Additional Papers

Common diseases of smallholder poultry and their control in Bangladesh

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INTRODUCTION

Bangladesh, the world's biggest delta landscape is situated between 20° 34′ and 26° 38′ north latitude and between 88° 01′ and 92° 41′ east longitude. The country is bounded on three sides- west, north and east - by India with a small strip of boundary with Myanmar at the extreme south -east. In the south lies the Bay of Bengal.

The climate of Bangladesh is dominated by tropical monsoon with high to fairly high rainfall and an equable temperature. The relative humidity varies from 40% to 99%. The country is one of the most densely populated and least developed in the world. The majority people live in rural areas and are solely dependent on agriculture, and from time immemorial the system of agriculture is very much integrated consisting of crop, fishes, livestock and poultry.

More than 80% traditional farmers still raise native scavenging chickens, with little or no inputs, mostly for domestic consumptions and petty income. However, in recent years due to rapid urbanization around major cities lands are becoming scarce for crop production, and also due to increased demand for meat and eggs in the urban areas people are switching over from scavenging native chickens to commercial chickens, which are mainly exotic purebred and/or hybrids, and various crosses. The commercial layer or broiler farms operated by low-income group people in rural situation, with around fifty or more chickens, raised in semi-intensive to intensive operations in our study have been put under 'Smallholder Poultry' (SP).

Recently, Rahman *et al.* (1997) have highlighted the prospects of rearing exotic hens by the rural poor in Bangladesh. They found SP projects as important tool for poverty alleviation and social empowerment for the poor, especially for the rural women. Seeing the prospects, various government and non-government organizations (NGOs) have come forward helping distressed women and unemployed youths across the country in establishing SP farms so as to make them self reliant. However, in the existing socioeconomic and environmental conditions SP farming yet is not so profit making because of various problems including diseases. And coupled with many other problems diseases have been encountered as the number one problem so far.

The geo-climatic conditions and attached territorial location of the country with India and Myanmar is very much conducive for the development and spread of a wide variety of diseases. The economic losses caused by different diseases in terms of low production,

mortality and cost of medicine is enormous. In this paper an attempt has been taken to focus on the most commonly occurring diseases of SP in a rural development project and their control at farmers level, and possible suggestions thereof.

METHODS

This study was conducted in a rural setting at Bailor and Kanthal union of Trishal, Mymensingh, located at about 100 km north of Dhaka and about 18 km south of Mymensingh district headquarters on both sides of the Dhaka- Mymensingh highway. This is a moderately highland area and less frequently gets inundated during floods. The major part of the area is under rural electrification and well communicated with the district headquarters of Mymensingh.

Majority people of this area are poor and involved in agriculture with little lands and infrastructures. Considering the poor economic backgrounds of the common people the local Rotarians underscored the need of poverty alleviation in the area through improved agriculture, and livestock and poultry development. Consequently, the Rotary Club of Mymensingh, Bangladesh district 3280 with the financial support of the Rotary Foundation of Rotary International launched its 3-H (Health, Hunger and Humanity) project in two phases 1988 to 1992 and 1995 to 2000 named 'Livestock and Poultry Development Project' and 'Integrated Farming Development Project', respectively.

Amongst the many objectives of the projects, SP development was a focal target to help income generation of the women and unemployed youths. To this end, side by side of rearing of indigenous chickens, improved pure breeds (White Leghorn, Rhode Island Red, Fayoumi, and Australorp) and various crosses (Sonali, and Rupali), and ultimately different high yielding layer and broiler hybrids were introduced in the area. Farmers were motivated, trained and where possible incentives, loans were provided. Later a poultry hatchery unit has been established near the project centre to facilitate distribution of day old broiler and layer chicks. A qualified Veterinary Surgeon and several trained auxiliary personnel/ vaccinators were deputed for disease surveillance, treatment and control. We as a counterpart of the project management monitored the disease situations in SP in the project area during the period from May 1995 to April 2000.

As a consequence, sick and/or dead chickens brought by the SP contact farmers and/or project field personnel at the project clinic were investigated for various diseases/ ailments. The diagnosis was based on history, clinical signs and symptoms, clinical examinations and postmortem lesions. Factors influencing diseases, and treatment /control measures adopted by the farmers were recorded.

RESULTS

In this investigation as many as 20 different diseases were recorded including deficiency disorders (Table 1). The most common diseases were, infectious bursal disease (IBD), Newcastle disease (ND), salmonellosis, mycoplasmosis, vitamin and mineral deficiency disorders, colibacillosis, fowl cholera and coccidiosis. Incidences of IBD, ND, colibacillosis, mycoplasmosis, coccidiosis and deficiency disorders were very high in chickens aged between 3 weeks and 4 weeks, where as salmonellosis was common in laying hens.

TABLE 1. COMMON DISEASES OF SMALLHOLDER POULTRY ENCOUNTERED AT THE ROTARY INTERNATIONAL PROJECT, KANTHAL AND BAILOR OF TRISHAL, MYMENSINGH FROM 1995 - 2000 (N= 24258).

Category	Disease	Number affected (%)	Total (%)
Infectious diseases (viral, bacterial, mycoplasma, fungal, etc.)	Newcastle disease	5336 (22.00)	73.37
	Salmonellosis	3820 (15.75)	
	Mycoplasmosis	2546 (10.50)	
	Colibacillosis	2127 (8.77)	
	Fowl cholera	1885 (7.77)	
	Aspergillosis	1184 (4.88)	
	Lymphoid leukosis	485 (2.00)	
	Necrotic enteritis	268 (1.10)	
	Infectious coryza	86 (0.35)	
	Aflatoxicosis	37 (0.15)	
		23 (0.09)	
Parasitic diseases	Coccidiosis	1024 (4.22)	7.30
	Ascaridiosis/Heterakiosis	212 (0.87)	
	Cestodiosis	209 (0.86)	
	Ectoparasitosis	326 (1.34)	
Deficiency disorders	Riboflavin (vitamin-B2) deficiency	1034 (4.26)	11.51
	Thiamine (vitamin-B1) deficiency	927 (3.82)	
	Biotin/Choline deficiency	530 (2.18)	
	Encephalomelacia (Hypovitaminosis E)	18 (0.07)	
	Mineral dificiency	284 (1.17)	
Miscellaneous diseases Infectious bursal disease	Non-specific pneumonia	785 (3.24)	7.82
	Visceral gout	395 (1.63)	
	Heat stroke	327 (1.35)	
	Ammonia intoxication	390 (1.60)	

Infectious diseases:

Of the reported cases, more than 73% birds were affected with infectious diseases (mostly viral and bacterial) causing high morbidity and mortality. In some farms mortality was even up to 100% due to IBD and/or ND.

IBD or Gumboro disease: The disease occurred in the chicken flocks in intensive management mostly. Clinical signs included vent picking, depression, ruffled feather, rapid weight loss and whitish diarrhoea. Chickens died due to severe dehydration. Postmortem showed haemorrhages in the thigh and/or pectoral muscles, and the bursa of Fabricius was swollen.

ND or Ranikhet disease: It was a very common disease in the project area in semi-intensive system of rearing. The affected birds showed varied types of symptoms. These included difficult breathing, cough, loss of appetite and sudden drop of egg production. Paralysis of the leg and/or wings along with torticollis and in coordination of movement was also noticed. Greenish/greenish white diarrhoea was a common feature. Postmortem examination revealed petechial haemorrhages in the proventriculus.

Lymphoid leukosis: The disease affected the heavier breeds of chickens during pre- and post- production stage. Enlargement of liver and spleen with white nodules of various sizes were the characteristic postmortem lesions.

Salmonellosis: This was recorded in about 11% cases. The affected chickens showed inappetance, slow growth, and debility. Chalky white materials were found to attach with the vent. Diarrhoea and subsequent dehydration was very common. There was catarrhal enteritis, peritonitis and pericarditis and also in long lasting cases ruptured yolk materials in the abdominal cavity.

