatching home-produced eggs for home consumption or for limited trade within the village. The production performance of these birds is relatively poor, with 40–60 eggs and about 1–1.5 kg meat at the end of the production cycle. The birds are generally free ranging, with few or no inputs being provided. Housing in these systems is rudimentary and mostly built with locally available materials such as wood, mud bricks, sugarcane stems, bamboo and cereal stovers.

Biosecurity measures are more or less absent; although some observers believe that the natural genetic diversity found in this system provides adequate resistance to diseases and the ability to withstand disease outbreaks – unlike intensive systems. Others, however, argue that the absence of biosecurity and disease-prevention measures poses a real threat to public health and livestock production in developing countries, and emphasize the need for a more stringent and formal regulatory and production systems. Losses caused by predators and diseases are high in this system. Global estimates of such losses are not available, but Sonaiya (1990) put forward an estimate of approximately 825 million for the number of chicks, guinea keats and ducklings dying each year in Africa as a result of diseases and predation.

Survival and growth in the extensive scavenging system is affected by competition for

feed resources in the villages (household waste, material gathered from the environment, crop residues and fodder materials, by-products from local industries, etc). Thus, the scavenging system works well where there is abundance of biomass. However, in areas where there is scarcity of natural resources, poor rainfall, and high livestock density, competition with other species for natural resources/surplus material can be severe, making it difficult for poultry to grow and survive (both due to stunting and poor ability to escape predators). Roberts (1995) argues that starvation associated with dwindling biomass availability in villages is an important factor contributing to poor growth and survival in village poultry. Under these circumstances, simple interventions, such as supplementing feed using creep feeders, can significantly enhance the survival and growth of chickens. Similar arguments and results are presented by Sarkar and Bell (2006). Other reasons for low productivity include management system (leading to overburdening of chickens with a variety of tasks, such as brooding and rearing chicks, leaving little time for productive purposes) and variability in the quantity and quality of feed (Sonaiya, 1995; Goromela *et al.*, 2006).

Estimates of the contribution of family poultry to overall household income vary widely. Rauen et al. (1990) reported that in the Dominican Republic, family poultry contributed approximately 13 percent of household income. Setioko (1997), on the other hand, estimated family poultry's contribution to exceed 50 percent of total household income in the transmigrant farming system in East Kalimantan, Indonesia. A survey undertaken by Riise et al. (2005a) estimated monthly income level from poultry among households to be around 200–250 taka in Bangladesh. These authors further note that this average nominal figure has been constant for almost a decade, indicating that real income from poultry has fallen over time. They observe that with a relatively low profit margin and a downward propensity, smallholder poultry farming is mainly attractive to people with low opportunity costs, i.e. those who have limited opportunities for alternative income streams.

Irrespective of the direct contribution to household income, small-scale poultry is often recognized as an important contributor to overall livelihood security. A recent study of household poultry systems in India assessed main reasons for keeping poultry by rural households. The sample comprised three categories of households: small and marginal farmers keeping poultry within the home compound; small and marginal farmers, keeping poultry in a nucleated settlement; and landless people keeping poultry in and around the house. In Tamil Nadu, a state in southern India, generation of planned and regular income was identified as the main reason for poultry keeping, whereas in Rajasthan in northwestern India, poultry were almost wholly kept for household consumption[3] (Conroy *et al.*, 2005). Studies from other parts of the world have also reported similar results. For example, Aning (in FAO, 2006b) reports income supplementation and augmentation of domestic meat supply to be the primary reasons for keeping poultry in backyards in Ghana. A number of children from poor African households have reported that payment of their school fees is dependent on the income derived from their poultry micro-enterprises. Similarly, rigorous field studies of the impact of household poultry production in Bangladesh have found significant increases in consumption of several food items (not just meat and eggs) among the beneficiaries. Nielsen (1998) found that the control group had lower

[3] This is, at least in part, reflected in the larger aggregate market in southern India that results from a larger proportion of non-vegetarians in the population and relatively higher incomes.

initial consumption levels and significantly lower consumption increases during the project period. Further, Nielsen *et al.* (2003) found that starvation during the lean season declined by almost 75 percent in the case of poultry-rearing households. Similar results have been reported by a number of other authors.

Small-scale commercial poultry production farms, falling under Sector 3, are generally characterized by medium-sized flocks (ranging from 50 to 500 birds) of local breeds or cross-bred stock. Farmers usually provide housing structures made of local materials, purchase part of their feed, use vaccines and veterinary services whenever available, and may even have minimal biosecurity systems in place. Such systems are more prevalent in urban and peri-urban areas; output is usually sold to nearby urban centres, with varying degrees of organization in the marketing system. While some poultry growers have relatively formal marketing contracts, others usually rely on verbal contracts. Such contracts are restricted to sale–purchase agreements and have no effect on the choice of technology, input supplies or any other service support. These systems usually serve as the transition phase between Sector 4 and large-scale commercial systems characterized by large vertically integrated production and processing units and more formal contracts with farmers growing between 1 000 and 20 000 chicks.

Both Sectors 3 and 4 have a special place in the economy of developing countries, as they contribute towards poverty alleviation by drawing under-utilized labour resources into production. While most studies acknowledge the direct impact on income generation and nutrition security, it is the impact of the subsequent multiplier effect – with farmers spending their increased income on the goods produced in the non-tradable, non-agricultural sector – that contribute even more to poverty reduction (Mellor, in NDDP/FAO, 2004c)[4]. However, these units do face significantly higher transaction costs, and as such require policy support in terms of physical infrastructure and technology transfer through extension.

3 COMMERCIAL VIABILITY, SUPPLY CHAIN AND COMPETITION WITH LARGE OPERATORS

A large proportion of household poultry production (Sector 4) is still subsistence oriented and thrives on the absence of alternative supply sources for animal protein and a lack of alternative livelihood opportunities. Traditional backyard poultry systems with low input and low output are usually characterized by a rudimentary supply chain of input suppliers and traders. A large proportion of farmers allow the hens to hatch most of the eggs produced; surplus (mostly male) birds are consumed within the household, and there is very little market linkage. Given very low productivity and low levels of marketed surplus, supply chains are difficult to build and sustain. Semi-commercial systems, on the other hand, do have market linkages on both the input and output sides, but the chains remain informal and coordination of various activities in the chain is largely based on personal contacts.

[4] Mellor (in NDDP/FAO, 2004c) notes that the rural non-farm sector, which includes about half the rural population, produces goods that for quality and transaction-cost reasons cannot be sold in international markets. Thus, the expansion of the rural non-farm sector critically depends on growth in local demand. Growth in local demand comes from growth in the farm sector (including livestock). Given that demand for the goods and services produced by the rural non-farm sector is highly income elastic, growth in the farm sector creates a multiplier effect which contributes significantly towards poverty reduction – not just that of farm households, but also that of other households on whose services these households depend.

Studies that have examined financial aspects of household poultry production generally report a favourable cost–benefit ratio. For example, Parthsarthy (1996) studied units of 100 layers in central India and reported a net profit of Rs 10 per 100 eggs. Another study (Johri *et al.,* 2002), conducted in 18 villages in northern India where crosses of exotic with indigenous breed were distributed and chickens reared as scavenging-type backyard units, reported a benefit–cost ratio of 3:1. Several studies of small poultry units conducted by banks in India have indicated a profit of Rs 0.80 to Rs 1.00 per layer per month and Rs 1to Rs 2 per broiler depending upon the market demand and the efforts made by the farmers to find a market for direct sale of their produce. "Back of the envelope" calculations from Viet Nam suggest an annual rate of return to capital of more than 700 percent (Otte, in FAO, 2006a).

Most such studies have, however, examined backyard poultry production in isolation from the larger changes in global and national poultry production. While it is useful to study the structure of costs and benefits arising from small-scale poultry production, the question remains whether these systems can remain viable at a commercial scale in the wake of the expansion of large-scale poultry production.

In the absence of sustained commercial viability, small-scale poultry production will not provide a viable mechanism for asset accumulation and poverty alleviation. We did not find any study addressing the question of the commercial viability of small and large-scale production in overlapping competitive space. Most practitioners, however, continue to maintain that village/backyard poultry is commercially viable due to significant savings on feed costs and distinct preferences for meat and eggs from local birds, resulting in significant price mark-ups over and above broilers and industrial eggs. In some cases, the price mark-up has been reported to be as high as 100 percent. Observers and practitioners also maintain that markets for the product of household and commercial systems are highly segregated and that it is unreasonable to expect that the two will come into overlapping competitive space in the foreseeable future.

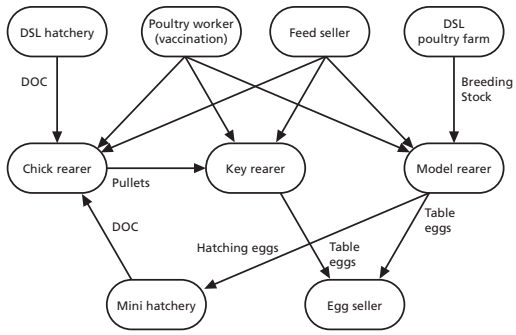
According to this view, markets for village poultry are limited to neighbourhood consumers and to rural and small urban market clusters, whereas commercial poultry is mostly focused on medium- to large-scale urban markets with sufficient scale and growth opportunities; this segregation is expected to continue to provide the necessary space for small-scale poultry to coexist with large-scale operators. While the argument may hold in some countries, there are also examples of situations in which large units have displaced small-scale production. In Thailand, for example, the share of small-scale production has gone from over 95 percent a couple of decades ago to less than 10 percent now. Indeed, even the native chickens are no longer limited to backyard production by rural households and are beginning to be produced on a large commercial scale. Export of native chickens is also being contemplated by commercial native chicken producers (Change, 2004). Thus, some native products that have been immune from foreign and large-scale competition may no longer remain so in future. Modern technology, improving physical infrastructure and aggressive marketing strategies have the potential to penetrate any market as long as there is sufficient demand and profits to be made. It appears that smallholder poultry can survive only as long as markets remain segmented.

The question of "overlapping" versus "segmented" markets for small and large produc-

ers is an interesting one, as it will define the role of public policy in protecting, promoting and expanding the market space for small producers. In areas with high poverty incidence, poor market linkages and where markets for small and large producers are highly segmented, developing market linkages can pay rich dividends in terms of enhancing poor peoples' livelihoods. But, this can also result in new competitive pressures leading to exclusion of smallholders from emerging and existing markets if they are not adequately equipped to meet the complex and dynamic demands of emerging markets. In regions where market linkages are already fairly well developed, the public policy challenge is to promote institutional innovations that can integrate small producers into the value chain (by helping them to meet food-quality and safety standards) without imposing disproportionate transactions costs. A number of such models – farmer cooperatives, producer companies, self-help groups, contract farming – have been successfully tried across the globe and have delivered good results in terms of integrating small producers into the value chain. In addition, this will also require market reform policies that encourage smallholder investment and discourage differential subsidies to large-scale operations, and provision of public goods such as research, extension and infrastructure.

The debate about "large" versus "small" notwithstanding, a number of development projects and private agencies have recognized the potential offered by small-scale poultry, either as a means of breaking the vicious cycle of poverty or as a business opportunity offered by the bottom of the poverty pyramid. Most these experiences have involved attempts to provide the institutional architecture and technological support needed to enhance productivity and to provide the necessary market linkage and service support. While there is some variation in the models across projects and organizations, most of these initiatives are geared towards ensuring a steady supply of chicks, feed and credit, as well as providing forward linkages with the market. These experiences offer important lessons for adapting/promoting institutional innovations in other parts of the world. In this paper we discuss two such initiatives from South Asia – the DANIDA, International Fund for Agricul-

FIGURE 2
Elements of the Bangladesh poultry model



Note: DOC = day-old chicks.
Source: Dolberg in NDDP/FAO (2004a).

tural Development (IFAD) and Asian Development Bank (ADB)-supported household poultry model in Bangladesh, and the Keggfarms-supported Kuroiler model in India.

4 THE BANGLADESH POULTRY MODEL: A QUICK OVERVIEW

The Bangladesh poultry model – perhaps the most widely known chicken-based development experience – evolved out of a food aid project supported by the World Food Programme and the Department of Livestock Services (DLS). BRAC (Bangladesh Rural Advancement Committee) joined the initiative partly to provide credit support; they included the poultry model in their Rural Development Programme during the years 1983 to 1986. Three smallholder livestock development projects, SLDP1, PLDP and SLDP-2, were all designed based on this model.

The model has adapted and evolved, internalizing the lessons learned from within and from similar initiatives elsewhere. In principle, the model combines packages of technical training, credit and market linkages; it emphasizes promotion of backyard poultry to target the poorest female-headed households. The model also emphasized promotion of individual entrepreneurs such as feed sellers, and egg collectors. The approach was to identify target-group households with less than half an acre (approximately 0.2 ha) of land, organize village groups, provide them with training, credit and a supply of inputs, and undertake necessary supervision and monitoring. The model consisted of an integrated system of production, marketing, input-supply and service-support subsystems. Each component of the system engaged poor households and provided necessary organizational support. Most of the activities were carried out by the women themselves. The key players in the system included: (i) poultry extension workers – who provided vaccination, some basic treatment, and advice on poultry management; (ii) poultry rearers – the target group for the project, who reared layers and broilers in their backyards; (iii) chick rearing units – which reared day old chicks to six weeks; (iv) feed sellers – who provided supplementary feed; and (v) egg collectors who provided the link with market.

The model has been documented extensively in the literature. Therefore, this paper avoids repeating specific details. Essential elements of the model are illustrated in Figure 2 and Box 1. Evaluation studies of household poultry projects in Bangladesh and other countries have demonstrated that the approach has a pro-poor bias, has a significant impact on the economic and nutritional status of the poor – especially women and girls, and has a favourable benefit–cost ratio. For example, Haque (1996) reported a benefit–cost ratio of 3.1:1 at the level of the household, and close to 4:1 for the key rearer (Table 2). Encouraged by these results, new pilots based on the model have been tested in a number of countries including Benin, Burkina Faso, Eritrea, Kenya, Malawi, Senegal, South Africa, the United Republic of Tanzania, Viet Nam and Zimbabwe. Studies from various parts of the world have also shown that household poultry production has a much greater outreach to the poorest households and can therefore be an effective targeting tool.