Fowl cholera: The disease was common in scavenging native chickens, which also affected hybrid chickens in the project area. The affected birds showed fever, anorexia, mucous discharge from the mouth and nasal passage, and diarrhoea. The most striking sign was cyanosis of combs and wattles. Postmortem lesions included swollen liver with focal coagulation necrosis. Lungs were also congested and pneumonic.

Mycoplasmosis and/or Chronic Respiratory Disease (CRD): It was observed in about 9% cases and usually occurred sub-clinically. Clinically the disease was manifested by tracheal rales, nasal discharge, cough, anorexia and emaciation. On postmortem fibrin deposition on the surfaces of visceral organs were common.

Colibacillosis: It was recorded in about 8% cases. Chickens died suddenly showing no visible symptoms. However, postmortem examinations revealed petechial haemorrhages in the spleen, heart and liver.

Necrotic enteritis: The disease was detected in less than 1% cases characterized by anorexia, listlessness, ruffled feather, emaciation and diarrhoea. The main lesion consisted of necrosis and haemorrhage in the wall of intestine and in some cases necrosis of the liver.

Infectious Coryza: The disease has been encountered occasionally with the symptoms of serous and/ or mucous discharge from nostrils, facial oedema and conjunctivitis.

Aspergillosis: The disease was recorded in about 2% cases characterized by gasping, ruffled feather and depression. The carcasses were very much cachectic. Yellowish and/ or whitish nodules of various sizes and shapes were seen mostly in the lungs, and sometimes on the intestinal surface, pleura and peritoneum. Respiratory passage was plugged with mucous exudates.

Parasites and parasitic diseases: In all, about 8% chickens were affected with various parasites. Among the metazoan parasites, Ascaridia galli, Heterakis gallinarum, Raillietina spp. and Capillaria spp. were detected. However, only A. galli and tapeworms caused intestinal obstructions in some cases. The most striking effects of A. galli infection in layers were drop in egg production and in broilers stunted growth. In A. galli affected broilers the breast and thigh muscles were very much emaciated. The only protozoan disease of considerable economic importance was coccidiosis. About 5% chickens died due to intestinal/caecal coccidiosis. The disease was characterized by droopiness, depression, ruffled feathers and blood mixed diarrhoea. On post mortem the affected intestinal tract, particularly caeca were swollen and congested. Ectoparasites like lice,flies, flea, red mite and scaly leg mite were detected in some laying flocks. Whereas, housefly caused great nuisance to the broiler flocks.

Nutritional deficiency diseases: About 12% birds were found affected with nutritional deficiency disorders. The most common was hypovitaminosis B (thiamine and ribofla-

vin). Thiamine deficiency caused paralysis of the neck muscle and the affected birds were in star gazing position. Deficiency of riboflavin caused curled toe paralysis. Vitamin E deficiency was characterized by encepalomalacia, ataxia, subcutaneous oedema, in coordination of movement, prostration and death. Deficiencies of calcium, magnesium and selenium have been observed in growing and layer chickens.

Miscellaneous diseases: About 8% diseases were encountered in this category. Among the diseases/conditions, non- specific pneumonia was very frequently detected. The other conditions were visceral gout, heat stroke and ammonia intoxication. Visceral gout was detected in laying hens above 20 weeks age. The affected birds showed anorexia, listlessness, dizziness and drop in egg production. Postmortem examination revealed deposition of chalky white materials in the visceral organs and the kidneys were enlarged. In several occasions both layers and broilers died due to heat stroke during hot summer months. At necropsy muscles looked just cooked, in particular the breast muscles. Ammonia intoxication due to production of ammonia gas in the poultry litter was also detected in poorly ventilated houses. The affected birds showed the symptoms of leg and wing paralysis and blindness.

Treatment and/or control at farmers level: A great majority of the farmers in the locality did not practice proper treatment and/ or control regimens to combat poultry diseases. Feeding, housing, medication, vaccination, and disposal of dead birds and waste materials were very casual and haphazard. The farmers reported to the project veterinary clinic or elsewhere for help only when a large numbers of productive birds were sick and/ or dead. Farmers vaccinated their flock mostly against ND, fowl pox and fowl cholera with the help of the project. They had very little opportunity to go for vaccination against IBD (gumboro), Marek's disease, salmonellosis, mycoplasmosis and other emerging or re-emerging epidemic diseases. Therefore, farmers were mostly dependent on antibiotics and sulphur drugs to keep this disease incidences minimum. About 95% farmers used coccidiostats as a feed additive, and to get rid of helminth parasites (A. galli and others) majority farmers used anthelmintics. Farmers cared very little about ectoparasitic problems.

DISCUSSION

In spite of growing awareness in commercial poultry farming, cost effective poultry rearing is still in a nascent stage in Bangladesh. In particular, SP farming in Bangladesh is facing a major seat back towards sustainability due to various diseases/ ailments. On average 30% poultry birds die annually due to diseases (Ahmed and Hamid, 1992). BRAC experiences also suggest about 35% to 40% poultry die due to various diseases and predators (Saleque, 1999).

Various biological, cultural, social and economic factors greatly influence healthy flock management in the villages. High chick mortality has always been found associated with poor feeding, housing and health control practices. Although farmers, poultry development specialists, research workers and poultry health related academics believe diseases are the main obstacle to profitable poultry production in Bangladesh but no disease surveillance programme has been undertaken so far. Therefore, obviously there is a dearth of published literature in the field of village poultry and/ or SP in the country. Based on our present observation IBD and ND are the two main diseases causing high mortality in SP.

In Bangladesh IBD is an emerging disease. The disease first occurred in an outbreak form in 1992 and caused mortality as high as 70% in layers and 30% in broilers (Islam, 1996). However, in present systems of SP farming mortality ranged from 10% to 20% (Bhattacherjee *et al.*, 1996; Islam, *et al.*, 1998). Immunization history suggests, in spite of vaccination of the chicken flocks with imported IBD vaccines mortality could not be checked. IBD vaccines are not produced in Bangladesh; therefore, it is imperative to search for a suitable vaccine that is antigenically related with the IBD virus prevalent in Bangladesh. ND is an old disease endemic in this country, causing havoc in scavenging chickens.

Very recently, due to available vaccines (BCRDV and RDV) in the country the situation has been changed significantly. However, in our observations faulty farm management and improper vaccinations have led the farmers to heavy losses due to ND. As reported by Kamal (1989) and Islam *et al.* (1998) incidences of ND varied from time to time and place to place, which is also our present observation. Salmonellosis is always a problem of economic concern.

Although the disease has been reported in several forms depending on the causal agents but in this study most of the cases were suggestive of pullorum disease. Usually young chickens are severely affected with pullorum disease but in the present investigation laying birds were the victims. Salmonella vaccines are imported but not readily available to the common farmers. Colibacillosis was often found associated with mycoplasmosis. Strict hygienic measures and proper sanitation at all levels of farm management has been found the best method of control but a few farmers were able to adopt the practices.

About 2% birds depicted symptoms of brooder pneumonia (aspergillosis) and a very few with aflatoxicosis. The mycotoxicosis /aflatoxicosis should not be neglected, since it could be an important inducing factor to many infectious diseases (notably IBD, salmonellosis and colibacillosis) in hot, humid and rainy months in Bangladesh. It is a widely held view that mycotoxicoses can led to increased susceptibility to infectious agents because it impairs disease resistance through an alteration of various defence mechanisms (Thaxton *et al.*, 1974). Although endo-parasites (Ascaridia and Heterakis) have been regarded as the main impediment of profitable production of poultry in tropical countries including Bangladesh (Islam and Shaikh, 1967; Oyeka, 1989; Jansen and Pandey, 1989; Mondal and Qadir, 1991); but it was not the case in this study. May be the heavy mortality caused by infectious diseases overshadowed the impact of less fatal parasitic ones.

On the contrary, farmers dewormed poultry routinely in the project area and also tried to clean poultry manures at regular intervals. Incidences of coccidiosis are also decreasing in Bangladesh because of routine use of coccidiostats and use of vaccines in some selected organized farms. But it will take time to reach coccidial vaccines to the smallholder farms. Necrotic enteritis was though not very common but it should be regarded as an important disease since it has been found associated with coccidiosis causing severe production losses in broiler industry (Vissiennon, 1996).

A high rate of deficiency disorders in SP reminds us scarcity of quality feedstuffs and careless feeding practices. An increasing trend of nutritional deficiency disorders may be correlated to faulty ration formulation, and indiscriminate use of feed additives and antibiotics. All the diseases under miscellaneous category like non-specific pneumonia, heat stroke and ammonia intoxication, were related to poor/ faulty housing and/ or feed and water management.

A closer look at SP farming showed that in spite of training and motivation farmer's attitude towards healthy poultry management was still hazy. Most of the farmers vaccinated their flocks without maintaining cool chain and indiscriminately. The principles of bio-safety are yet difficult to implement by the SP growers because of various socio-economic barriers. Moreover, various deadly diseases are getting entrance through the importation of parent stocks, because we do not have adequate quarantine facilities. Quality feedstuffs, vaccines, medicines, chicks, and disease diagnosis facilities are still far from the reach of the majority SP farmers. Without taking any effort to tackle all this problems of SP farming on a regular basis, mere ad hoc programme will not help SP farming to grow anymore in the country, because disease situation might get worsen in the near future.

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Questionnaire to assess training needs in the area of village poultry production

PREPARED FOR PARTICIPANTS IN THE INFPD E-CONFERENCE. MAY 2002.

Name:

Position:

Institution:

Postal Address:

Tel:

Fax:

E-mail:

Highest academic qualification:

1. For how many years have you been working with village poultry?

2. How did you gain your knowledge of village poultry production?

3. a) What specific training on village poultry production have you completed?

   b) Who conducted this training?

c) How was the training conducted?

d) What were the best aspects of this training?

e) How could this training have been improved?

4. What areas of village poultry production would you like to know more about?

5. Do you have access to - (Please tick the correct response)

a) A computer?	Yes	No
b) A printer?	Yes	No
c) E-mail?	Yes	No
d) The internet?	Yes	No
e) Any comments?	Yes	No

6. What reference material on village poultry do you have access to:
   a) In your own collection?

   b) In libraries?

7. What specific reference material on village poultry would you like to have easy access to that you currently lack?

8. Would you be interested in studying for a Graduate Certificate in Village Poultry Production? (Details on last page; please tick the correct response)

   Yes No

   Any comments?

9. Would you prefer to study for the Graduate Certificate in Village Poultry Production - (Please tick the correct response)
   a) Fulltime at the University of Queensland? Yes No
   b) Part-time as a distance education course? Yes No
   c) Any comments?

10. Would you be interested in studying for a Graduate Certificate in Small Scale Production and Quality Control of I-2 ND Vaccine? (Please tick the correct response)

    Yes No

    Any comments?

11. Would you prefer to study for the Graduate Certificate in Small Scale Production and Quality Control of I-2 ND Vaccine - (Details on last page; please tick the correct response)
    a) Fulltime at the University of Queensland? Yes No
    b) Part-time as a distance education course? Yes No
    c) Any comments?

Thank you for completing this form. The information you provide will be used to prepare training courses that will meet the needs of workers in the field.

Please return the form to Dr Robyn Alders at robyn@tropical.co.mz or please send it by fax to +258-1-475172 marked for the attention of Dr Robyn Alders.

GRM International, an Australian Consulting Agency, is working with the University of Queensland to establish an International Village Poultry Centre that will provide a wide range of services. One of the services will be the provision of training that will lead to the award of Graduate Certificates, one on the small-scale production and quality control of I-2 ND vaccine and a second on village chicken production.

Proposed UQ Graduate Certificates

Each Graduate Certificate will consist of eight units of coursework based on four subjects, of two units each. The Graduate Certificate courses will be run as distance learning courses over at least 13 weeks with students coming together for part of this time in a suitable location. If students do not wish to study fulltime, then the course may be done part time over 40 weeks. Students will require access to e-mail and preferably to the internet also.

The prerequisite for entry into the course is a degree in veterinary science from a recognized university or an approved degree from elsewhere, or evidence of relevant training and work experience to satisfy the Head of the School of Veterinary Sciencethat the student is suitably qualified. Prospective students will have to submit a formal applicationand will have to meet the English requirement of 6.5 in IELTS with a score of 6 for writing. During the course, students' practical skills and theoretical knowledge will be assessed, the latter via the completion of problems and small assignments.

Small Scale Production and Quality Control of I-2 ND Vaccine Graduate Certificate

1. Introduction to ND, ND control, ND diagnosis and ND vaccines.
2. Introduction to laboratory management and maintenance; and practical aspects of I-2 vaccine distribution and cost-recovery.
3. I-2 ND vaccine production.
4. I-2 ND vaccine quality control, registration and field testing.

Village Chicken Production Graduate Certificate

1. Village chicken farming systems, gender, sociocultural aspects and economics.
2. An introduction to avian physiology and pathology.
3. Diagnosis, treatment and control of common diseases and production constraints.
4. Extension methodologies, participatory constraint identification and development of control strategies.

Chicken Production Systems

Murray Maclean

INTRODUCTION

Chicken production systems are usually classified according to the intensity of production, either intensive, semi-intensive, or traditional, and the primary output of production, either meat or eggs. The more intensive the production system, the more capital is invested, the higher the management level required in terms of input management and product marketing, and the higher is the poultry enterprise contribution to the whole farm income.

In Cambodia, traditional village-level chicken raising is carried out by nearly all farming families. The emphasis is on meat production for sale and home consumption but eggs are sometimes collected and sold instead being hatched. Very few traditional raising units at village level have been elevated to semi-intensive level.

In recent years there has been an increased number of intensive egg and meat production units near to Phnom Penh and Battambang, utilising imported breeds and prepared feeds.

This discussion will be limited to traditional raising as carried out by rice-farming families.

BREEDS

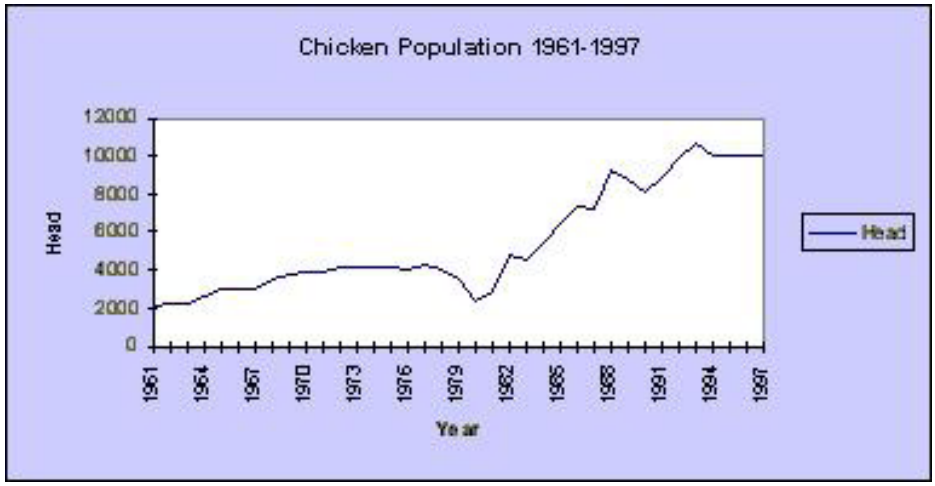
There appear to be four major breed types of chicken in Cambodia, according to Gauthier (1995), quoting Sarom (1995) as follows: Jai chickens: These are small poultry, with yellow/orange feathers with white spots, and red crest. These are considered to be closely related to the original forest-type chickens Sompuwv chickens: A large chicken with deep yellow or red feathers, commonly found near the Vietnamese border, but also in other places. It has a reputation produces lar Skuoy chickens: These have black shiny feathers, and a red comb. Fighting chickens: These are large chickens wit long legs, the males commonly used for fighting.