Critics have raised questions about the sustainability of the Bangladesh model after withdrawal of donor support (see for example, Riise *et al.*, 2005a). Still, it remains beyond doubt that the experience has demonstrated the potential offered by smallholder poultry to enhance the livelihood security of the poor. Suffice it to say that the sustainability of the model is an area of genuine concern, which in turn depends on the economic environment and support systems.

BOX 1
Beneficiaries in the Bangladesh poultry model supply chain

Model Breeder – Small low-cost parent farms with a breeding stock of about 50 Fayoumi hens and the requisite number of RIR cocks received either from the project site or directly from government poultry farms. These were raised under a semi-scavenging system with balanced rations for producing high-quality fertile eggs for hatching. These eggs were to be sold to mini hatcheries and to key rearers who would hatch them under local broody hens.

Mini Hatchery – Small low-cost hatcheries operated with solar energy and kerosene stove. Each hatchery had a capacity to hatch 1 000 chicks per month. The day-old chicks were sold to the chick rearers and key rearers.

Chick Rearer – Small rearing farms with a capacity of 200–300 chickens per batch and four batches per year. The chickens were reared in low-cost houses from one day old to eight weeks of age. These chickens were fed with balanced feed and sold to key rearers at about eight weeks of age.

Key Rearers – Small farms with about five cross-bred layers for the production of table eggs. The hens were kept under semi-scavenging conditions with 30–70 percent supplementary feed. Additionally, four local hens were kept to hatch eggs, preferably from model breeders, and rear chicks from mini hatcheries.

Poultry Workers – A number 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 for the poultry.

TABLE 2
Benefit–cost ratios for various players in the Bangladesh poultry model

Activity	Benefit–cost ratio	Percent poverty alleviation*
Chick rearer	1.29:1	31.67
Key rearer	3.86:1	28.59
Model rearer	1.52:1	32.50
Mini hatchery	1.60:1	00.00
Feed seller	1.06:1	25.00

* Percent households below the poverty line without the model (control) — percent households below the poverty line in model area.
Source: Haque *et al.* (1996).

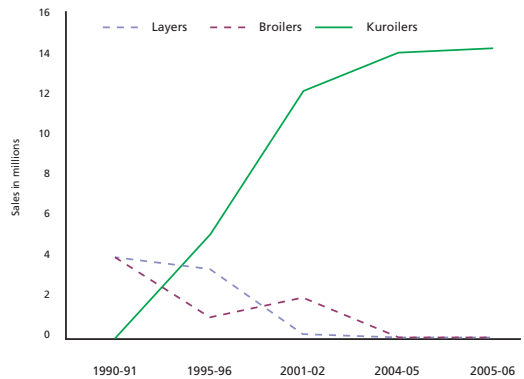
5 THE KUROILER: A BIRD OF HOPE?

Faced with increasing competition from large-scale integrated transnational poultry production units, Keggfarms – a small-scale company on the outskirts of New Delhi – decided to venture into the rural market and exploit the potential offered by backyard poultry, for its own survival. After an intense study of poultry-husbandry practices in rural India, the company decided to breed a dual-purpose bird which would be as hardy as a local village bird, but would nonetheless produce many more eggs and grow significantly faster. In addition, it had to retain the feather colours for camouflage, be sufficiently agile to run away from predators, and be as disease resistant as the local birds.

Keggfarms launched the "Kuroiler" = "Kegg + Broiler" in 1993 and sold more than a million day-old chicks in the first year.[5] By 2005–2006, the number had already reached the 14 million – a phenomenal annual growth rate of almost 22 percent sustained for more than a decade. The bird completely transformed the company in terms of geographical presence, clientele, distribution channel and so on. It shifted its operations from agriculturally prosperous areas to areas with a high incidence of poverty and vulnerable livelihoods. The company which had been in the commercial broiler business for more than three decades, completely phased out broilers and layers by 2005/2006 (Figure 3). Most important of all, however, the Kuroiler emerged as the "bird of hope" for hundreds of thousands of extremely poor families with little or no other support for sustaining their livelihoods.

Estimates of how far the Kuroiler has travelled are imprecise at best. Recent reports (DVAHEE, 2006) suggest that the Kuroiler has already touched the lives of about a million households in some of India's poorest regions. Kegg supplies its day-old chicks to 1 500 mother units across the states where it operates – directly or through its appointed deal-

FIGURE 3
Sale of day old chicks by Keggfarms: 1990/1991 to 2005/2006

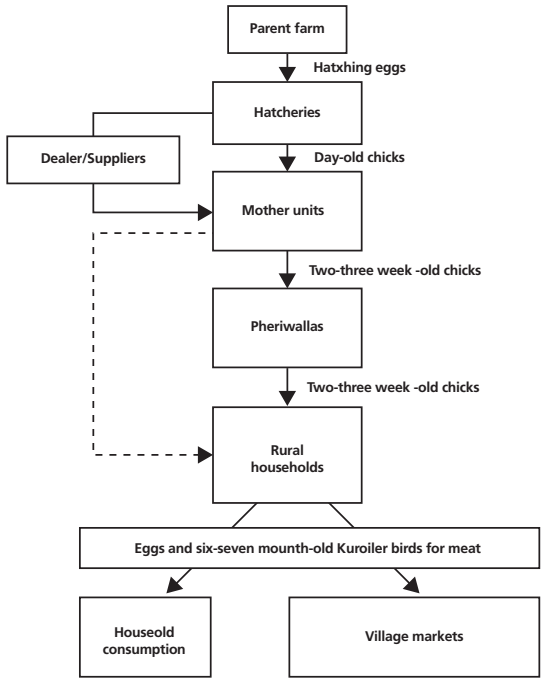


[5] The "K" in the Kuroiler also derives from "curry", the generic term for spice mix and the style of Indian cooking. Due to the hardy character of Kuroiler meat, it takes a little longer to cook, allowing the "curry" to permeate deep inside the meat, giving it a distinct taste and aroma specially suited to the Indian palette.

ers/suppliers. The mother units are operated by local entrepreneurs who keep anywhere between 300 and 2 000 birds at one time. They rear the day-old chicks up to about three weeks of age, vaccinate them if necessary, and then sell them to vendors (pheriwallas). Pheriwallas then travel to villages and sell the chicks to households at the price of about Rs 20 (US$0.5) per chick. Typically, the mother unit entrepreneur and the pheriwallas make a profit of approximately Rs 3 per bird. Finally, the rural households make Rs 250–300 (US$6.5–7.5) per month as supplementary income.[6] They trade in the eggs and also sell the birds for meat (see Figure 4 for a schematic representation of Kegg's distribution channel).

As Kuroiler day-old chicks are raised to two to four weeks of age at the mother units before being sent to village households, the husbandry, nutritional and health practices observed at mother units play an important role in the efficiency of these units and the performance of chicks down the chain. Thus, operators of mother units need training in basic brooding, husbandry and health practices. Keggfarms provides this training, either through its field staff – most of whom have prior husbandry exposure – or through structured courses in mother-unit management. When needed, Keggfarms sends experienced hus-

FIGURE 4
Kuroiler distribution channel



[6] Measured in purchasing power parity dollars, monthly income from Kuroiler raising will be approximately 32–35 dollars.

bandry personnel from its units to advise field staff on any problems that may have arisen. Additionally, field staff also provide commercial guidance to mother units, when required, with regard to sourcing/quality of feed, medicine, vaccines, market knowledge, etc.

Because of the fragmented and remote nature of beneficiary households, Keggfarms is unable to maintain any active contact or out-reach to the village households that rear poultry from three weeks onwards. This represents a critical gap, and provides an important avenue for public–private partnership related to the public-health and poverty-reduction implications of household poultry. Although this remains a critical gap, the fact that Kuroilers are performing efficiently in village conditions is now well demonstrated by the ongoing and increasing demand for them. As a policy, Keggfarms does not supply day-old chicks to villages, as this would result in huge "infant" mortality. When birds are sent at two to four weeks of age, the liveability improves dramatically.

Sustainability of the Kuroiler model derives from the interdependence of livelihoods at all levels – like the Bangladesh model in the ideal case. Sustainability of pheriwallas depends on sustainability at household level. Sustainability of mother units depends on pheriwallas; finally the sustainability of Keggfarms depends on that of all those in the chain. Unlike externally supported rural poultry projects, everyone in the Kuroiler chain is independent, and yet their livelihoods are dependent on each other. This characteristic of the Keggfarms model prompted the jury of "Business India Innovation Awards" to note that "[The business is] sustainable because it has created rural entrepreneurs. A great deal of scalability happens when such entrepreneurship is created."[7]

With regard to the threat of competition from larger players and other risks posed by public health and biosecurity considerations, the company believes that given the very different nature and characteristics of large-scale commercial and small-scale household production systems, the two systems are likely to continue to operate in segmented markets. Further, it is argued that the public-health risks posed by large-scale commercial systems are far greater than household-based village poultry production due to inherent resistance to diseases, biodiversity provided by the mixed gene pool in local birds, and the scattered nature of production; this minimizes, if not eliminates, the risk of large-scale outbreaks. Effective control measures taken by the Government of India in rapidly containing the recent outbreaks (instead of blaming backyard poultry production) demonstrate that well-orchestrated public–private partnership in disease prevention and control can contribute substantially towards minimizing public health risks emanating from small-scale scattered poultry production (see also Otte *et al.*, in FAO, 2006c and FAO, 2007).

No systematic study has yet analysed the economic and livelihoods impact of the Kuroiler[8]. However, crude "back of the envelope" calculations suggest that a household unit with approximately 20 birds can get additional cash income of Rs 500 per month. For an agricultural labourer earning anywhere between Rs 1 000 to Rs 1 500 per month, this additional cash income is an immense support. Similarly, the pheriwalla, with an initial

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[7] Kegg Farms was recently conferred an "Innovation for India" award in Social (Business) category (http://www.businessworld.in/content/view/729/784/).

[8] A detailed household survey of households, mother units, pheriwallas, and selected dealers and suppliers was underway

capital outlay of a bicycle and a basket to hold the chicks, and a working capital of about Rs 2 000 to purchase the chicks, could generate a net profit of about Rs 6 000 per month – more than twice that of a family living below the poverty line.

6 FUTURE CHALLENGES FOR SMALLHOLDER POULTRY AND THE POLICY RESPONSE

Most backyard poultry production systems have little in the way of linkages with formal value chains. But with retailing undergoing rapid transformation in a large number of developing countries, especially in Asia, there is potential and opportunity for linking these small backyard producers to larger markets via more formal value chains. However, that would also bring small producers and industrial poultry into more overlapping competitive space, raising questions about cost competitiveness and sustainability. This would also perhaps raise costs of complying and competing in the increasingly safety- and quality-conscious market. In such a context, as noted above, the big policy question pertains to the integration of small-scale commercial poultry production systems into expanding value chains and the required policy interventions – such as promotion of farmer organizations (cooperatives, producer companies, contract growers, etc) – to increase opportunities for small producers and to minimize pains during transition to large-scale poultry production. Recent studies have shown encouraging results with regard to private companies developing newer models to integrate small producers into the value chain instead of displacing them.

The main challenge for small-scale/rural poultry is, therefore, organizational not technical. It is important to continue to promote village poultry to contribute to household nutrition security and livelihood support, but concerted efforts must be made to find organizational solutions to minimize public-health risks and provide appropriate extension support on issues like disease prevention, predation and improving hatchability. Unfortunately, most government extension programmes in developing countries are not oriented towards addressing the needs of poor households. Further, although there are a large number of NGOs that are much closer to the people, development of household poultry enterprise does not appear to be on the agenda of many of these organizations. Similarly, some private-sector organizations (such as Keggfarms in India) have invested significantly in the development of fast-growing and more productive birds that do not require significant additional inputs, and have also made sufficient investment in developing the distribution network for birds. However, extension and public health support systems continue to be a weak point, increasing vulnerability to exogenous shocks.

In this context, significant investment in capacity-building and empowerment of village communities can promote change and technology adoption, and establish the foundation for village-based, farmer-to-farmer, livestock extension mechanisms. Many minor services like vaccination of day-old chicks and timely protection against poultry diseases are inaccessible to the poorest groups (especially in marginal areas); several rounds of vaccinations during the year are possible only if the relevant skills are available among farmers themselves. It would therefore be essential to impart skill training to farmers to promote self-help and

[9] At the time of writing this paper.

self-reliance for individual and community benefit. Thus, the real challenge appears to be to develop functioning partnerships between community-based animal health workers, NGOs, private-sector enterprises and government animal health support systems.

The bigger question, of course, is how does one promote small-scale poultry, and what sort of policy and organizational support may be necessary to nurture these enterprises? In areas where there is already a good tradition of backyard poultry, the requirement may be to systematically identify constraints and facilitate provision of support services. This, in turn, requires study of the entire production system, market chain, profitability and suitability of resources. It is also important to focus research on the aspects of the market and institutional environment that are changing, and on how these changes are likely to affect the poor. Once some understanding is established in this respect, it will be necessary to initiate a dialogue with influential agencies to put in place the required support mechanisms while ensuring that the process is interactive and inclusive. It is important that small-scale poultry is seen as an integral item in the menu of livelihood options, both by practitioners and policy-makers.

Where there is no tradition of household poultry, it is perhaps better to start in areas where there is already some awareness of the activity. Organizational support for organizations that have local credibility and are already engaged in livelihood-support activities will also be critical. Once again, additional efforts may be required to introduce smallholder poultry as an additional option for livelihood support. What needs to be understood in this case, however, is that poultry may not be the only entry point for poverty alleviation. There are certainly other entry points available; it is important to establish a menu of entry points, and identify those that are most appropriate for the specific circumstances.

Role of the government and other stakeholders: There is poor awareness among governments of the potential of smallholder poultry in supporting poor peoples' livelihoods. That is one reason why government support for promotion of this activity is often poor. It is, therefore, necessary to raise awareness about this option while ensuring that the government does not overwhelm and crowd out others. In this context it is also necessary to identify organizations that have already established some trust and credibility with local communities, and use these organizations as a catalyst for promoting action. At the same time, it is necessary to nurture powerful alliances, including academia, which can discuss smallholder poultry activities and can influence the opinion of government and the political establishment. International agencies such as FAO, and the United Kingdom's Department for International Development (DFID), can aid in this process by providing credibility to activities such as those promoted by BRAC and Keggfarms.