Farmers commonly refer to two types, the jai and the kok, the former referring to the small local chicken, and the latter to a larger local chicken type. The majority of village chickens are crosses between the various types, and are commonly referred to as "local" breed chickens, with the result it being very difficult to identify any specific breeds. Similar to village chickens throughout the world it is well adapted to minimal input village scavenging conditions, where nutrition is poor, and parasitic and infectious diseases are common. In Cambodia as in other countries in the region, village poultry raising is characterised by regular outbreaks of disease, presumably Newcastle Disease, that causes a high rate of mortality.

NUMBERS - NATIONAL BASIS

MAFF Statistics 1996-97 indicate a total poultry population of nearly 11.5 million, which is of the order of 1.2 poultry/head of population. It is difficult to estimate the proportion of these that are ducks, since separate statistics are not always maintained for the two major types of poultry. FAO reports that 1996 chicken numbers as 10,100,000. The following table shows numbers of chickens in Cambodia from 1961 to 1997 according to official statistics.

FIGURE 1
Chicken population in Cambodia 1961-97, in,000 head. Source FAO 1997



This shows a large increase the chicken population over the period from 1961 to 1997, in a similar pattern to that seen in the pig population. According to these figures, chicken numbers were in 1997, approximately 2.5 times the number of chickens in 1969.

It should be understood that the above figures should be taken as a general guide only. Leaving aside the unlikelihood of chickens being counted accurately, there can be enormous within year variations as to the number of chickens, at least on a village basis, due to disease outbreaks that kill many chickens. Sources also vary as to the actual population. For example, Tichit (1982) records that there were 4,700,000 chickens in 1967, whereas FAO source used above records 3,080,000 chickens.

DISTRIBUTION

The distribution of poultry throughout Cambodia is shown on the following map. It shows the concentration of the poultry population in the populated provinces around the major market in Phnom Penh.

LIFETIME PRODUCTION

Cambodian village chickens begin producing eggs at around 6-7 months old, when they weigh from 1.2-1.5kg. They begin by going through a laying period of 15-20 days, during which they lay about 11-13 eggs. There is usually no specialised hen house for the hens to stay in at night, and where eggs can be safely deposited.

The hens incubate the eggs by sitting on them for a period of 21 days. Of these eggs, only about nine will hatch into chicks. Once hatched these chicks follow the mother hen for a period of about two months, after which they will fend for themselves. At this stage males can be distinguished from the females by their larger appearance and crest development.

By six months of age, there is likely to be only about five surviving chicks due to deaths due to the effects of parasitism, poor nutrition, infectious disease, and predation. The males are usually sold or eaten at this age, when they weigh around 1.5 kg. Some females may be sold or eaten, but it is necessary to keep some females for breeder replacements.

If hens do not die during disease outbreaks that regularly sweep through the villages, they may be kept by the farmer until they are 2-2.5 year old. By this stage they are considered old and their egg production has dropped. In fact, hens that survive the disease outbreaks are often proudly announced as such by the farmers.

This pattern of reproduction and production from a hen in one year, without serious disease outbreaks is illustrated below:

FIGURE 2

Pattern of reproduction of one hen in one twelve month period, with some indicative numbers of chickens in each age group, numbers of chickens sold, and timing of sales.

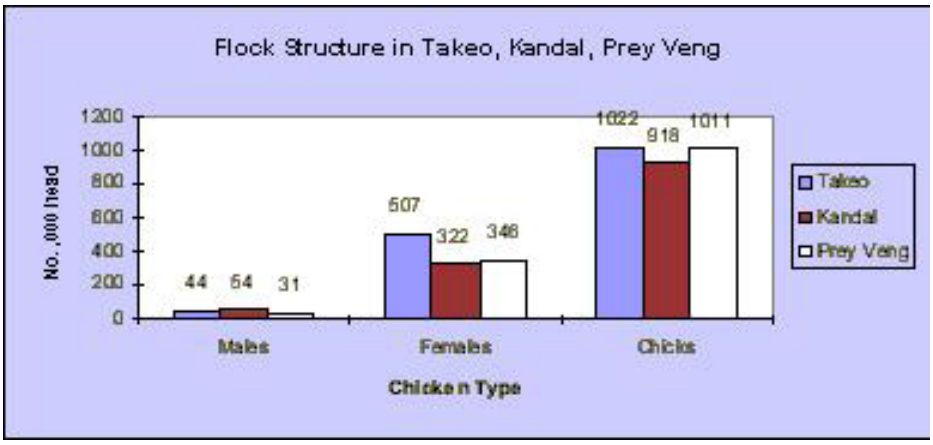
Mth	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hen	1	1	1	1	1	1	1	1	1	1	1	1
	12	9	7	5	5	5	5					
				12	9	7	5	5	5	5		
	5						12	9	7	5	5	5
	5	5	5	5						12	9	7
Youn	10	14	12	10	14	12	10	14	12	10	14	12
Sold	4			5			5			5		

12	12 Eggs-laid, and incubating, total 32-34 days
9	9 Chicks following the hen, period 2 months
5	5 Chicks scavenging free from the hen, aged 2-6mth

PROVINCIAL FLOCK STRUCTURE

A MAFF 1995 survey found the following relative numbers of adult males, adult females, and chicks.

FIGURE 3
Flock Structure of chickens in Takeo, Kandal, Prey Veng. Source MAFF survey 1995



This table shows similar flock structures in the three provinces, their being on average one male to every ten females, and 2.5 chicks to every adult female. The survey was carried out in May so it is possible that many villages would have recently had an outbreak of disease which would be expected to reduce numbers of chicks.

In a theoretical flock structure, where hens consistently raise five chicks to 6 months of age, in four clutches a year, the flock structure would show a ratio of chicks to adult females of around 13:1, much higher than the 2.5:1 shown in this table. This may indicate some non-laying hens or a high death rate in young chicks. In the survey results, it is suggested that there is a large number of non-laying hens, but the question asked to farmers in the survey was ambiguous therefore it is difficult to interpret.

FAMILY FLOCK STRUCTURE

The regular occurrence of disease that kills a large percentage of chickens dominates the pattern of flock structure through the year, and forces the farmer to retain many of the young females to try to ensure that he continues to have breeding hens to keep producing.

In a self-replacing flock of one hen which regularly replaces breeding females, and has a no serious outbreaks of disease, the following flock structure is seen:

FIGURE 4

Flock Structure of one-hen self replacing flock in a 12 month period, during which there are no serious disease outbreaks. No eggs are sold. Inside the squares are indicative numbers of chickens for each age group. See table above for legend.

Mth	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hen	1	1	1	1	1	1	1	1	1	1	1	1
	12	9	7	5	5	5	5					
				12	9	7	5	5	5	5		
	5						12	9	7	5	5	5
	5	5	5	5						12	9	7
Youn	10	14	12	10	14	12	10	14	12	10	14	12
Sold	4			5			5			5		

In this model, the breeding female is replaced at the age of one year. This means that one young female each year needs to be retained as a replacement. Average chicks per hen is 12.8, and sells 19 chicks per year.

In the real situation in Cambodia, there are regular outbreaks of disease that kill many chicks and some hens. The following is an example of a flock with a serious disease outbreak at the end of May that kills 90% of chicks, but no hens.

FIGURE 5

Flock structure of a flock with a serious disease outbreak at the end of May that kills 90% of chicks, but no hens. No eggs are sold from the flock.

Mth	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Hen	1	1	1	1	1	1	1	1	1	1	1	1
	12	9	7	5	5	1	1					
				12	9	0	0	0	0	0		
	5						12	9	7	5	5	5
	5	5	5	5						12	9	7
Youn	10	14	12	10	14	1	1	9	7	5	14	12
Sold	4			4			1					

In this model, average chick per adult is 9, and sells 9 x 6mo chicks per year.

A model of a flock in which there are two outbreaks, end of May and end of November, in one (November) of which the hen is also killed appears as follows:

FIGURE 6
Example of a single-hen self replacing flock which there are two outbreaks, end of May and end of November, in one (November) of which the hen is also killed.