Need for a common platform: There is a need to organize a series of meetings and workshops to sensitize decision-makers, politicians, bureaucrats, technocrats, policy-makers and planners of pro-poor programmes. This sensitization must be based on hard data. It is also necessary to involve people who write Poverty Reduction Strategy Papers, Human Development Reports, policy documents, etc. International organizations such as FAO with a mandate to promote global exchange of information, collection, analysis, interpretation and dissemination of data, and national and international technological, social and economic research, can play a significant role in this context.

Capacity-building: Organization of support services and input supply is a critical ele-

ment of any model that attempts to link smallholders with output markets. This requires support from people with strong organizational skills. Thus, appropriate capacity-building measures must become an integral part of interventions that design and implement livelihood-support options such as backyard poultry. Successful projects such as those implemented by BRAC and Keggfarms can be a resource for this training. Similarly, government and NGOs can provide technical training.

Linking with microcredit: Microfinance organizations and self-help groups may help with credit to finance important expenditures. Establishment of strong linkages with microcredit organizations must, therefore, be seen as an integral component of all livelihood-support interventions, including household poultry. Besides facilitating access to credit, credible microcredit organizations and self-help groups can also help rationalize interest rates.

Data and analytics: Finally, the database pertaining to poultry production is extremely weak and seriously hampers the analytical work necessary to support decision-making. There are significant discrepancies even in the basic production and price data put out by the government, private agencies, and international organizations. Generation of accurate data is critical for informed policy decisions, and concerned agencies should seriously deliberate the possibility of creating a common information system for livestock products, including poultry.

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Village chicken production systems in Thailand

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SUMMARY

This paper reviews information on village chickens or Thai indigenous chickens (TIC) in Thailand, describing their production systems, management, conservation and utilization. TIC have been part of Thai farmers' way of life for centuries. Throughout this time, TIC production systems have been sustainable and have given rise to few problems. Currently, about 6 million households, or 50 percent of Thais, keep TIC at home. Each family produces 30–50 birds of marketable size annually, which represents 100–120 million birds for the country as a whole. These chickens are from parent stocks consisting of one cockerel and three to five hens per household. Flock size varies through the year, as it depends on the hatching rate, the availability of natural feed, the effects of endemic diseases, and the amount of time that the farmers have available to take care of their birds. Periods of seasonal change are critical times of high mortality; about 30–70 percent of birds in a flock die annually.

Although TIC productivity is very low compared to commercial breeds, attempts to increase production by using new techniques have not been successful. This is a lesson that has been learned in the past decades. However, introduction of high-performance TIC cockerels may be possible. About 50–70 percent of TIC raised in the villages are for home consumption; the rest are for sale to provide cash income. Few are used for cultural and religious activities.

Demand for TIC meat is generally higher than supply, as people regard TIC meat is tastier and healthier than broiler meat. Other good characteristics of TIC, including disease resistance, tolerance of heat stress, and good maternal ability, are heritable and need to be conserved. Appearance and plumage colours are major criteria for TIC classification. Out of 17 groups of TIC, four have, since 2001, been targeted and established for village-level and commercial-scale utilization. A cross-breed known as Kai Baan Thai (Thai village chicken), sired by TIC with exotic breed hens, and raised on a commercial scale, is a new product with good potential for high-end niche markets.

Since the avian influenza (AI) outbreaks of 2004, some 20 million TIC have been destroyed, as they were blamed for carrying the disease. Six measures for the prevention and control of AI outbreaks were launched immediately by the government, with positive effect. Education of the farmers regarding AI has continued; this is not only to reduce the

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risk of AI, but also to prevent other endemic diseases and parasites.

Key words: Thai, indigenous, chickens, Kai Baan Thai, production systems, Thailand

1 INTRODUCTION

Thailand is situated in the mainland Southeast Asia, lying between 5° to 20° North and 97° to 105° East. The country's area is 514 000 km^2; about 70 percent of which is used for agriculture. The climate is tropical with relatively high temperatures (24–36 °C) and high humidity (66–83 percent). The population is 65 million; with on average 5 people per household. Nearly 6 million households, mostly smallholders, are in the rural areas. Most of them traditionally possess indigenous chickens (Choprakarn, 2007).

Village chickens or Thai indigenous chickens (TIC) *(Gallus gallus domesticus)* have been Thai people's way of life at least since the time of the Ayutthaya Kingdom some 400 years ago (Choprakarn, 1976). This can easily be seen throughout the country. TIC are a source of food protein and quick cash income; they are used in leisure pursuits and as offerings in various rituals and ceremonies. They also play an important role as consumers or yard cleaners in the rural area ecosystem by converting leftovers and agricultural by-produce into meat. These roles make TIC a unique part of the everyday lives of the Thai people. Nonetheless, TIC are still at the bottom of the list of farmers' economic priorities (Choprakarn, 1988; Haitook *et al*., 2003; Klinhom *et al*., 2005; Laopaiboon *et al*., 1999; Namdaeng, 1991; Phalarask, 1985; Simaraks *et al*., 2007).

Most Thai farmers prefer TIC to imported exotic breeds, even though TIC have comparatively inferior egg and meat productivity. This is because TIC can survive under very harsh conditions and still reproduce regularly even with minimum care and management (Choprakarn *et al*., 1998a; Klinhom *et al*., 2005; Laopaiboon, 1990; Laopaiboon and Jitpraneechai, 1999).

About 100–120 million TIC of marketable size are produced annually. This comprised 10 percent of chicken-meat production in Thailand before the avian influenza (AI) outbreak of 2004 (Choprakarn *et al*., 1998a). It is reported that since this outbreak, AI has led to the death or slaughter of almost 20 million TIC (Department of Livestock Development, 2005). The loss of genetic resources is a major concern, and there is urgent need to find ways to save these resources from subsequent AI outbreaks. Many measures and ideas have been tried and proposed, with wide acceptance from other countries and World Organisation for Animal Health (OIE) (Lekchareonsuk *et al*., 2006).

This paper draws on both published and unpublished papers to review village TIC production systems, along with research and developmental work, and the conservation and utilization of these genetic resources. It also discusses prospects for the future.

2 MANAGEMENT SYSTEMS

Throughout the country, TIC are generally raised under free-range conditions. However, in the case of fighting cocks, production is much more intensive. Most smallholders employ a "low input/low output" system which is appropriate to their local conditions, while a few farmers (less than 10 percent) keep their chickens semi-intensively to supplement their incomes. Only a very small number of commercial farms exist, serving niche markets. For clarity, this paper focuses mainly on TIC production for meat and at the village level.

Most Thai farmers, generally, keep their TIC in the backyard. But some farmers may take their birds to the fields when endemic diseases break out in the villages and/or during crop growing and harvesting seasons. Chickens are penned to protect them from predators and/or thieves at night. A pen is usually located under a rice storage for ease of construction; if it stands alone it will still be close to the house. TIC are fed twice daily, in the morning and evening, mostly by women. Chickens can move freely with their flock scavenging around for edible insects, seeds and fresh plant parts. In most cases, there are no vaccination and de-worming for TIC; but some farmers may have local herbs for prevention and/or curing (Choprakarn *et al*., 1983; Klinhom *et al*., 2005; Laopaiboon, 1990). This practice tends to satisfy the farmers involved.

A family generally keeps one rooster with three to five hens to form a flock, annually. This helps to maintain pecking order and reduce fighting in the flock. In a year, such flocks can produce up to 90–150 day-old chicks, equivalent to 30–75 marketable birds of 1.0-1.5 kg body weight at four to five months of age (Choprakarn *et al*., 1983; Choprakarn *et al*., 1998a; Laopaiboon and Jitpraneechai, 1999; Namdaeng, 1991).

The number of chickens per household varies greatly depending on time of the year and capacity of the farmers. From October to February (cool and dry), the number of day-old chicks running around is at its greatest, and the chicks' growth rate is also high. This is because of the higher hatching rate, and the availability of plenty of natural feeds and of crop by-products. However, the numbers tend to decline from March to September (hot and humid) due to low hatching rate, shortage of natural feeds, endemic diseases, and internal and external parasites (Choprakarn *et al*., 1998a; Klinhom *et al*., 2005; Laopaiboon; Jitpraneechai, 1999).

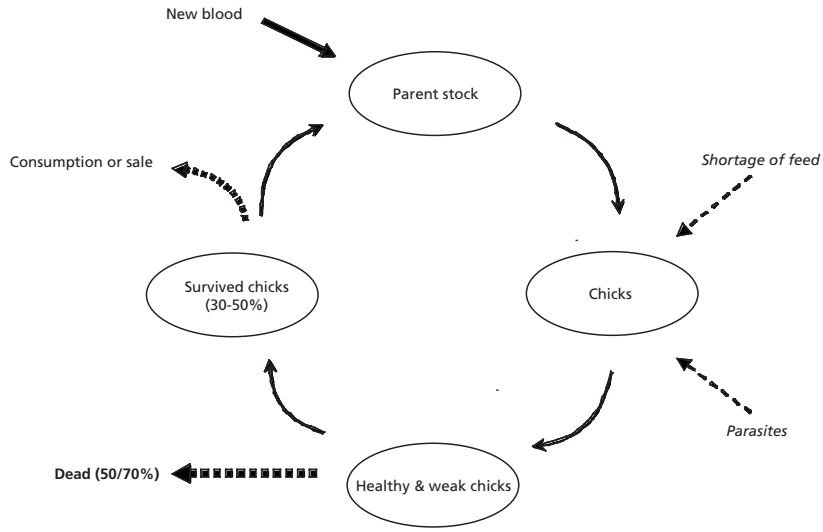
Demand for TIC is high during May to June and November to January; market-sized chickens are needed as food for farmers working in the fields during the crop cultivation and during harvesting seasons, respectively (Choprakarn *et al*., 1983; Choprakarn *et al*., 1984; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999; Namdaeng, 1991).

TIC parent stocks are used up to 2–3 years old depending on their performance. The next generation of chickens may descend from the same flock or be introduced from within or outside the village. Recommendations for parent-stock selection are, for males, high body weight and long legs, and for females, good maternal ability, i.e. producing at least 9 eggs/clutch, good behaviour during incubation and when taking good care of her broods. Another important criterion for parent stock is no cannibalism of their own chicks (Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999; Namdaeng, 1991).

The survival rate of TIC, from one-day old to marketable size, is 30-50 percent. Therefore, a typical hen can produce 10–15 market-sized birds annually (Choprakarn *et al*., 1983; Choprakarn *et al*., 1984; Namdaeng, 1991).

The general picture of the TIC production system is summarized in Figure 1.

FIGURE 1
Raising indigenous chickens by Thai farmers under traditional system



Source: Choprakarn *et al.* (1983).

3 POULTRY GENETIC RESOURCES

It is accepted by Thai researchers that Cochin Chinese and Burmese Red Jungle Fowl are the ancestors of TIC. The former is generally found in the east and the northeast of Thailand, while the latter are common in the east and the north (Royal Institute, 1995).

TIC are widely used as parent stocks throughout the country. They are primarily classified by appearances, especially their plumage. Male chickens are more colourful and also grow faster than females. Male plumage is mainly black, but the dorsal plumage on their necks, hackles, backs, saddles, and wings are in different colours such as yellow, green, dark brown, reddish brown, and/or white. Female feathers are basically black, dark brown, and/or brown; except for the Kai Chee (literally means "nun chicken") with all white feathers. Combs are usually pea, single, and/or rose. Shank colours are white, yellow, and/or black in both males and females. Currently, 17 groups of TIC have been categorized according to their feather colours (Reodecha and Choprakarn, 2005). More detailed information on their genetic make up relating to disease tolerance, maternal ability and economic traits is needed.

The behaviour of both sexes of the TIC is almost the same as that of wild fowls. Aggression is common, in order to protect themselves or their broods from predators and enemies. Maternal ability of the females is high during nesting, egg laying and brooding. Although these behaviours are not desired for commercial-scale production, and are culled out, they must be conserved in the TIC kept under rural conditions (Choprakarn *et al*., 1998a).

Under good management (high inputs), TIC productivity is very low compared to exotic breeds. However, under rural area conditions (low inputs), TIC perform much better (Laopaiboon, 1990; Phalarask, 1985).

Female and male chickens enter maturity at 6–8 and 8–12 months of age, and with 1.4–1.8 and 1.8–2.3 kg body weight, respectively (Choprakarn, 1988; Laopaiboon, 1990). Mating occurs at any time of the day, but is most frequent during early morning and evening (Choprakarn *et al*., 1998b; Klinhom *et al*., 2005; Phalarask, 1985).

A female TIC lays 3-4 clutches of eggs yearly. It takes 2 weeks for laying, 3 weeks for hatching, and 6–10 weeks for taking care of her broods. Thus, a hen spends 10–15 weeks for each reproductive cycle (Choprakarn, 1988; Choprakarn *et al*., 1998b; Katawatin *et al*. 1996; Phalarask, 1985). The time period of a hen's reproductive cycle depends on two main factors; feed and body weight. A hen needs good quantity and quality feed; and should reach at least the previous body weight before entering the next reproductive cycle (Boonlear, 1989; Choprakarn, 1988).

A hen lays 10–12 eggs/clutch. The hatching rate is 80–85 percent, higher in the cool season and lower in the hot and rainy season. Consequently, a typical hen produces 25–40 day-old chicks annually (Boonlear, 1989; Choprakarn, 1988; Klinhom *et al*., 2005; Phalarask, 1985).

Egg weight and body weight of day-old chicks are in the range of 45–55 and 33–35 grams, respectively. Growth rate of a chick is 7–10 grams/bird/day – highest between 12 and 14 weeks of age, then it tends to decline. A TIC takes about 4–5 months to reach marketable size with a 80–85 percent carcass (Choprakarn, 1988; Phalarask, 1985).