Mth	1	2	3	4	5	6	7	8	9	10	11	12
Hen	0	1	1	1	1	1	1	1	1	1	1	0
	0	0	0	0	0	0	0					
				12	9	1	1	1	1	1		
	1						12	9	7	5	5	1
	0	0	0	0						12	9	0
Youn	1	0	0	0	10	1	1	10	8	6	14	1
										1		

This flock has an average chick to hen ratio of 5:1, and sells one 6mo chick only.

The real situation is probably somewhere between these last two examples, that is 1-2 serious outbreaks of disease per year, with low-level disease in between times. With such a high level of disease, it would not be surprising that farmers would collect and eat or sell eggs

FEEDING STRATEGIES

Village chickens are free range scavengers that are fed supplements, which are primarily energy supplements, of white rice or paddy, which is usually cast over the ground in the yard of the house. Gautier (1995) states that young chicks may be given a supplement of white rice equivalent to 250 grams/day/10 chicks (amount equal to one can or kompong), and that an adult hen with her chicks may be given from 50-250 grams paddy/day. Some farmers give nothing to the chickens from November to April, considering that there is sufficient rice in the ricefields.

ECONOMIC CHARACTERISTICS

Indicative Gross Margins of a single hen flock with three scenarios of health control are shown below. Scenario one is poor health control and two disease outbreaks per year, the second is poor health control and one disease outbreak per year. The third is good health control and no disease outbreaks per year.

TABLE 1. INDICATIVE GROSS MARGINS FOR SINGLE-HEN ENTERPRISE WITH VARYING DEGREE OF HEALTH CONTROL.

	Health Control	$GM/year	Comment
1	Poor	1.67	Two outbreaks per year
2	Poor	2.89	One outbreak per year
3	Good	5.79	No outbreaks

The above table shows the large effect of health on profitability. In the good health option, only vaccines and treatments are carried out. No extra housing is provided.

The following is an example of scenario one above:

TABLE 2. INDICATIVE GROSS MARGIN FOR SINGLE HEN SELF REPLACING FLOCK THAT EXPERIENCES REGULAR DISEASE OUTBREAKS.

Item	Unit	Value Unit	No. Units	Total	Comment
1. Costs				1.70	Total
Purchase	Head	1.70	1	6.75	
Feed costs	Kg	0.30	22.50	8.45	
2. Income Chicks	Head	1.30	6	9.80	Total
Eggs	Kg	0.04	8	0.32	
Groos Margin				1.67	

Role of Small Scale Poultry in Rural Livelihoods Project

Syed Yousuf Hussain

INTRODUCTION

The Department for international development (DFID) UK has planed a very large mission partnership initiative in State of Andhra Pradesh (India) in primary education, Employment generation, Poverty eradication, water conservation. DFID is a partner in scaling of water shed activities by supporting capacities building, livelihoods support, convergence of other scheme and services collectively called "WATER SHED + ACTIVITIES" Through Andhra Pradesh Rural Livelihood project (APRLP) in five drought prone district having 14.8 million human population with geographic area of 8.6 million hac., aver rainfall 677 mm, working in 16 mandals, 105 villages with 13 pilot NGO's. A.P having biggest SHG in country 4.1 lakhs, 5.5 million members with saving pound 80 million, government assistance 30 million pound, loans assistance from bank 40 million pound total corpus of 150 million pound.

SUPER GOAL

Reduction of poverty in D.P.Dist of A.P under water shed scheme

Goal: - Effective and sustainable approach to eliminate poverty by enhanced livelihood of village poor by improve livestock activities in 13 pilot mandal through NGO's.

Support Services From APRLP

A. Technical
   1. Training model preparation
   2. Participatory training
   3. Exposure visit to Poultry Farm and Poultry products selling centers.
   4. Grounding, Evaluation and monitoring

B. Financial
   1. Support to SHG by financial agencies
   2. Direct finance support by community
   3. Support matching grands from project directors, DPAP.

APPROACH

1. Concept ualization of project by APRLP
2. Orientation course for project Implementing Authority (PIA) or NGO's--- APRLP_ Resource person
3. Capacity building of PIA for project appraisal ---- RP

4. Prepare operational plans ----- DCBC_ PIA
5. Social mobilization ------ DCBC _ PIA
6. Capacity building of primary and secondary stake holder ----- DCBC
7. Identification of target group ---- DCBC
8. Preparation of action plan ----- R.P., DCBC
9. Preparation of training model---- R.P
10. Identification of resource center ------ DCBC
11. Grounding, evaluation, monitoring---- R.P

Our Role: - Livestock consultant, development and implementation of livestock activities, short term consultant review every after 6 months and also a Resource person for livestock project.

PROCEDURE

In one of the identified pilot PIA i.e. Devarkonda mandal of Mahboobnagar Dist under DASM, NGO's three days training for 35 SHG leaders under taken in Sanjiveeni charitable trust a resource center (R.C.) having necessary infrastructure for training running industrial training institute and other activities. Selected SHG leader train by RP, participants requested to tell their problem with rearing village desi chicken. Participants belong to near by villages 10 to 12 km radius from RC all of them are group leader having desi chicken at home. Problem first identified like,

1. High mortality in desi chicken
2. Low productivity lay 50 to 60 eggs in a year.
3. Chances of theft, accidents are more
4. Supply of vaccine regularly in Rural areas very negligible
5. Govt Veterinary dispensery fully not equipped to deal with poultry diseases
6. Lack of knowledge of feed ingredients locally available, managemental practices not know
7. Training programmed for poultry keeping under taken by livestock department once in a while without sufficient information and no follow up.
8. Eggs and chicken farms situated in rural areas are discouraging or depopulating desi chicken
9. None accessibility to purchase eggs and chicken from commercial farms in retail results more cost than urban areas.
10. Like cattle service worker or shepherds training centre in village livestock center one poultry health worker needed for 10 to 12 villages.

Desi birds rearing is an integrated component of village women and culturally accepted and at any cost she/he do not want to stop but need solution of above mention problem permenantly. Basic concept of training was "Participatory training". Solution of each problem was deliver suited to rural management. 50 day old male commercial chicks was kept in training programmed apart from all necessary equipment and each participants allow to learn about equipment, Vaccination procedure, Debarking when and how, merits and demerits feeding watering, Brooding procedure. 20 progressive, attentive, with little education was identify during the training and further trains by RC on vaccination, medication and feed manufacturing techniques.

Mini Modern Cross Breed Commercial Layer farming

1050 day old commercial layer chicks breed BV 300 Placed in resourced center and rear up to 16 week in RC idea behind rearing in RC

1. Management aspect.
2. Vaccination schedule
3. New Concept and rearing 50 birds individually women's was not fully equipped in terms of management practices.
4. To minimize the cost of production (Growing).

Brooding management, Lighting, Vaccination, Medication, Debarking, Deworming, Body weight control, Feeding schedule during growing period done by SHG in presence of RC. Initially for six weeks chicks mash feed purchase from market after that growing feed manufacture in RC as per formulation suggested by RP with locally available raw material. Growing mortality 1.8% with in standard body weight 92% uniformity at the end of 16 week After competition of 16 weeks 50 birds distributed each individual women selected by DCBC/NGO's. Total cost of growing period equally divided in 50 women's. Birds at the start of 17 weeks shifted to cages for laying. Each cage accommodates 5 birds standard cage size suggested by RP. Even 5,10,15 birds can be kept, keeping in view the local consumption demand that is main criteria for successful implementation

Women found rearing 50 birds in cages is easy job than deep litter, hardly 1 hour in a day they spend on 50 birds for feeding, Watering, Collection of Eggs and cleaning. For 50 birds keeping on deep litter required 100 sq ft constructed shed not possible with poor as they don't have place to live. Cages 10 can be kept outside the house under shelter with 4 to 5 feet space apart from this other advantages.

1. Easy to manage, Feed, Water and collection of eggs.
2. Clean eggs no breakage.
3. Litter born diseases almost negligible.
4. Deworming not require
5. Theft, accident incidences nil
6. Light requirement less than deep litter one bulb of 100 watts sufficient
7. Feed consumption less saving, on feed waste of feed
8. Cost of shed construction almost nil only a thatched shelter
9. Cull, sick birds easily identify
10. More eggs per hen compare to deep litter

MARKETING

Total eggs are sold in village shop directly to consumer thus village consumer save 50np as compare to earlier. Consumption habits of most nutritious balance food that is eggs increases to many fold in the 50 villages were these birds rear. Simultaneously egg consumption awareness programmed was initiated by PIA by arranging villages meeting, Posters in local language, Video film demonstration to highlight the eggs consumption advantages.

During laying period, Feed manufacture at RC in presence of 50 women weekly basis formula suggested by RP and weekly visit to each group that is 50 with help of NGO's is

done by RP to monitor health status, Feed Consumption, Feed Storage facilities, Egg production and regard maintain by individual group is monitor on regular basis. As one cycle of 72 weeks not yet complete birds are in laying old performance is as per the standard.

A.P. State contribute 30% in egg production and 25% in Broiler of country 150 million layer and 700 million Broiler, Commercial Poultry population of country and 60% of A.P egg production export to other India state, infrastructure for poultry laying is easily and economical available in state even though our experience show that rural people still getting egg and chicken at costlier rate than urban in A.P. This one model started with extensive base line survey of village population to maintain production and demand ratio.

Other Pilots NGO's we are working on even small number like 15 to 25 birds in each village depend on consumption and human population. Initially SHG were afraid of maintaining birds as they thought cages are meant for big commercial farms and they cannot afford. One cage for 5 birds costed them Rs.60 only with less space and management hassle free, one time investment with an average income of Rs 150/ bird per year. Apart from this villages are easily assets to 2 eggs at cheaper rate, providing secondary income were as other livestock activities like Ram, lamb, Calf, Cow rearing require affords land for grazing, fodder, generated income for period of year.

In this model women keeps money for daily feeds by selling eggs in retail and rest of the amount keeps in saving i.e. is on and average they are getting 43 to 45 eggs daily sold at Rs1.50 per egg means 45x1.5= Rs.67.50 income daily where as feed per day for 50 birds at 125 grms per bird per day @ Rs.6.50/Kg =81 N.P. Totally expenditure on feed Rs 40.6-67.5= net income Rs 26.90 on 50 birds were as if she works for a day in field gets double the amounts approx that to only in season.

Our experience working on this model show regular monitoring and evaluation after placements of chicks till now support groups to get good result if replicated in all Pilots require train workers all NGO's that is reason we working on poultry health workers training (Please see separated documents). All infrastructure right from chicks, feed, Medicine, Vaccine and cages made available can be replicated as a small holder poultry farming in developing countries for poverty eradication and malnutrition problems. This model is not yet completed a cycle that is the reason difficult to find out demerits.

CONCLUSION

In short we put the model implementation plants and has taken a lot of base work, affords to motivated, capacitatised group initially, input provision for small scale cross breeding rearing in remote places are the main constrains. We confidented after 2 or 3 flock rearing group can handle all operation right from brooding to feed making but should sell egg out side the villages. Any further information in detail on this model available with us. We also working on two other model

1. Preserving village desi chicken by cross breeding
2. Village poultry health worker

Contribution of the Newcastle disease vaccine

Emeritus Peter Spradbrow

May an unrepentant virologist join your discussions? It is now nearly 20 years since the Australian Centre for International Agricultural Research (ACIAR) accepted and argument put forward by Professor Latif Ibrahim and me, that rural Malaysia would not benefit fully from flocks of village chickens until Newcastle disease could be controlled. We had worked together with an Australian avirulent Newcastle disease vaccine; strain V4, in commercial chickens. We suggested this vaccine for use in flocks in villages remote form a cold chain. At about the same time the Bangladesh process was commencing, with an "intensive vaccination drive against Ranikhet disease" (Dr Ziauddin 21.May 2002, 20:48) Perhaps a little earlier the GTZ project on village livestock was underway in North East Thailand and the chicken flocks were vaccinated against Newcastle disease before other studies were undertaken.

I recall seeing extension material produced by FAO for use in Bangladesh. It included a coloured, illustrated booklet and projection slides that feature vaccination against Newcastle disease, but with conventional vaccines. Are these materials still in use, or still available? I could not locate them on my latest visit to FAO Rome.

Some of the Pacific Islands should have valuable contributions to make. Just what can be done with village chickens where there is no Newcastle disease? Are there other conditions that will eliminate entire flocks?

It will be difficult to transfer the current Bangladesh model to new locations. It will surely be a matter of sowing the seeds and allowing local evolution. From the little I have seen of Bangladesh, it will be difficult for other countries to replicate the source of day-old chicks or the infrastructure for their transport. The process of sustainable intensification will not be easy.

Many of the concepts displayed in this conference have been with us for the past 20 years, and probably much longer. Women and children will be the main beneficiaries, and sustainability of activities is very difficult. The role of "improved" stock remains a point of contention. It would be tragic to lose the genetic diversity present in village flocks. I heard Dr Hammond speak recently of the difficulties of overcoming genetic pollution when unwise decisions have been made. Perhaps uncontrolled Newcastle disease has benefits in some situations.

Concern about zoonotic infections derived from village poultry is a novel view. In some countries it is traditional of chickens to share the dwelling or the housing compound with their owners and I am not aware of problems except with bird lice. Some of the people; we try to help have such desperate hunger that they eat animals that have died of disease. We

must understand their hunger before expecting them to understand our concerns about transmission of disease.

Another recent innovation has been the recruitment of sociologists to our cause. This can only increase our ability to interact successfully with villagers. I hope some will devote attention to another question. Why do some administrations have the understanding and the will to produce appropriate poultry vaccines while others do not? What can we do to improve this situation?

Expérience Béninoise en matière d'aviculture villageoise intégrée

Falade Hippolyte

Dans le cadre du Programme d'Appui au Développement de l'Aviculture Villageoise (PADAV) financé par le Royaume de Danemark au Bénin, l'aviculture traditionnelle béninoise connaît aujourd'hui un nouvel essor avec un volet micro financement associé à l'appui technique sous l'initiative de deux ONG nationales: APTRETECTRA et GRAPAD. La première jouant le rôle d'Intermédiaire Technique apportant l'appui nécessaire sur l'itinéraire technique de l'aviculture et la seconde en tant qu'intermédiaire financier s'occupe du volet financement à la base (mise en place et recouvrement de crédits). Ce document donne un bref aperçu sur l'expérience telle qu'elle est conduite au Bénin avec un accent particulier sur l'aspect financement à la base.

CADRE DE DÉVELOPPEMENT DE L'EXPÉRIENCE

Démarrée en 1997 et pour une première phase de cinq (5) ans, DANIDA a financé un Programme d'Appui au Développement du Secteur agricole (PADSA) qui comporte deux composantes, l'une publique et l'autre privée. L'objectif global du programme étant l'amélioration des conditions de vie des populations rurales.

Les principales activités menées jusqu'ici par la composante privée qui utilise comme stratégie d'appui, l'intermédiation avec au centre les ONG (intermédiaires financier et technique) concernent:

- le financement de micro-projets générateurs de revenus dans le domaine post-récolte;
- le développement des cultures maraîchères;
- le développement des structures financières de proximité;
- la formation des bénéficiaires et des ONG suivant une démarche participative.

Globalement, les résultats obtenus sont satisfaisants et pour renforcer les acquis, la Réunion de Revue Annuelle (RRA) de novembre 1999 a recommandé de mettre l'accent sur les micro-crédits qui introduisent de nouvelles technologies et les micro-projets orientés vers les organisations paysannes. Et, c'est en accord avec cette stratégie que les ONG APRETECTRA et GRAPAD ont initié depuis l'an 2000 avec l'appui du "Réseau danois d'aviculture" et le PADSA, le Projet d'Appui au Développement de l'Aviculture Villageoise (PADAV).

LA MICROFINANCE COMME ÉLÉMENT STRATÉGIQUE D'APPUI AU PADAV

A travers le PADAV, il s'agit d'expérimenter un systÏème de développement de poulets villageois incluant une approche de micro-crédit appropriée aux plus démunis (développée par le GRAPAD comme intermédiaire financier) et des services techniques bien ciblés (dont la gestion est réservée réservée à APRETECTRA en qualité d'intermédiaire technique).