Local consumers consider TIC meat to be fine in texture and to have more flavour and less fat than the exotic breeds (Itarapichet *et al*., 2003; Jaturasitha *et al*., 2002; Wattanachant *et al*., 2004). This makes TIC a tasty and healthy chicken. TIC are more heat tolerant (Aengwanich, 2003; Tirawattanawanich *et al*., 2005) and are more resistant to common diseases such as Newcastle disease, fowl cholera and fowl pox than are exotic breeds and cross-breeds between TIC and exotics (Ratanasethakul and Laopaiboon, 1982; Ratanasethakul *et al*. 1983; Ratanasethakul and Boon-eg, 1989; Ratanasethakul *et al*., 1984a). To conserve and utilize these traits, research is being carried out on frozen semen (Vongpralab *et al*., 2007a and Vongpralab *et al*., 2007b) and genetic markers (Mekchay *et al*., 2005; Mekchay *et al*., 2006; Singhapol, 2003; Siriphonvat, 1995).

4 FEED AND FEEDING SYSTEMS

There are two styles of feeding for TIC; chickens may be fed by the farmers and/or scavenging around on their own. In the first method, chickens are given broken rice, rice bran, ground corn kernels, and/or cassava chips, depending on crops available, usually in the morning and evening. The amount of feed given is generally not enough for the birds' energy requirements, especially during the crop growing and harvesting seasons, as the farmers go to the fields early in the morning and return late in the evening. It is, therefore, suggested that, where there is plenty of natural feed, it might be better to feed TIC only once, in the evening. Doing this would force the chickens to scavenge extensively and save some inputs (Choprakarn *et al*., 1983; Choprakarn *et al*., 1984; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999; Phalarask, 1985).

Some farmers provide extra protein sources for their chickens by using termites and house-fly larva, but this is not convenient. A more practical method is by putting up light bulbs at night in the backyard to attract insects. This not only brings in a lot of insects as

chicken feed, but for human food as well. Moreover, insect pests attracted to the light can be destroyed, saving crops from damages (Choprakarn *et al*., 1983; Klinhom *et al*., 2005).

Another feeding method for TIC is to use household waste products, together with natural feed available around the homestead. Most natural feeds are composed of high levels of protein, vitamins and minerals. The quantity and quality of these feeds depend on location and season; there are plenty in the wet seasons but they are very scarce during dry seasons (Choprakarn *et al*., 1983; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999).

The most common natural feeds are earthworms, worms, termites, insects and plant leaves. Cattle ticks and manure are also sources of high-quality protein for chickens; the more scavenging by the chickens, the fewer ticks and less dry manure left on the ground (Choprakarn *et al*., 1983; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999). This not only helps cattle to stay healthy, but also reduces odour in the vicinity. It should be noted that termites are rarely found on the ground around farmers' houses, this is because the TIC are good predators of termites.

Scavenging also affects the chickens' health and survival rates, as waste products are the main sources of the bacteria and parasites that affect the birds all year round. Unexpectedly, young chicks tend to eat rubber bands, and once inside their gizzards, these rubber bands severely affect the digestion system (Kunjara and Sangvaranonda, 1993; Kunjara and Sangvaraononda, 1997; Ratanasethakul and Laupaiboon, 1986; Ratanasethakul *et al*., 1984b; Sukprasert *et al*., 2006).

At present, the scavenging area for TIC is tending to become more limited as houses take up previously available land. This, therefore, affects the quantity and quality of natural feeds available to the chickens. Consequently, numbers of free-range TIC are expected to be lower in the future.

5 MARKETING SYSTEMS

TIC are consumed mostly by their owners, relatives, and friends. It is estimated that 50–70 percent of TIC are eaten at home during times of food shortage, when guests are visiting, and at crop planting and harvesting times. Eggs are usually saved and hatched to produce new chicks. Non-fertile or un-hatched eggs are considered a specialty in some areas (Choprakarn, 1983; Haitook *et al*., 2003; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999).

Marketing systems for TIC can be divided into three levels; there are person-to-person purchase in the villages, wet (fresh) market in towns, and seasonal markets elsewhere (Choprakarn *et al*., 1998a).

Person-to-person purchases in the villages involve a direct contact between buyers and TIC farmers. These purchases occur when some villagers have guests visiting or a food shortage. This marketing system is occasional or seasonal, but significant. Chickens are sold live and the bird size varies from young, 1 kg body weight, birds up to old parent stocks (Choprakarn, 1983; Klinhom *et al*., 2005).

In the case of wet (fresh) markets in towns, the farmers carry their TIC to the markets very early in the morning. The number of chickens brought by a farmer ranges from three

to ten birds. The desired weight is 1.0–1.5 kg/bird; if heavier, the price tends to go down due to the inferior, tougher, meat texture. In general, prices of female chickens are higher than those of males due to better meat texture and flavour. Some farmers sell live birds directly to the consumers, while others sell slaughtered-cum-dressed birds, with or without viscera. A number of farmers may sell their chickens to the local slaughterers. Supply of TIC to these markets is not regular, and depends on the farmers' circumstances. Most farmers often sell their birds when they need cash or get sick and/or the flock is too crowded. Otherwise, they will keep their birds in the flock. Thus, TIC can be viewed as the farmers' "piggy bank" (Choprakarn, 1983; Choprakarn *et al*., 1998a).

Seasonal markets happen at special occasions, such as a few days before Chinese New Year's Day. There is a very high demand of TIC throughout the country at this time of the year. A few weeks earlier, intermediaries will collect mostly black-plumage female chickens of about 1 kg body weight. Birds are dewormed and fed full feed so that they reach marketable size. The chickens can then be sold for a price that is at least twice that obtained at normal times of the year. However, this seasonal market is facing uncertainty following the major AI outbreaks. The activity is limited by the government's AI prevention measures introduced in order to reduce the outbreak area (Choprakarn *et al*., 1998a).

TIC is one of a very few agricultural products that never face price problems. This is because of its high meat quality which results in high demand, while the supply is always low. In general, the price of TIC is about 1.5 times higher than that of broilers. However, most smallholders do not increase their production, as the practices do not fit well into their way of life and local conditions.

6 POULTRY HEALTH AND HEALTH CONTROL SYSTEMS

Newcastle disease, fowl cholera and fowl pox account for 30-100 percent of the mortality rate of TIC annually. Occurrence of these endemic diseases depends on the time of the year. Newcastle disease, the most serious for all ages of chickens, occurs during seasonal changes from cold to dry and from dry to wet seasons. Fowl cholera, the second most important disease, affecting mostly 3 month old chicks, occurs only in the dry season. Fowl pox can be found all year round in young birds. Another disease of young birds, infectious coryza, is common in both wet and cold seasons. Although fowl pox and infectious coryza do not cause immediate death, they weaken the chickens. This, subsequently, makes the chickens vulnerable to other diseases, and death often follows (Ratanasethakul and Laopaiboon, 1982; Ratanasethakul *et al*., 1983; Ratanasethakul and Laopaiboon, 1986; Ratanasethakul and Boon-eg, 1989; Ratanasethakul *et al*., 1984a).

When endemic diseases occur, some farmers move their chickens to the crop fields far from the villages. This reduces the chicken mortality rate to some extent. In some areas, villagers are encouraged not to bring commercial broiler meat in. They are afraid that the meat brought in may carry diseases (Choprakarn *et al*., 1983; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999; Namdaeng, 1991).

External and internal parasites are common in TIC. Although they do not cause death directly, they affect the hatching and growth rates of the birds. When a hen gets external parasites, mostly in the summer, she will spend less time in the nest. Thus, nest temperatures are lowered. The majority of external parasites are *Menopon gallinae, Megninia* spp.,

and *Echidnophaga gallinacea* which affect the hatching rate and young chicks (Ratanasethakul and Laopaiboon, 1986; Sangvaraononda, 1993). Young chicks will be weakened and vulnerable to other diseases and death often follows. In the case of internal parasites, chicks can easily be infected within a few weeks of scavenging on the ground, especially in the rainy season. These parasites include *Ascaridia galli, Raillietina echinobothridia*, and *Oxyspirura mansoni* (Kunjara and Sangvaraonononda, 1993; Kunjara and Sangvaraonononda, 1997; Ratanasethakul *et al*., 1984b; Sukprasert *et al*., 2006).

Traditionally, vaccination is not practised in the TIC production system, except in a limited number of villages where there is research work and/or extension programmes implemented by various agencies (Kwaengsopha, 1989; Simarak *et al*., 2007). However, most farmers can identify the differences between Newcastle disease and fowl cholera, and also point to the time of outbreaks. Some farmers, especially those close to town, use human medical supplies for their chickens' health programmes. These include antibiotics to treat respiratory diseases and insecticides for external parasites. Herbs available locally such as *Andrographis paniculata, Curcuma longa, Stemona tuberose, Tinospora crispa, Cymbopogon citratus, Nicotiana tabacum, Ocimum tenuiflorum, Psidium guajava* and *Areca catechu* are very popular among farmers to keep their birds healthy. These herbs are used quite satisfactorily for disease prevention and/or internal/external parasite eradication (Klinhom *et al*., 2005; Sukprasert *et al*., 2006).

A few decades ago, some farmers in the remote areas might have cooked dead chickens for food, as they did not have any idea about the detrimental effects. However, nowadays, birds that die of disease are well disposed of (Choprakarn *et al*., 1998a; Klinhom *et al*., 2005).

Even though a large number of TIC throughout the country were destroyed in 2004 as a result of the AI outbreaks, farmers take only about six months to restock chickens in their backyards. It is very easy to obtain parent stock from the neighbourhood or from other villages. This population elasticity is another advantage of TIC (Simarak *et al*., 2007).

During early AI outbreaks, farmers did not understand clearly about the virulent nature of the disease, and could not identify the differences between fowl cholera and AI. The Thai government immediately issued six major standard measures to control AI outbreaks. These included surveillance, movement control, stamping-out and pre-emptive culling, and disinfection and carcass disposal. Ongoing measures to educate the farmers via public media, and by local staff at farm level, are very effective. This education makes farmers take more care of their TIC, especially when they observe sick birds in the flocks. The measures not only benefit AI control, but also enhance the control of other common diseases (Lekchareonsuk *et al*., 2006).

7 CULTURAL ISSUES

Thai people in rural areas are predominantly farmers or their occupations are related one way or another to agriculture. However, most young people from these areas prefer to seek work in towns or cities. Some of them may come back home as farm labourers during crop growing and harvesting times, but most of them need to visit home during important festivals like the traditional Thai New Year's Day in April. These seasonal economics and social activities result in an extra demand for food, and the most convenient source is TIC

in the backyard. This encourages more than 90 percent of farmers to have TIC of their own (Choprakarn *et al*., 1983; Haitook *et al*., 2003; Klinhom *et al*., 2005; Laopaiboon; Jitpraneechai, 1999).

TIC – like rice – are part of the Thai farmers' way of life; both have been with the farmers for a very long time. The farmers' attitude towards their chickens is similar to that of people who keep dogs or cats. In terms of economics, TIC are much more beneficial. They are food for the farmers, a piggy bank at home, and can be used for cultural and religious activities (Klinhom *et al*., 2005).

Eggs, precursors of birth and symbols of life, are an essential part or ingredient of many Thai offerings and sweets used in many rituals and ceremonies. Boiled eggs are an important part of decorative flower baskets used in many ceremonies, ranging from welcoming the birth of a child to weddings. In some instances, a boiled egg is shelled and then cut into halves; the outer egg white and then the inside texture is examined carefully. Then the future is told, to satisfy or warn those involved. In some places, people may make a wish together with putting an egg upright on its end; when this is done, a wish is likely to be accomplished. In some remote areas, a raw egg is used to indicate the burial site for the dead (Klinhom *et al*., 2005).

Cock-crow early in the morning is still used as alarm call for the villagers. In some areas, it is said that when chickens stretch out their wings to dry feathers, this is a sign that rain will soon fall. In a wedding ceremony in some villages, a cock and a pullet are presented together, representing a bridegroom and a bride, respectively. Most farmers are very proud to serve their own chickens to distinguished guests. For some traditional customs, a slaughtered, plucked and boiled whole chicken is often used as an offering for ancestor veneration and worship of village deities. In some instances, a cartilage under mandible is examined to indicate soil fertility and availability of natural food (Klinhom *et al*., 2005)

Cock fighting is still a popular pastime for many Thai men. This is an important cultural heritage from the Ayutthaya Era when King Naresuan's cock won a fight against the Burmese King's cock (Choprakarn, 1976). People have both negative and positive attitudes to this social activity. Some regard the activity as a form of animal cruelty and as a source of family problems associated with gambling. Some argue that cock fighting maintains a good source of TIC genetics through both natural and human selection. A lot of local wisdom involving TIC has been developed and passed down the generations as a result of this activity. Most herbs used for TIC originate from cock fighting. Farmers still prefer to introduce the loser cocks to their flocks, as these birds are cheaper, bigger in size, and stronger than general cockerels.

With very deep ties between the farmers and their chickens, parent stocks are the last choice to be used for food or sold. Due to the familiarities between the farmers and their favourite chickens for a long period of time, some owners even have a special ceremony for their beloved chickens when they die (Choprakarn *et al*., 1983; Klinhom *et al*., 2005; Laopaiboon and Jitpraneechai, 1999; Simarak *et al*., 2007).

8 DEVELOPMENT OF TIC: PAST, PRESENT, AND FUTURE

Research and development of TIC can be categorized into two levels; one for smallholders and another for commercial-scale production. In the past, smallholders were the main tar-

get for research and developmental work. The importance of TIC had been recognized and this issue was added to the Fifth National Development Plan of Thailand during 1982 to 1986. Researchers and extension workers from various institutions were involved in many projects. The main objectives were to increase food-protein sources and cash income for the farmers; and also to increase the number of day-old chicks per hen per year, and to decrease the mortality rate of the chickens (Choprakarn *et al*., 1998a).

The number of hatchlings can be increased up to two times by increasing the number of clutches from three to five or six per hen per year, while the number of hatchlings in each clutch remains the same. The number of clutches can be increased by early separation of the hen from her broods. This stimulates the hen to enter the next reproductive cycle within one month of hatching, instead of the more usual two to three months. In this way, it takes only nine to ten weeks instead of 15 to 17 weeks for each reproductive cycle. In this case, day-old chicks are completely separated from the hen and are fed with concentrate for one month before they are let out to run with the flock. This is a critical period because chicks take at least two to three weeks to learn how to scavenge and survive. Weak chicks and high mortality are common during this growth stage (Boonlear, 1989; Choprakarn *et al*., 1998b; Katawatin *et al*., 1996).

Crossing TIC with exotic breeds in order to increase the number of day-old chicks is not practical. About 30 percent of the hens do not brood and do not take care of their broods. Cross-breeds do not like to scavenge around and can not cope as well as the TIC with the harsh environment in rural areas (Laopaiboon, 1990; Phalarask, 1985).

A good vaccination programme (Newcastle disease, fowl cholera and fowl pox), associated with internal and external parasitic control, can satisfactorily lower the mortality rate of the flock from 50–70 percent to 30-40 percent (Ratanasethakul and Laopaiboon, 1982; Ratanasethakul *et al*., 1983; Ratanasethakul and Laopaiboon, 1986; Ratanasethakul *et al*., 1984a; Ratanasethakul and Boon-eg. 1989; Ratanasethakul *et al*., 1984b; Sangvaraonon-da, 1993; Sukprasert *et al*., 2006). However, this is practised sporadically due to intermittent vaccine supplies, and it does not fit well to the farmers' way of life.

Early chick separation and vaccination can increase the number of chickens at marketable size from 10–12 to 30–35 birds per hen per year. Even though there is extra cost for feed and vaccines, it is covered by the additional returns. Most farmers agree with this approach, but this technique is not generally practised, as it takes more time and does not fit well to their production system. Moreover, high chick mortality tends to occur due to overcrowding in the flock and an imbalanced ecosystem (Boonlear, 1989; Choprakarn *et al*., 1998a; Choprakarn *et al*., 1998b).

It is concluded that the traditional TIC production system with low inputs is still suitable for Thai farmers. This has been proved by many researchers (Choprakarn *et al*., 1983; Choprakarn *et al*., 1998a; Laopaiboon and Jitpraneechai, 1999; Klinhom *et al*., 2005; Phalarask, 1985); it was reported that, for example, all 19 groups of farmers who had participated in various TIC extension projects ceased to do so after project terminations (Simarak *et al*., 2007). It is strongly recommended that there is no need to increase TIC production for smallholders by any other methods affecting their management systems.

Currently, Kai Baan Thai (Thai Village Chicken), a new product derived from a cross-breed sired by TIC with an exotic breed, is being produced commercially in standard farms

to supply high-end niche markets. These meat-type chickens grow faster than TIC and reach the marketable weight of 1.3–1.5 kg within a shorter time of 13–15 weeks. They have the same meat quality as TIC, in terms of both flavour and texture, but with less fat than broilers. At present, the annual production is about 10 million birds and it tends to increase (Intarapichet *et al*., 2003; Jaturasitha *et al*.; 2002; Wattanachant *et al*., 2004).

In 2001, a conservation programme for TIC was formally started, based on collaboration between the Thailand Research Fund and the Department of Livestock Development. The main objective has been to prepare uniformity of TIC breeding stock for smallholders and for industrial–scale production. Four out of 17 groups, namely Pradu Hangdum (Black-tailed Pradu), Luang Hangkhao (White-tailed Yellow), Kai Dang (Red Chicken), and Kai Chee (Nun Chicken) have been selected according to their plumage colours. These distinct feather groups have now been established (Reodecha and Choprakarn, 2005) and are available to the farmers. Moreover, some of these four groups are being selected for pure male lines to be used in the commercial farms. However, local populations of TIC are still important as parent stocks for smallholders throughout the country.

9 CONCLUSIONS

Raising TIC by the traditional method (low inputs/low outputs) has proved suitable for Thai farmers' production objectives and the conditions in rural areas.

Cross-bred TIC meat is tastier and better for health compared to broiler meat, making it a very interesting choice, not only in Thailand but also for other countries.

TIC genetic resources have to be conserved. TIC behaviours such as maternal ability and survival ability under harsh conditions are very important for smallholders. The meat quality of TIC is now used for marketing campaigns on an industrial scale. More studies of their genetic make-up relating to maternal ability and economic traits are needed.

It is important to regularly educate farmers on AI prevention measures and management of their flocks.

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Formal and informal contract farming in poultry in Bangladesh

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SUMMARY

Since the early 1990s, contract farming as a market institution in the poultry industry in Bangladesh has evolved along with the expansion of commercial poultry farming. Apart from classical contract farming within vertically integrated enterprises, there are also formal and informal contract arrangements in input marketing and output marketing. In this paper, the characteristics of these forms of contract arrangements and their implications for the poultry industry in Bangladesh are discussed. A high drop-out rate among commercial poultry producers is observed. Results of a survey conducted among farmers who dropped out of the poultry business in recent years are presented, highlighting the causes of dropping out and the possible role of contract farming in addressing them.

Key words: poultry, market, institutions, contract

1 INTRODUCTION

In Bangladesh, commercial poultry production using improved genetics, feeds and management has grown rapidly since the early 1990s in response to increased market demand for livestock products including poultry. The total poultry population in the country increased from 91 million in 1990 to 101 million in 1992, 123 million in 1995 and 153 million in 1997. This increase occurred almost entirely in the commercial poultry sector. In 1998, there was a sharp decline in the population to 138 million due to a severe flood. The population then stabilized at around 140 million until 2006 (figures from FAOSTAT – http://faostat.fao.org/default.aspx). Contract farming in the poultry sector has also evolved to some extent, along with the expansion of commercial production.

This paper begins by briefly presenting the background to the emergence of contract farming as a market institution in the developing world (Section 2). It then discusses the evolving forms of poultry contract farming, along with their pros and cons, and their implications for the future role of contract farming in the sector. In Section 3, the types of contract farming arrangements prevailing in the poultry sector in Bangladesh and the profiles of practitioners of various contract types are described. In Section 4, the implications of the current contract arrangements in the sector are summarized. In Section 5, major reasons for dropping out of the poultry business, as reported by a sample of farmers who dropped out, are discussed along with implications for contract farming.

This paper is partly derived from a longer study (see Jabbar *et al.*, 2007).

2 BACKGROUND TO THE EMERGENCE OF CONTRACT FARMING AS A MARKET INSTITUTION

In recent decades, the demand for livestock products in developing countries including Bangladesh has increased rapidly, propelled by rising levels of income, population and urbanization. Demand has principally been met by large-scale urban/peri-urban production. Although growth in demand for livestock products should, in principle, bring opportunities for the large numbers of livestock-dependent poor who have traditionally dominated developing-country markets, such producers have generally faced severe competition as markets have expanded. Small-scale or poor producers have captured only a tiny share of these expanding markets because of their inability to produce high quality products at competitive costs and to reach urban markets. This is a result of a lack of access to information, skills, technologies and other infrastructure, which increases transaction costs. Further, the absence, in most rural areas, of adequate preservation and marketing infrastructure means that the individual market-entry investments needed to fulfil production and sanitary standards are prohibitively high given, the quantities of marketable products produced. Lack of access to market information further reduces the negotiating position of small production units. Government policies have often supported and subsidized industrial livestock production, promoting economies of scale, but usually overlooking equity, environment and health consequences (Delgado *et al.*, 1999).

To overcome the above-mentioned constraints, a variety of organizational arrangements that allow small production units to benefit from various forms of collective action, such as producer groups, input- and output-marketing cooperatives, and product collection schemes, have been supported by government and non-government organizations in a number of countries, with varying degrees of success. Contract farming is one such institutional arrangement that is considered to be useful in facilitating market access for smallholders in high-value supply chains that require specialized production inputs, and sales to markets for specialized outputs. Contracting has long been used in various fields of economic activity as a means to strengthen supply chains, with varying degrees of success (Glover, 1987; Farrelly, 1996; Runsten and Key, 1996; Eaton and Shepherd, in FAO, 2001).

Contract farming promotes the linkage of smallholders to the market in circumstances where the transaction costs of direct engagement with the market are high for producers and/or traders. Contract farming has also been successful in enabling the transfer of improved technology and the integration of smallholders into an economy that embraces modernization and globalization. In addition to enhancing the incomes of smallholder producers per se, contract farming may also be beneficial for overall employment and for infrastructure or market development for the wider community. Particularly when multinational agribusiness firms are involved, contract farming may also increase access to lucrative export markets (ERS, 1997; Eaton and Shepherd, in FAO, 2001; Delgado *et al.*, 2003). Given current concerns about diseases such as avian influenza, quality assurance is becoming an even more challenging task, and the involvement of smallholders in any supply chain is likely to make the management of those chains even more difficult and costly. Under such conditions, contract farming may provide one avenue to keep smallholders engaged in the sector. Production and price risks are important features of poultry farming. Risk sharing is one of the widely cited reasons for contracting. Numerous studies of contract

farming put emphasis on risk reduction as a principal incentive for producers to enter into contracts (Covey and Stennis, 1985).

Conversely, contract farming has been blamed for breaking up existing farming activities, involving farmers in inflexible production arrangements, and potentially jeopardizing food security and subsistence production. Moreover, where the contracted product requires substantial investment in equipment or infrastructure, the debt burden of contract farmers may increase along with dependency on the large integrators or agribusiness companies which may show characteristics of monopoly firms (Shivramkrishna and Jyotishi, 2007). Depending on whether participation in contract farming is restricted to males and/or larger-scale farmers, and the rights and treatment of locally-hired labour by such farmers, contract farming arrangements may result in a negative effect on overall equity and gender relationships (Glover, 1987). Women and child workers, in particular, may be disadvantaged because of unfavourable contract terms (Singh, 2003).

3 TYPES OF CONTRACT FARMING IN POULTRY IN BANGLADESH

Contract farming is usually defined as farming which is a part of a vertically integrated enterprise within which actors are linked through contracts defining roles, responsibilities, rights and obligations. However, contract arrangements may also prevail outside vertically integrated enterprises. Forms of contract farming may be defined on the basis of a set of criteria (e.g. types of partners involved, how risks, benefits and obligations are shared, how contract agreements are made, enforced and monitored, and how disputes are settled). The prevailing legal and regulatory frameworks in a country or society determine how these factors are incorporated in contracts and are actually practised. Some of the above-mentioned elements of contract farming are common in other forms of collective action such as cooperatives and production and marketing groups; a distinction, therefore, needs be made between contract farming and other organizational forms.

Considering these elements and analysing the firms and enterprises involved in various contract arrangements in the poultry sector in Bangladesh, the following three types of contract arrangement can be identified:

(a) Production–marketing contracts – relevant actors are involved in contracts within a vertically integrated enterprise for supply of inputs and services, disposal of outputs, and sharing of risks and benefits. The agreement is documented in writing and signed by the parties.

(b) Input-marketing contracts – relevant actors are involved in contracts for supply of one or more inputs and services, generally to market agents who directly deal with producers. The agreement is documented in writing and signed by the parties.

(c) Output-marketing contracts – primarily a forward-purchase contract in which contractors purchase output from existing producers. The agreement is basically verbal or in a form that may not be considered acceptable in a formal court for dispute settlement.

The evolution, profiles and characteristics of the various enterprises operating under different contract types are discussed in more detail below.

3.1 Production–marketing contracts

The principal actors in this arrangement are Aftab Bahumukhi Farms Ltd operating in Kishoreganj District, Biman Poultry Complex operating in Savar near Dhaka District, and BRAC's poultry operations in a number of districts. The main characteristics of these three enterprises are summarized in Table 1. A more detailed description of the individual enterprises is given below.

Broiler farming by Aftab Bahumukhi Farms Ltd

The Aftab Bahumukhi Farms Ltd (ABFL) is one of the subsidiary companies of the Islam Group of Companies, Dhaka, a multi-enterprise company that also has the largest private-sector commercial operations in the agricultural sector. The ABFL established a broiler farm in 1991 in Bhagalpur Thana (subdistrict) in the District of Kishoreganj, about 110 km northeast of Dhaka city. The ABFL started contract farming as an experimental programme with a group of 20 farmers. Based on the initial experience, the ABFL took up in, 1994, an elaborate vertically integrated contract growing programme for poultry, involving rural people in poultry farming as an income-generating activity by providing technical and professional support. As the ABFL started as an agro-based firm, it included farms of all sizes in its poultry and other farm programmes. There was perhaps no special consideration given to small farms, but they were included so long as other requirements for engaging in poultry production were met. Unlike vertically integrated farms in developed countries, where big trading companies usually prefer contracts with large-scale farms and farmers to minimize transaction costs, the ABFL has tried to be inclusive. One of the objectives of the ABFL was to increase the income and welfare of farmers in the areas around the firm's headquarters. This motivation may partly lie in the fact that the owner of the Islam Group, of which the

TABLE 1
Summary of characteristics of enterprises practising production–marketing contracts

	Aftab Ltd	Biman	BRAC
Year established	1992	1997	2002
Products covered	Broiler and breeder stock	Broiler	Broiler
Vertical integration	Yes	Partial	Partial
Input supply	On credit till 2003, then cash	On credit	On credit
Output purchase	Market price plus margin	Fixed price	Fixed price
Production risk	100% producer with insurance	100% producer	100% producer
Price risk	Shared	Producer	Producer
Number of producers	350 and 122	25	215
Batch size	1 500–2 500 Average 1 800	1 000–5 000 Average 2 500	500–2 000 Average 800

Source: Jabbar *et al.* (2007).

ABFL is a component, comes from the locality; so contributing to the welfare of local people through his business ventures may serve both business and a welfare objectives.

The ABFL has developed into a vertically integrated firm over time and has established its own feed mill and hatchery. The firm consists of a modern hatchery that produces 60 000 broiler and layer parent birds and supplies 100 000 day-old chicks per week to the fast-growing poultry industry. The firm has also established retail sales centres in Dhaka city to supply eggs and poultry meat to consumers. The Poultry Complex of the ABFL is already one of the largest in the country. The ABFL's poultry feed mill was first established primarily to provide balanced feed for the ABFL contract poultry farms. It was later expanded to meet the wider demand for poultry feed in the country. At present, ABFL has three feed mills with a capacity of 10 000 tonnes of feed per month. It distributes balanced feed to farms throughout the country using its own distribution channel.