Le sous-secteur avicole étant très peu développé et trÏès exigeant en matiÏère de soins de santé, il est retenu dans les zones d'intervention une forme d'organisation favorisant le développement de la solidarité au niveau des producteurs comme base stratégique du Projet.

En conséquence, le crédit solidaire est identifié comme un atout pour le succès de ce dernier. Et le choix de ce mode de financement pour sous-tendre les activités du projet permettra de:

- de faciliter l'accès des populations pauvres, en particulier les femmes, aux moyens financiers pour développer de mini-entreprises avicoles;
- de créer une organisation solidaire locale pouvant développer des stratégies de défense de ses intérîêts et exercer des pressions pour faire prévaloir les règles d'hygiène indispensable à une bonne protection des cheptels avicoles;
- de renforcer la position ou le statut de la femme par son insertion dans un processus d'apprentissage continu et notamment d'amélioration de ses conditions d'existence;
- d'utiliser le crédit comme moyen devant préparer les bénéficiaires à procéder à des déstockages réguliers du cheptel.

ORGANISATION ET GESTION DES ACTIVITÉS À LA BASE

En attendant une extension du Programme sur l'étendue du territoire, vingt villages ont été identifiés dans quatre circonscriptions administratives du pays pour servir de site pilote. L'unité d'expérimentation dans ces villages est l'Association Villageoise pour la Promotion de l'Aviculture traditionnelle (AVPAT).

En effet, l'Association Villageoise pour la Promotion de l'Aviculture Traditionnelle (AVPAT) constitue l'unité de base dans les vingt villages d'intervention. Dans chaque village une AVPAT est crée et comprend huit groupes de solidarité (GS) d'environ cinq (5) personnes. Elle constitue la structure sur laquelle est basée le développement des activités du Projet en général et du crédit en particulier. C'est donc au sein des AVPAT que se développent les activités de crédit avec comme principaux bénéficiaires les éleveurs et les vaccinateurs.

L'aspect novateur et la complexité du domaine ont nécessité de la part du GRAPAD, une revue des outils de gestion existants pour une gestion efficace tenant compte de l'aspect intégré du Projet.

Étant entendu que GRAPAD est une ONG à volet micro-finance et en tant que telle développe déjà son système de crédit dans le cadre de l'exécution du Programme d'Appui au Développement de l'Agriculture (PADSA) au profit des populations défavorisées pour le développement de leurs activités génératrices de revenus.

FONCTIONNEMENT D'UNE AVPAT

La création des AVPAT qui met notamment au centre l'intermédiaire technique, (APRETECTRA) comprend deux grandes étapes: l'identification des groupes cibles et la constitution des groupes de solidarité.

En ce qui concerne l'identification, elle prend en compte les principaux acteurs à la base. Il s'agit des éleveurs qui exercent effectivement les activités avicoles, et les Vaccinateurs Villageois de Volailles qui interviennent dans la protection sanitaire du cheptel avicole.

Quant à la constitution des Groupes de Solidarité (GS), elle tient compte soit de la confiance qui existe entre les différents membres exerÇçant une mïême activité ou des affinités de toutes sortes quelles soient d'origine parentale ou amicale. Ces groupes comprennent en moyenne cinq membres.

L'AVPAT ainsi crée est structurée comme suit:

- L'Assemblée Générale (AG) qui est l'organe suprïême de décision.
- Le Conseil d'Administration (CA), composé d'un président, d'un trésorier d'un secrétaire et de deux VVV, est chargé de la gestion administrative et financiÏère de l'AVPAT.
- Le Comité de Contrôle (CC) composé de trois membres en moyenne et chargé de la vérification de la gestion financière de l'AVPAT.

L'ensemble des membres du CA et du CC constitue le Comité Communautaire de Crédit (CCC) étudient entre autres les dossiers de demande de crédit.

Crédits et conditions d'octroi au niveau d'une AVPAT

Pour bénéficier d'un crédit, les conditions générales à remplir se présentent comme suit:

1. Être membre actif d'une AVPAT
2. Respecter les statuts et règlements intérieurs de l'AVPAT
3. Accepter de constituer de l'épargne lors des remboursements à domicilier dans le compte de l'AVPAT
4. Être de bonne moralité
5. Accepter la caution solidaire
6. Résider dans le village
7. Avoir un passé en crédit sain
8. Accepter le suivi de ses activités
9. Accepter les conditions de remboursement des crédits
10. Respecter l'objet de crédit.

Caractéristiques du crédit

Les caractéristiques du crédit, comprennent le montant du crédit, les modalités de remboursement, les taux d'intérêt et d'épargne.

Le montant initial de crédit est de 25.000 Francs CFA (environ 38 euros) au maximum par éleveurs. L'échéancier de remboursement est de 6mois avec une période de grâce de 6 mois qui correspond à la durée minimale avant le déstockage uniquement valable pour le premier cycle. Le remboursement mensuel prend en compte la sixième partie du capital, de l'intérêt (12%) et de l'épargne (18%).

Étant entendu que les communautés de base ciblées sont constituées en majorité de populations pauvres dont les revenus sont si faibles que leur demander de constituer des ressources internes pour s'octroyer du crédit c'est les condemner demeurer dans la misère, la caution solidaire reste la seule garantie.

QUELQUES RÉSULTATS ET EFFETS

Un crédit d'un montant de Douze millions quatre cents vingt mille (12.420.000) FCFA (soit environ 18.933 euros) a été octroyé une vingtaine d'AVPAT (en moyenne 800 personnes dont 80% femmes.).

Les remboursements ont commencé depuis le mois de mars 2002. À ce jour les membres des AVPAT effectuent des remboursements à bonne date. Certains effectuent même des remboursements par anticipation. Le taux de remboursement estimé à la fin de mars 2002 est de 99,85%.

Il faut noter également que les bénéficiaires ont suivi plusieurs formations aussi bien sur les itinéraires techniques de l'aviculture que sur la gestion du crédit.

Les crédits ont permis aux bénéficiaires d'entreprendre mïême à, faible échelle ce qui les met à l'abri de l'oisiveté et des soucis. À travers les crédits, les femmes arrivent à faire face à un certain nombre de besoin. Ainsi, elles ont reconnu que depuis le début de leur collaboration avec le PADSA des changements interviennent dans leur vie. Au nombre de ceux-ci on retient:

- constitution du capital
- amélioration de leur revenu
- diversification de leurs activités génératrices de revenus
- constitution de l'épargne

Ces changements se traduisent au niveau de la femme par une certaine flexibilité, avec une acquisition d'une grande autonomie financière. Par ailleurs elles ont réussi à se soustraire de certains travaux pénibles en payant la main d'œuvre masculine.

Bien que des inégalités persistent au niveau du statut économique, social, et juridique des femmes, l'ouverture des perspectives dans le secteur traditionnel contribue à lever des barrières.

Elles assistent désormais aux réunions et participent activement aux dépenses du ménage. Elles ne tendent plus toujours la main à leur mari pour les petites dépenses (frais de scolarité des enfants, dépenses des soins de base de leurs enfants; etc.) du ménage. Toutes choses qui soulagent l'homme.

A research process and methodology focusing on indigenous Kenyan chickens

Ndegwa, J.M., Norrish, P. Mead, R., Kimani, C.W., Wachira, A.M.

Paper presented at the International Network for Family Poultry Development (INFPD) Symposium during the XXI World's Poultry Congress in Montreal, Canada, August 20 - 24, 2000

SUMMARY

Indigenous chickens are among the local assets of poor people living mainly in rural areas and who make up between 65 - 80% of total population in sub-Saharan Africa. Over 90 % of rural households keep and rear chicken in small flocks of about 20 birds. Not until quite recently, there hardly had been any meaningful investment in harnessing this valuable resource as means to alleviate pervasive indigence.