The agreement between the ABFL and a contract farmer is very simple. Any farmer located in the company's operating area is eligible to enter into a contractual agreement. From 1994 to 2003, the ABFL provided day-old-chicks, feeds and veterinary supplies on credit, and ensured purchase of the output. All the credit liability of the contract farmer was adjusted against the value of their delivered products. After the bird flu rumour which followed outbreaks in Southeast Asia in 2003, the ABFL changed the arrangement from input supply on credit to cash. Although there was no bird flu in the country in 2003, there was suspicion among producers and consumers, and this affected the industry. The price of broilers and day-old chicks decreased drastically within a few days. Many farmers went out of business as they incurred unsustainable losses. The ABFL reportedly incurred a loss of nearly taka (Tk) 150 million as a result of the incident (in mid 2006, US$1=Tk 65.31). As a consequence of the scare, the number of the ABFL's contract farms fell from 650 to 200 in 2004. However, numbers increased to 315 in 2005.

The distribution of responsibilities between the contract farmer and the ABFL within the vertically integrated farming system is summarized in Table 2. The contract farmer typically provides land, housing, equipment and labour. According to the agreement, a farmer builds a covered shed at his/her own cost under the direct supervision of the ABFL extension staff, to ensure a congenial and healthy environment for proper growth of the birds. The average duration of the grow-out cycle is roughly five to seven weeks for an average sized (1.5 kg) broiler. Until 2003, the ABFL used to buy the mature live broilers from the contract farmer by paying a fixed price per kg and then marketed these through the ABFL sales centres in Dhaka. After 2003, when the price of poultry fell drastically, the ABFL also changed its contract arrangement and stipulated that farmers would be paid a price that is a given amount lower than the prevailing market price. For example, in 2003, farmers were paid Tk 53 per kg when market price was Tk 60 per kg live weight, in order to cover the procurement and distribution costs of ABFL.

Risk reduction is an important cited reason for entering into a contractual agreement. Risk is an important feature of poultry farming. There are two types of risk: production risk and price risk. Price risk is an important contributor to revenue variability. The biological nature of broiler production and the unsuitability of the product for long-term storage is an important cause of price instability. Production risk is mainly a result of the death or loss of birds. Outbreaks of diseases may also cause considerable economic losses and erode

TABLE 2
Sharing of responsibilities between the contract farmer and the contractor (ABFL) in broiler production

Particulars	1994–2003		2003 onwards	
	Contractor	Farmer	Contractor	Farmer
Land, buildings and equipment		X		X
Manure handling, storage and disposal capacity		X		X
Day-old chicks	X*		X**	
Feed ingredients, processing and delivery	X*	X	X**	X
Fuel, electricity and telephone		X		X
Facility repairs		X		X
Veterinary services and medicine	X*		X**	
Transportation cost of all input and output		X		X
Labour: production and maintenance		X		X
Labour: supervisory and specialists	X		X	

Note: * = on credit and ** = in cash.
Source: Jabbar *et al.* (2007).

confidence in poultry farming. The major poultry diseases that farmers face in the study areas included fowl cholera, gumboro disease, fowl pox, Newcastle disease. Gumboro and Newcastle disease are epidemic diseases, which cause huge losses.

The vast majority of farmers are generally risk averse, i.e. they normally choose the less revenue-risky business. As poultry is a risky enterprise and farmers are not able individually to deal with distant urban markets, the ABFL initially tried to reduce price risk through a forward contract and purchase arrangement. Later, the mechanism was changed in favour of a risk-sharing arrangement between the ABFL and the contract farmer, which operated by assuring a certain share of the prevailing market price. In order to reduce production risk, an insurance scheme linking compensation to mortality rate was introduced.

There is no poultry insurance system for independent farmers in Bangladesh. The ABFL is the only organization that has introduced an internal insurance scheme to cover the risk of loss and safeguard the interest of its contract farmers in the case of death of immature chicks resulting from diseases or other causes. According to this scheme, the ABFL operates a contributory security fund. Farmers contribute Tk 1.50 per chick to the fund when they purchase day-old chicks. For chick mortality within a given range, a portion of the initial contribution or risk premium is refunded. For example, if chick mortality is less than 3 percent, 4–6 percent, 7–10 percent or 11–15 percent, then 80, 40, 20, and 10 percent of the contribution, respectively, is refunded to the farmer. If the mortality rate is above 15 percent, the farmer can claim full insurance compensation. In this case, for birds up to 20, days old Tk 20 per bird is paid after deducting 15 percent from the total number of birds

lost. For birds older than 20 days, Tk 30 is paid per bird after calculating the benefits from birds up to 20 days of age. Because of this measure, farmers feel secure and encouraged to take up the venture.

Overcoming marketing problems is a major motivation for joining a contract system. In Bangladesh, poultry farms located far from major urban markets face a number of problems in marketing, including inability to sell birds at desired times due to lack of buyers, inadequate transport facilities to carry birds to markets, uncertain prices and low bargaining power. By entering into a contractual agreement, farmers have an assured market outlet.

Access to technical knowledge and management skills is another advantage of contract farming. Most poultry farmers in Bangladesh start business without acquiring proper technical knowledge and management skills. Facilities to train poultry farmers on various aspects of poultry farming and management are inadequate in the country. There is a major deficiency in knowledge about feeding regimes and management, both of which heavily affect production efficiency. Most of the independent broiler farm owners reported that they did not have sufficient knowledge about poultry diets and optimal rations. In broiler production, the ratio of feed varies for starter, grower and finisher stages, and managing these properly is a precondition for profit efficiency. The ABFL provides initial training in the management of the contract farming package and also provides continuous supervision throughout the growing period.

The main feature of the ABFL broiler-farming system is that it is a partnership between the ABFL and the contract farmer, whereby the contract farmer provides land, housing, equipment and labour, and the ABFL provides inputs (initially on credit but later on a cash basis), technical knowledge and supervision which reduces yield uncertainty, and an assured market for products at pre-agreed prices or a pricing mechanism that reduces price uncertainty – all of which are likely to contribute to a remunerative business.

Breeder-stock farming contracts by ABFL

The ABFL started contract breeder-stock farming more recently. The ABFL's hatchery production systems depend totally on import of grandparent stock from abroad, usually from France, the United States of America and the Netherlands. The ABFL rears the imported birds under its own supervision. The eggs obtained from the grandparent stock are hatched and the day-old chicks are distributed to the selected contract-grower farmers as breeder-stock birds. After 25 weeks of rearing, the parent stock birds start producing hatchable eggs, which the ABFL buys back. After hatching, they distribute the day-old chicks to contract and independent broiler farmers for rearing as broilers.

A written agreement is made between the ABFL and the contract breeder-stock farmer, usually for a ten-year period which can be renewed on mutual agreement. Unlike broiler contract farming, only solvent or relatively wealthy farmers in the operation areas of the ABFL are eligible to participate in the scheme, because of larger investment requirement. According to the agreement, the ABFL provides day-old-chicks, feeds, veterinary supplies in kind on credit, and intensive supervision. It also ensures purchase of the output. All the credit liability of the contract farmer is adjusted against the value of their products. Unlike broiler contract farming, input credit was not discontinued in breeder-stock contracts (Table 3).

The contract farmer typically provides land, housing, equipment and labour, and builds

TABLE 3
Sharing of responsibility between the contract farms and contractor (ABFL) in breeder-stock farming

Particulars	Breeder-stock contract farmer	
	Contractor	Farmer
Land, buildings and equipment		X
Manure handling, storage and disposal capacity		X
Day-old chicks	X*	
Feed ingredients, processing and delivery	X*	X
Fuel, electricity and telephone		X
Facility repairs		X
Veterinary services and medicine	X*	
Transportation cost of all inputs and outputs		X
Labour: production and maintenance		X
Labour: supervisory and specialists	X	

Note: * on credit
Source: Jabbar *et al.* (2007).

a covered poultry shed under the direct supervision of the ABFL experts to ensure a healthy environment for proper growth of the birds. Building the shed is a relatively costly investment, which few rural households can afford. In case of need, the ABFL helps farmers to access a bank loan of Tk 800 000 from Uttara Bank to build the shed. If any additional funds are required, ABFL provides 50 percent on credit; the remaining 50 percent has to be borne by the farmer.

The ABFL's internal insurance scheme, mentioned above, also covers the breeder-stock farms, but the premium and compensation rates are different. Farmers contribute 4 percent of the day-old chick price to the fund as a premium, and get refunds based on the rate of mortality. If the mortality is less than 10 percent, 11–25 percent or 26–50 percent, then 70, 60, 50 percent, respectively, of the contribution made by the farmer is refunded. If the mortality rate is above 50 percent, then the farmer can claim for the full insured sum. In this case, Tk 60 per bird is paid if the bird dies at the laying stage. In the event of a bird dying during the growing stage, Tk 100 per bird is paid to the farmer. Because of this measure, farmers feel secure and are encouraged to subscribe to the scheme.

Broiler-farming contracts by Biman Poultry Complex

The Biman Poultry Complex (BPC) is a sister concern of Biman Bangladesh Air Lines Corporation, which deals with dressed broilers under contractual arrangement. The complex started its operation in 1997. With 25 contract growers located in Dhaka, Tangail, Manikgonj and Gazipur Districts, within about 60 km of the Poultry Complex at Savar, the system ensures a supply of dressed chicken to the Biman Catering Centre and two sales centres in Dhaka. The Biman Catering Centre supplies chicken-based foods to different airlines operating out of Dhaka International Airport.

The BPC has entered into agreement with 25 farmers who have built good poultry sheds and have experience in broiler farming. Batch size varies from 1 000 to 5 000 birds, with an average of 2 500 birds. The BPC provides day-old chicks on credit and supplies technical services including veterinary treatment to the enlisted farmers and buys back live chickens from the contractee at a pre-determined price. In 2006, the prices were Tk 100/kg from February to July and Tk 95/kg from August to January. The price is reviewed periodically based on market conditions, so that any price risk is shared between the BPC and the contract farmers. However, production risk is fully borne by the farmers. There are rare cases of dispute between the contractor and the contractee. These disputes are settled through mutual negotiation and understanding.

Broiler farming contracts by the Bangladesh Rural Advancement Committee

The Bangladesh Rural Advancement Committee (BRAC) is the largest national NGO operating in the country as well as abroad. The BRAC's involvement in contract poultry farming has evolved over time. The BRAC is committed to poverty reduction and empowerment of the poor through providing credit, training and technical assistance. According to Saleque (2000), BRAC considered poultry to be a potential candidate activity for income generation among the landless and small farmers, particularly destitute women, many of whom owned a few chickens. In Bangladesh, poultry is kept by 70–90 percent of households, while fewer households keep goats and cattle. Households owning no land or less than 0.5 acre of land own more than 50 percent of the total poultry population. Poultry is sometimes used as the first investment in a "livestock ladder" (in the sense that one can move from poultry to goats/sheep to cattle, etc) to increase income and get out of poverty. During the 1970s and early 1980s, there were almost no job opportunities in the country for the landless, disadvantaged women who were BRAC's targets for relief and development work following the independence of Bangladesh in 1972. Relief could not be a mechanism for creating sustainable livelihoods for poor people. There was a need to provide relief beneficiaries with opportunities to earn an income. It was realiszed that poultry rearing, in which women in relief-beneficiary families were already engaged on a very small scale, could be an income earning activity for a large number of poor women. The belief that, starting with a few chickens, relief-dependent ultra-poor people, especially women, could gradually move away from relief and towards self-sustained livelihood activities was the basic foundation of the poultry model developed by BRAC jointly with the Department of Livestock Services (thus called the BRAC-DLS model) which eventually became a major development innovation (Islam and Jabbar, 2005).

Through trial and error, over the period 1978 to 1985, BRAC developed a smallholder poultry model in collaboration with the DLS, targeting landless and poor households, especially women. Initially there was no model or specific design, but over time several activities were linked together in a network involving nine inter-related actors, each performing a specific task such as hatching eggs, rearing day-old chicks to a certain age, rearing them to mature birds, supplying feeds and vaccination services, and selling eggs and broilers. The DLS used to supply day-old chicks from its hatcheries as foundation material for the network groups. After the model proved to be a success at a pilot scale, it was replicated in wider areas during 1985–1992, when the concept was taken up by major donors such as

the International Fund for Agricultural Development (IFAD), the World Bank and the Asian Development Bank (ADB), and the Government of Bangladesh for replication through development projects over the period 1992–2003. BRAC and the DLS remained involved in the implementation of this large project – providing of some services, along with several other NGOs. The DLS continued to provide day-old chicks for the project participants. However, the DLS's limited capacity to supply day-old chicks became, at some stage, a constraint to expansion of the model. Partly as a response to this problem, BRAC started to produce day-old chicks in order to serve the requirements of the poultry model (Dolberg, 2001). However, in addition to addressing the shortage of day-old chicks for the project participants, BRAC also saw a business opportunity. It used the experience of the poultry model to develop a contract-growing system, whereby it started supplying day-old chicks and other inputs on credit to smallholder producers, and initially bought back eggs and broilers at pre-determined prices. The difference between this system and commercial contract growing is that, as in the poultry model, BRAC kept the focus on poverty alleviation by targeting smallholders and the poor (Islam and Jabbar, 2005).

After the expiry of the smallholder poultry development project in 2004, many of its poultry network groups became non-functional, and in many places the supply chains collapsed. However, BRAC continued to support more efficient and functional groups by supplying day-old chicks through its own rural livelihood programme, while developing alternative mechanisms to promote contract poultry farming as an income-generating activity among smallholders.

Apart from the poverty-focused collaborative poultry development programmes, BRAC has gradually moved to unilateral programmes under varying arrangements. BRAC generally sells day-old chicks and feed to the poultry farmers through dealers. It also provides support for training, vaccines and medicine and helps with the marketing of products, through agents, at the existing market price. At the field level, dealers make an informal contract arrangement with farmers by making credit sale of inputs and often buying output on credit.

During 2002–2004 BRAC tried contract farming in Sherpur District by providing key inputs such as day-old chicks, feed and medicine on credit and buying back broilers at pre-determined prices. The arrangement did not work because of violation of contracts by farmers, particularly during periods of higher market prices when they sold products in the local market instead of selling to BRAC.

Recently, BRAC has entered into an arrangement with "Mexicana Chicken", a fast-food retailing enterprise of the Nasir Group of Industries. Under the arrangement, BRAC supplies "Mexicana Chicken" with hygienic broilers raised through contract growing by 215 farmers in seven districts, namely Gazipur, Manikganj, Norshingdi, Kishoreganj, Tangail, Mymensingh and Brahmanbaria. Batch size varies from 500–2 000 birds, with an average of 800 birds. BRAC supplies day-old chicks and other inputs to the farmers through agents. It also provides technical supervision to the farmers. Quality of the product is ensured through strict scrutiny by BRAC personnel according to specifications suggested by "Mexicana Chicken". BRAC usually enters into a written contract with the producers to buy products at the prevailing market price. The contract includes the provision that if, under certain unavoidable circumstances, the specified quantity and quality of products cannot be

supplied or bought, it must be informed at least three days before the delivery date. Price risk is shared by both contractor and contractee, because the contract price depends on market price fluctuation. The production risk is fully borne by the farmer. The contracting arrangement ensures access to quality inputs for farmers and also ensures a stable market for the inputs supplied by the integrator.

3.2 Input-marketing contracts

There are 130 hatcheries in the country, of which 68 are fully functional, others are partially functional or closed for one reason or another. There are also 52 feed mills. Among these, only three large companies – Kazi Farm Ltd, Paragon Poultry and Nourish Feed Ltd – practise formal input-marketing contracts. A brief description of their operations follows.

Kazi Farm Ltd is the largest producer of parent stock as well as day-old chicks for broiler and layer poultry in Bangladesh. The farm was established in 1996. In 2006, the company also established the largest poultry feed mill in Bangladesh. Kazi Farm Ltd has begun exporting poultry products to the Middle East and Nepal, and is managing the operations of a broiler-breeding farm in the Sultanate of Oman.

To achieve the full potential of the farm, Kazi provides countrywide sales and services. It employs over 100 sales staff, who are stationed in different poultry-producing areas. The day-old chicks and feeds are distributed through 600 feed and chick distributors all over the country. A person who, according to the judgment of the company, is financially solvent and has personal integrity is selected as a distributor or agent for a particular geographical area comprising one or two thanas (subdistricts).

Kazi Farm Ltd enters into a written contract with the distributors, under which the latter have to abide by a set of conditions including fulfilment of a target volume for the purchase of day-old chicks and feed from the company. The distributors are also required to deposit some security money with the company, normally equivalent to the price of 1 000 chicks. The distributors have to purchase day-old chicks and feed through advance payment in cash or as a bank draft. There is no provision of credit sale to the distributors. Under the informal contractual arrangement with the farmers, the company has set up a service network of veterinarians and animal husbandry graduates to help farmers to deal with disease problems. These technical personnel regularly visit the client farmers and offer veterinary services free of cost. This is an investment by the company to ensure chick survival and that the poultry business operates on a sustained basis – thus ensuring that its own feed and day-old chick business can be sustained and expanded.

In this system of contract, both production and price risks are borne by the farmers. However, farmers benefit from the supply of healthy day-old chicks and feed through the dealers both in peak and lean periods.

Paragon Poultry Ltd is one of the largest producers of day-old chicks in Bangladesh. It has developed a special type of contractual arrangement through which it supplies day-old chicks and feeds to poultry raisers through its 205 dealers scattered all over the country. It supplies 400 000 day-old chicks per week and 140 tonnes of feed per day. The company claims more than a 10 percent market share of the day-old chicks produced in the country. The company does not directly participate in purchasing the farmers' products, but some of the dealers help farmers with selling the products. All production and price risks are, obviously, borne by the farmers.

Nourish Feed Ltd is one of the largest poultry-feed producers in the country. It also produces day-old chicks as a supplementary venture. It supplies day-old chicks and feed to the farmers through its 160 dealers operating across the country. The company supplies 300 000 day-old chicks per week and 330 tonnes of feed per day. The company captures a substantial market share for poultry feed and more than 2 percent of the country's day-old chick production. The company considers Kazi, Aftab and Paragon to be the major competitors in the feed market. The company does not directly participate in the purchase of farmers' products, but occasionally helps farmers in the marketing of products through the dealers. As the company does not participate in the purchase of products at any predetermined price, both production and price risks are fully borne by the farmers.

3.3 Output-marketing contracts

Other than the producers, aratdars, wholesalers and output retailers are the three main actors in the output marketing chain.[2] The aratdars and wholesalers of eggs in Dhaka city sometimes make forward purchase contracts with layer farmers in Gazipur District. They also sometimes make contracts with agents who then buy eggs from producers with or without prior contract to supply the aratdars. The difference between this arrangement and formal contract is that these forward contracts are made with existing farms rather than for the establishment of new farms. In this arrangement the aratdars make a lump-sum advance payment, which is adjusted according to the value of products at the time of delivery. The main benefit for the producers is that this cash advance can be considered as a form of credit with which to buy inputs in situations where going to a formal credit agency may be time consuming or problematic. The price of eggs is generally fixed unilaterally by the aratdars. Although these prices remain close to the prevailing market prices, they are sometimes lower than the prices that prevailed during the immediate past, and are therefore unexpected from the point of view of producers. The basis on which prices are set is not made clear by the aratdars. The producers supply eggs without knowing the price beforehand. The aratdars in Dhaka, through their syndicate, set prices on a day-to-day basis, and the producers just have to accept it. It is often alleged that the aratdars extract an unduly high margin/commission through these practices.

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[2] Aratdars are large traders and one of the basic institutions in the traditional market system. They buy and store products for varying periods of time for temporal arbitrage. In the case of broilers and eggs, the storage period is relatively short, as live birds can't be stored for more than a day without incurring extra feed costs and risking loss of weight, and eggs can't be stored for long without risk of spoilage.
Wholesalers are large traders (but smaller than aratdars) dealing with one or more inputs (feeds, drugs, equipment) and/or products (broilers, table eggs). They are licensed full-time traders having fixed business premises in the wholesale market, and they handle a large volume of transactions mainly in bulk. They purchase products from producers and small traders and sell to the retailers.
Output retailers are the smallest traders, having permanent stalls in the section of the markets for broiler and table eggs. Input retailers are similar enterprises dealing with one or more inputs; they operate in local markets or convenient places close to producers. They mostly buy products from the wholesalers and sell to the ultimate consumers or users.

4 IMPLICATIONS OF THE VARIOUS CONTRACT ARRANGEMENTS FOR THE POULTRY INDUSTRY

4.1 Production–marketing contracts

About 600 farm households are involved in production–marketing contracts or the classical type of contract farming under the three enterprises operating such schemes; this accounts for a tiny share of the country's total broiler output market. From the point of view of producers, there is no opportunity to choose among the three operators as they operate in different geographical areas. Thus, there is no competition, as such, with regard to the terms that they offer to prospective participants. There are some differences between the operators in terms of the potential for smallholder farming families or small-scale poultry producers to participate in poultry contract farming as a mechanism to diversify income generation and to achieve some escape from poverty. BRAC is relatively more involved in serving smallholders – the average size of the land and poultry flock of its contractees is the smallest among the three operators – while Aftab's breeder-stock farmers are relatively rich.

The main advantage to the producers is an assured outlet for products; other conditions, such as production- and price-risk sharing and mode of payment for inputs, are variable among the three current operators of this type of contract. However, Aftab's internally generated insurance scheme has something to recommend it for adaptation by other enterprises – not only in the poultry sector, but also in other commercial agricultural operations. There is no similar example of an insurance scheme in the agricultural sector providing service to smallholders, though there is much talk about insurance to cover risks in crop and livestock production. Potential risk of avian influenza may limit expansion of this type of contract arrangement in poultry, and may also lead to the emergence of terms more favourable to integrators. An insurance scheme of the type being operated by Aftab may be modified to accommodate such high-risk events and allow small producers to remain engaged in the poultry sector alongside large operators.

4.2 Input-marketing contracts

A dual structure is emerging in both the hatchery and feed industries: a few large operators are deriving economies of scale and controlling large market shares; they may push smaller operators out of business if policy distortions (cheaper credit, import subsidy on raw materials, tax relief) continue to favour large operators. Continued competition in the industry will be beneficial for suppliers of inputs, input traders and producers, as it will keep prices low and improve the quality of products and services. There is underinvestment in the hatchery industry, so production of day-old chicks is lower than demand. Consequently, to maintain the production cycle, producers are required to make advance orders and advance payments at higher prices. Advance payment requirements may also result from the perishable nature of the product, which means that hatchery owners may want to schedule production based on orders and concomitant delivery schedules. Contract farming is supposed to address this imbalance and uncertainty, but it appears that input-marketing contracts alone, with input sellers and agents having secondary contracts with producers, are not a satisfactory solution to the problem of uncertainty. The feed industry and the commercial feed market is operating slightly better than the hatchery industry in this respect, perhaps because of the less perishable nature of the product; yet there is room for expansion of

investment in this industry. Dependence on imported raw materials and uncertain electric supply are, however, major bottlenecks constraining expansion.

4.3 Output-marketing contracts

Forward-purchase contractors are basically informal money lenders who provide a service in a situation where access to formal credit for small-scale poultry producers is either limited or costly. Asymmetric information on supply, demand and prices, and the market power of buyers derived from this asymmetry, are the main problems for producers under this type of contract. Easier access to formal credit at interest rates and terms comparable to larger operators will increase the bargaining power of small-scale producers becoming involved in forward-sale contracts. Entry of more formal contract farming operators into the industry, easier access to formal credit, feeds and day-old chicks, and better provision of market information on supply, demand and prices to producers and traders will increase opportunities for producers to choose between input-purchase and output-marketing options, and also increase the bargaining power of producers even when they have to be involved in informal forward-purchase contracts.

5 PROBLEMS LEADING TO BUSINESS FAILURE AND THE ROLE OF CONTRACT FARMING IN SOLVING THEM

A survey among commercial poultry producers conducted by Jabbar *et al*. (2005) indicated two fairly common features of the poultry industry: some farms changed from broiler to layer farming or vice versa, while others dropped out of the poultry business altogether. A similar pattern was observed during a more recent survey (Jabbar *et al*., 2007). Change from one type of poultry farming to another indicates that producers respond to anticipated market opportunities and are able to adapt their fixed infrastructure easily or quickly. Many reasons may contribute to the business failures that cause producers to drop out of the business altogether.

In order to understand the causes of business failure and dropping out of poultry farming, a survey was conducted during July–September 2007 among 140 poultry farms in five districts namely – Gazipur, Kishorganj, Jamalpur, Bogra and Rangpur – which have concentrations of commercial poultry farming. As there was no list of the farms that had dropped out of business, purposive sampling was used to select farms for interview. The thanas or subdistricts within each of the selected districts were visited and "drop-out" farms were identified by talking to feed and output traders, DLS staff and other key informants. The interviewees were asked a direct question about the reason(s) for dropping out of the business. The survey also included some additional information to elucidate the nature of the business and its management – including flock size, duration of the business, sources of input supply and veterinary services, training in poultry farming, quality of the poultry houses, feeding and management practices, and the types and skills of the labour employed. This information was used to assess possible links between the stated reason(s) for dropping out and the technical and financial management of the business.

Eighty-four percent of the sample farms raised broilers, while the remainder raised layers. These farms were in business for an average of 3.6±2.6 years: 3.1±1.9 years for broilers and 6.3±4.0 years for layers. Forty-six percent of the layer farms operated for more than

seven years before dropping out, while 61 percent of broiler farms dropped out within three years of establishment (Table 4).

A summary of the interviewees' reported reasons for dropping out of business is presented in Table 5. Most respondents gave multiple answers, so the percentages do not add up to 100. It appears that inconsistency between input and output prices, several problems related to the supply and price of day-old chicks (the basic material for the broiler industry), shortage of capital, high mortality and low productivity, low local demand for products, and difficulty in accessing distant markets are the major reasons that led to business failure and eventual dropping out of the business. All the stated reasons for dropping out of business were found to be enterprise neutral (i.e. there was a similar pattern among broiler and layer farms). They were also scale-neutral: for each stated reason or combination of reasons for dropping out, there was no significant difference between terms of the scale of operation (measured by installed capacity and actual number of birds raised or flock size) between those respondents giving the reason and those not giving the reason (but who might have given another reason). No systematic technical and management problems could be associated with the stated reason(s) for dropping out, except that some associations between high mortality and low productivity could be discerned, which had implications for contract farming type market institutions.

Sixty-six (47 percent) of the sample of 140 drop-out farms gave high mortality leading to unsustainable losses as the main reason for dropping out of business. Among these 66 respondents, 61 percent had had no formal prior training in poultry farming, compared to 81 percent among those who did not give high mortality as a reason for dropping out. Among those who gave high mortality as a reason for dropping out, 42 percent derived their technical knowledge about poultry farming from observing and talking to neighbours, 21 percent from traders of day-old chicks and feeds, 17 percent from drug suppliers or agents of pharmaceutical companies, and 20 percent through trial and error or other means. The corresponding percentages for those who did not give high mortality

TABLE 4
Duration of operation of sample broiler and layer farms before dropping out

Duration of business (years)	Enterprise type		Both
	Percentage of broiler farms	Percentage of layer farms	Percentage of all farms
1	23.7	9.1	21.4
2	19.5	13.6	18.6
3	18.6	9.1	17.1
4	16.1	4.5	14.3
5	11.9	13.6	12.1
6	6.8	4.5	6.4
7+	3.4	45.6	10.1
All	100.0	100.0	100.0

Source: Field survey 2007.

TABLE 5
Causes of dropping out of poultry farming as reported by a sample of farms

Perceived main reason(s) for dropping out	Percentage of the sample
Input price higher than output price/lower price of output/ output price not remunerative	81
Problems related to day-old chicks:	
High prices	63
Desired quality not available	51
Timely supply not available	34
Adequate quantity not available	31
Shortage of capital	60
High mortality of birds	47
Low productivity of birds	43
Low demand for products in local market	33
Moved into other business	29
Disagreement among family members/partners	26
Difficult to sell in distant markets	17

Source: Field survey 2007.

as a reason (but might have given another reason) were 31, 42, 16 and 11 percent. Thus, it appears that lack of proper knowledge of commercial poultry farming, and derivation of such knowledge from amateur or unprofessional sources, was a major reason for high mortality and consequent business failure.

Sixty (43 percent) out of 140 drop-out farms gave losses arising from low productivity of birds as the main reason for dropping out. Of these 60, 75 percent said they did not obtain supplies of day-old chicks on time, 70 percent said they did not get the desired number of day-old chicks, 97 percent said the quality of day-old chicks was low to average, and 89 percent said they had low/average satisfaction with the quality of purchased veterinary drugs. The corresponding percentages for those who did not give low productivity as reason for dropping out (but might have given another reason) were 60, 50, 75 and 63 percent. Thus, problems with the supply of day-old chicks and of quality drugs appeared to be a major reason for low productivity leading to losses and failure of the business, although other reasons could also have played some role.

These are the types of problems (especially those related to reduction of input and output price uncertainty and assurance of a remunerative return for all parties through timely and adequate supply of good quality inputs to produce quality output and reduce mortality) that are ideally addressed by contract farming-type market institutions. In the Bangladesh context, contract farming currently covers a tiny share of the industry, so there is wide scope to expand this type of market organization for the mutual benefit of producers, hatchery owners, feed manufacturers and integrators, and to promote the stable growth of the industry.

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Getting the poultry private sector involved in the development for Africa

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SUMMARY

Africa has the largest number of least-developed countries globally. Aid and debt relief, the traditional remedies offered to overcome the continent's dependency and underdevelopment have not been very effective. To achieve Africa's goal of sustainable development, the development of its private sector is essential. With the change in the role of state, and the increased competitiveness caused by globalization, African countries are increasingly relying on the private sector for economic growth. The private poultry sector in Africa is growing fast, and has the capability not only to influence its economic development, but to serve as a tool for poverty alleviation.

Key words: Africa, poultry, private, sector

1 INTRODUCTION

The agricultural sector is the backbone of the economies of most sub-Saharan African countries, providing food for the populations. Livestock production currently accounts for about 30 percent of the gross value of agricultural production in Africa. Seventy percent of the rural poor in Africa own livestock (Seré, 2004), and as mentioned in the poverty reduction strategy papers prepared by many African governments in the past years, livestock and especially poultry can play a big role in improving nutrition and poverty alleviation.

Food policies have been mostly concerned with promoting increased production of staples. While this is important for good nutrition, food and agriculture policies have done too little to improve dietary diversity and increase consumption. Even though liberalization of the economy means that the private sector is playing a greater role than previously, there is increasing evidence that the reform has not led to the anticipated broad-based sustained growth in farm productivity and incomes, particularly among the small-scale farmers and traders who continue to dominate the region's agricultural systems.

2 THE PRIVATE SECTOR

In recent years, many African countries have undertaken economic reform programmes, and the private sector is now one of the most important actors. It is widely recognized that the private sector institutions in most countries are weak, partly due to the dominance of the state in the past. Enterprises need a wide array of support services, from representation before government, to consulting and technical services, to financing (Kennedy and

Hobohm, 1999). The need for a strong private sector is further evidenced by the poor record of African countries in attracting foreign direct investment.

3 THE INFORMAL SECTOR

Challenges are many, as the formal small private sector faces competition from an informal sector that grows day by day. The informal sector in Africa could account for a significant portion of the GDP and employment. As Muwonge *et al*. (2007) note "There is an ongoing debate in the literature [as to] whether the informalization of African economies is a result of bottlenecks and red tape that hinder smooth operation in the informal sector, and hence compete with the formal sector, or whether the sector is complementing the inadequacy of the formal sector". The International Labour Organization (Xaba *et al*., 2002) illustrates how important the informal sector is to sub-Saharan Africa. In Cameroon, 80 percent of all jobs created in 1992 were in the informal sector. In Ghana, 89 percent of the labour force is employed in the informal economy, and in Nigeria, the informal sector employs one-third of the urban labour force (Muwonge *et al*., 2007).

Relevant studies in the region and casual observation across the continent show that African economies are becoming increasingly engulfed by problems related to the harmful impact of this unregulated sector on the economy in general and revenue performance of the government in particular (ibid.). The 2001/2002 Uganda Business Register reported that the informal sector constituted 150 138 businesses, which is 87 percent of the total 160 883 business establishments in the country (ibid.).

The private sector cannot act alone, it needs to work together with the public sector, and it is often realized that weakness in the capacity of the public sector also needs to be overcome. The role of the state has changed; while public institutions are no longer as directly involved in the provision of goods and services, they still have an important role to play in the development of the private sector, especially in regulating and promoting its development.

Partnerships between the private and public sectors are very important. The governments need to put in place sound and stable "rules of the game" that create a fair, attractive and level playing field, and give the private sector the confidence to get on, and compete, in what it does best: business and creation of wealth.

4 THE POULTRY INDUSTRY IN UGANDA

Livestock production constitutes an important subsector of agricultural production in Uganda. Most livestock production, including poultry, takes place on small farms. It is estimated that commercial flocks for egg and meat production represent only around 14 percent of the total number of birds in the country. Table 1, below, shows the estimated evolution in the number of commercial birds over a period of 11 years. Both production of broilers and layers have increased significantly.

The industry is relatively new in the country, with the first hybrid chickens arriving in the 1950s. In 1965, the first private company started producing animal feed. During the 1970s and 1980s the industry decreased tremendously; chicks, drugs and feeds were allocated by the Government due to shortage in the market. During the 1990s, the animal feed industry, drugs, and veterinary and extension services were liberalized, leading to the emergence of

TABLE 1
Evolution in the number of commercial birds in Uganda (1 000)

Poultry	1993	1994	1995	2000	2004
Commercial layers	597	657	722	1 163	1 658
Commercial broilers	1 274	1 402	1 542	2 483	3 573
Total	1 871	2 059	2 264	3 646	5 231

many feed mills and private practitioners. The private sector invested heavily in breeders and hatcheries.

The poultry sector in Uganda can be classified into three levels of production: indigenous flocks, parent-stock flocks producing hatching eggs for day-old broilers and day-old layers; and commercial flocks of broilers for meat and layers for production of table eggs. Supporting the industry are the feed mills, which provide feed for the whole industry. It is estimated that feed mills in Uganda produce a total of 80 000 tonnes of compound feed per year, sourcing 97 percent of their raw material locally (maize, fishmeal, cassava, cottonseed cake, etc.). Considering that 90 percent of total feed production is directed to the poultry industry, it could easily be said that poultry production is the driving force of agricultural development in Uganda.

Despite the importance of indigenous flocks for the rural population of Uganda, production of eggs and meat is very low compared to commercial flocks. Disease challenges and lack of proper vaccination programmes can in any year reduce the number of indigenous flocks.

The informal poultry sector dominates the scene in the country. While no more than ten feed mills are formalized, hundreds of small mixers have invaded the whole country. Therefore, an organized industry that can sustain the nutritional needs of the people and contribute to the growth of the economy and to the overall development of Uganda is of utmost importance.

4.1 The Poultry Association of Uganda

On 3 September 2004, the Minister of Agriculture officially launched the newly established Poultry Association of Uganda (PAU). For many years, all stakeholders had felt that without an organized association it would be impossible to solve many of the problems affecting the poultry industry.

The association is made up of poultry farmers, hatchers, feed millers, veterinary and animal husbandry service providers, animal and human nutritionists, health workers, economists, policy-makers, educationalists, drug manufactures and dealers – all united in the common cause of fighting malnutrition and poverty, right from the grass roots. The major objective is to transform poultry production in Uganda into a broad-based commercial activity for sustained food security, malnutrition reduction, poverty alleviation and income generation through integrated production, utilization, marketing and trade.

4.2 Challenges and initiatives

Today, poultry is playing a big role in the urban and rural economy in Uganda, acknowledging that there are many challenges to be solved. The emergence of highly pathogenic avian influenza (HPAI) worldwide has brought the poultry industry in Uganda into the picture as never before. Government has discovered a small but organized formal sector with a lot of potential to develop. But, it becomes evident that the sector, formal and informal, needs to be organized, monitored and regulated in order to promote development.

Implementing policy

This requires that the private sector sets itself high standards in terms of the way it behaves, its corporate governance, its approach and attitude toward the evils of corruption, and its approach to environment sustainability. All of that is part of the deal that has to be struck if profit is to be maximized, if growth is to be sustainable and if Africa is to develop (Boateng, 2005). It requires that the public sector equips itself with policy-makers that understand the industry, its dynamism, and its local and its regional context. It requires total commitment of key players and involvement of a multiplicity of disciplines to put policy formulation in context and take into consideration the peculiarities which exist in society, and to ensure that policies are acceptable to all. Polices can be useless if public regulating bodies capable of ensuring minimum standards in the informal poultry sector are not present.

The Animal Feed Bill

The Animal Feed Bill can serve as an example. The draft presented and proposed by the government to the formal sector in 2000 has not been effective, as 50 percent of the total output of animal feeds in Uganda is produced by the informal sector. Feed millers from the formal sector have suggested a pilot test of the bill involving the informal sector. A sensitization workshop involving more than 150 participants was held, and for a period of one year, samples of compounded feeds and raw materials were collected and analysed; the results were published in the newspapers with the names of the company and the standards attained by their respective products. This initiative has demonstrated the urgent need to improve the informal sector by registering premises and setting quality-control standards for the producers in order to create a fair market for all and sustain good production countrywide.

Egg awareness campaign

The egg awareness campaign promoted by the PAU focuses on enhancing consumption of eggs across the whole country by using existing resources: thereby generating a real revolution in the agricultural sector in Uganda. While one egg a day is good advice, per capita consumption of eggs in Uganda is below 20 eggs per year; a marketing campaign will address this issue by sensitizing the population as to the importance and benefits of including an egg in the their daily diet. Research has shown that the content of animal protein tends to be very low in the average African diet (Neumann, 1998). Therefore, raising awareness about the positive contribution that eggs, as a cheap animal protein source, can make to the diet of the Ugandan population, especially children at primary school level, is of utmost importance. It is assumed that an egg awareness campaign will increase egg consumption, and hence the poultry sector as a whole will be promoted.

Harmonizing players

Players in the sector need to be organized, and it has taken five years to form an association. Today, under the umbrella of the PAU, breeders, hatchers, feed millers, processors, commercial farmers and poultry product dealers, are united for a common goal. This is the main reason for having an association that has the objective of promoting the development of the sector and contributing to the development of the whole country. The members feel they are no longer single individuals, but one body looking forward to a better future.

Partnerships

Partnerships in our days are not only fashionable, but a necessity. Companies and particularly those in the poultry sector cannot work in isolation: public–private partnership is the only way to go. The recent HPAI crisis has highlighted the necessity of adapting not only the public veterinary services, which over the years have not been up to the dynamic changes in the sector, but also the necessity of having the private sector setting priorities, harmonizing players and, finally, formalizing the partnership with the public sector as a way of driving towards sustainable development.

5 CONCLUSION

The obstacles to private sector development in Africa are clearly many and varied. This is partly related to former dependency on the public sector as a provider and to the fact that the private sector is young and inexperienced, but above all it is related to the absence of the national or regional policies needed to develop an organized and harmonious sector. In Uganda, as in many African countries, there is an enormous room for expansion in the production; processing and marketing of poultry – see the budget speech for the financial year 2007/2008 (Suruma, 2007). Successful experiences with the private sector fostering growth and development will be realized if good governance, a sound economic environment and well-functioning physical and social infrastructure is in place. With improved policies and upgraded governmental institutions that promote and efficiently regulate the private sector, we foresee that the African poultry sector can contribute to reversing the increasing marginalization of African economies, and finally to changing the focus of the world's eyes towards this continent that is awaiting to be discovered as having the highest potential on our globe.

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Poultry as a development tool

SUMMARY OF DISCUSSION

There was a general consensus that, unfortunately, poverty would persist for the foreseeable future and that poultry keeping would continue to be a widespread livelihood activity among the poor. It was also noted that a problem in Sector 4 (backyard poultry) can be a problem for everyone. It was therefore recognized that this sector requires attention. However, there was some disagreement as to the potential of small-scale poultry keeping as a development tool. According to one point of view it is merely a safety net for the poor, with little potential for development. Others, however, stressed that poultry development is a means to empower and give options to the poor, thus enabling them to participate in the development process and take the first steps on a pathway out of poverty. Further, it was argued that although keeping a small flock of chickens is not in itself a solution to poverty, it can serve as an entry point for discussion of nutrition and other health issues with the owners. It was also argued that there is no clear distinction between the "safety net" and the "development" aspects of poultry keeping as the former is an important function for people who have no access to other forms of savings.

The point was also made that poultry production will inevitably change as society changes, and that there is a need to ensure that development policies do not restrict the opportunities for the poor to move beyond small-scale systems. Conversely, it was argued that there is a need to take into account the possibility that development efforts could expose poorer poultry keepers to greater levels of risk.

There was also some debate as to whether the main need is for poultry specialists or for generalists who can understand village systems, an argument for the latter being that the bottom line is to improve the health and nutrition of the villagers rather than only to promote poultry production; other options for livelihood development need to be considered. It was noted that projects can bring in specialist services as and when needed.

Another question related to the transfer of existing poultry development models to other countries. It was, for example, noted that attempts to introduce the Bangladesh BRAC model into Malawi – a country with a less dense population and fewer NGOs – were not successful. It was argued that approaches need to be adapted to the particular circumstances, starting with local priorities and developing according to the needs of local people.

Several speakers emphasized the importance of partnerships, including the need to work through local institutions and to ensure backing from governments. It was argued that links between private vets and community animal health workers offer an opportunity to overcome the weaknesses that often characterize public-sector delivery of livestock services to the poor. Links between the animal health services and the poultry keepers were also seen as important from the perspective of surveillance for highly pathogenic avian influenza and for other disease threats that may emerge in the future. The need for platforms for debate was noted, with FAO being described as one such platform.

Links to the market and mechanisms for the provision of credit were noted as important elements of poultry development programmes for the poor. Training and capacity-building were also emphasized. It was argued that health and food safety issues need to be better addressed, particularly where more trade in poultry products is seen as an objective. The genetic diversity of local poultry populations was described as a resource that to some extent underpins future sustainability and productivity; opportunities to exploit niche markets of various kinds (tastier or healthier meat) were noted.