Productivity of these birds has therefore been discouragingly very low. Bearing in mind that indigenous chickens comprise of close to 80% of total poultry population, ample investment in research and development in this sector then, is indeed a matter of great importance and for urgent consideration. The paper explores a research process and methodology carried out over a period of time as an attempt to mainstream indigenous chicken sector in the research and development agenda. There is also the stressing on its potential in contributing to development of sustainable livelihoods and poverty eradication among the poor, often marginalised section of the population, majority of who are rural women.

INTRODUCTION

In Kenya and elsewhere in the sub-Saharan Africa, between 65 – 80% of the population live in rural areas eking out a living from subsistence farming, often under very difficulty climatic and economic conditions (Gueye, 2000; Ndegwa, et. al., 1998). The main objective is to meet household food requirements. In most cases this is only a pipe dream and many of the rural folks are dependent on food handouts from their governments or non-governmental relief organisations. There is, therefore, a vicious cycle of dependency among millions of impoverished people in rural areas. They lack access to external inputs of production to improve output and their local resources are poorly managed and overexploited leading to environmental degradation and further impoverishment.

Improvement in the agricultural output in rural areas could be greatly enhanced by the proper harnessing and utilisation of local resources. Indigenous chickens are among the many local resources available in rural areas that, if well managed, could ease the burden of the people. Over 90% of rural households keep and rear indigenous chicken usually in small flocks of about 20` birds (Ndegwa ***et. al.***, 1999; Mbugua, 1990; MoLD, 1990; Stotz, 1983) and, according to Gueye (2000), more than 80% of the total poultry population in Africa is kept in rural areas. Chickens are usually regarded as a woman's domain and hence have a low status (Ndegwa and Kimani, 1996; Ndegwa *et. al.*, 1998).

Several factors contribute to low productivity often associated with indigenous chicken (Ndegwa and Kimani, 1996; Musharaf et. al., 1990) and manifested in terms of very high mortality, low growth rates and small mature weights and low egg production. But despite the low productivity, the birds play a very significant role in rural livelihoods in Kenya, and indeed in all other sub-Saharan African countries, (Gueye, 2000; Ndegwa *et al.*, 1998 MoLD, 1990; Ibe, 1990). In Kenya, indigenous chicken products (eggs and meat) are preferred and often fetch higher prices than those of exotic, mainly commercial-orientated poultry products. The contention then, is that, there is a potential for a local resource like indigenous chickens to, if properly harnessed, turn around the misery that is the lives in rural areas. This calls for a concerted effort by all stakeholders coupled with a change of attitude and policy focus. Infra-structural and institutional support, are hence required in research and development activities aimed at improving productivity at farm level.

Many people in sub-Saharan Africa have very precarious and vulnerable livelihoods. Any adverse change in situations surrounding them be they, environmental, socio-economic or political either at local or global level will almost certainly impact negatively on their lives. Their livelihoods are in no way sustainable. A comprehensive participatory approach is therefore necessary to develop a means of sustenance that guarantee the people a sustainable livelihood and freedom from being adversely effected by those conditions that have hitherto contributed to their perpetual indigence.

According to DFID (1999) andScoones (1998), a livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base. Farrington *et al.*, (1999) have given a perspective on early experience in implementing sustainable livelihoods as a new approach in poverty alleviation. This approach draws on improved understanding of poverty not just in terms of income and consumption, but also in terms of absence of basic capabilities to meet physical needs (health, education, clean water and other services) The understanding is also highlighted by Chambers (1987).

On the other hand, the povertynet (2000), a World Bank website on poverty gives a simple but comprehensive description of what poverty entails. Poverty is hunger, lack of shelter, being sick and not being able to go to see a doctor. Poverty is not being able to go to school, not knowing how to read, not being able to speak properly, not having a job, is fear for the future and living one day at a time. Poverty is losing a child to illness brought about by unclean water.

Poverty is powerlessness, lack of representation andfreedom. Poverty has many faces, changing from place to place and across time. Most often, poverty is a situation people want to escape. So poverty is a call to action – for the poor and the wealthy alike – a call to change the world so that many more may have enough to eat, adequate shelter, access to education and health, protection from violence, and a voice in what happens to their communities. Proper harnessing of local resources of the poor people will help in the development of sustainable livelihoods for themselves and their generations and, contribute significantly in the fight on poverty eradication.

In the context of the above exposition, research on indigenous chicken has been underway in the recent past in Kenya under the Kenya Agricultural Research Institute's Poultry Research Programme. This has been an attempt to mainstream this sector at various domains and to realise its potential to contribute to poverty alleviation and development of sustainable livelihoods for the poor.

This study details a research process on indigenouschicken from on-station to on-farm that has been carried out in Kenya at the National Animal Husbandry Research centre of the Kenya Agricultural Research Institute. The aim was to evaluate growth and production characteristics of indigenous chicken and subsequentlyto improve their production performance at farm level. It is a process that encompasses the various participatory modes described by Biggs (1989) namely, contractual, consultative, collaborative and collegial.

The on-station research was basically of the contractual mode without any participation of farmers although they were the main clients. From on-station the research process moved into another phase of field survey in the consultative mode of participation. The third phase of the research process was the on-farm studies with a strong farmer and extension participation. This phase had a collaborative and collegial mode of participation.

This paper, therefore, is a description of an attempt to focus critically on, and to bring to the fore, a local resource readily and 'abundantly' available and, affordable in rural areas. It is a resource that the often marginalised and most vulnerable groups in the rural communities, who are mainly women, have complete access to, and control of. It is a resource with untapped potential that could be exploited to turn around the misery that is the life in rural areas. It may be of little significance to many people as exemplified by lack of any meaningful research and development investment in this sector over the years, but it holds the key to eradication of poverty among many rural communities and groups especially in marginal areas.

The paper also highlights the involvement of farmers in the on-farm research process where they (farmers), are left to choose interventions/technologies from a basket of options and either adopt and adapt them at their own pace and according to each individual's ability and capacity. It is therefore a description of two completely different research approaches. One being the conventional 'laboratory-type' controlled process and the other being a non-conventional on-farm research process in the hands of the farmers and wholly dependent on their participation. In-between, are different steps or processes undertaken to bring to the fore a better understanding of the role of indigenous chicken.

The research process involves a set of inter-related activities that followed one another. These steps are described in more details under methodology. However an outline of the importance of each step would be proper presently. The on-station research helped create the necessary impetus towards on-farm research by raising the interest of many stakeholders (Research and extension managers, policy makers, farmers, various categories of students and others) who had all along been sceptical about focusing on indigenous chicken.

Some useful insights into the potential performance of indigenous chicken were generated. Researchers started to have more confidence and to focus more on the need for an in-depth study on characteristic performance of indigenous chicken. As a result of the preliminary studies, the raising of awareness about the importance of indigenous chickens started in earnest. The on-station studies also helped bring about a change in orientation within the Kenya Agricultural Research Institute's management and more resources were hence sought and directed towards the sector. An approach for a more extensive study of indigenous chicken involving the stakeholders was then developed and is described in detail in the following sections. But generally, it was comprised of stakeholders' workshops and field visits to key informants.

These activities were meant to mainstream the indigenous poultry sector within the whole dimension of the livestock industry in general and the poultry industry in particular. They also offered fora for learning from other people with divergent views, experiences and knowledge and importantly, forging of strong linkages for collaboration. These were followed by farm-level field baseline surveys to establish farmer practices. Subsequently, on-farm studies were set up.

The experience from baseline surveys, like that of the on-station research, informed the subsequent on-farm research activities. They gave the researchers an insight as to the real situation at the farms and an understanding of how to interact and deal with farmers and extension personnel. The walls were beginning to fall. This is evident from the way the on-farm research proposal was formulated which was a big variation from the approach prior envisaged in the priority-setting workshops and in which farmers, the primary stakeholders, were grossly under-represented.

In our approach, we strongly felt it would be more prudent to involve farmers in the whole research process from selection through implementation to monitoring. Farmers' own resources were to be the main inputs. Placing the fate of the research process in the hands of the farmers was a radical change of attitude in the part of the research team. This change of 'heart' and 'style' in conducting research came about due to, more than any other thing, information gathered from the field visits and from the survey experience.

METHODOLOGY

According to Yin (1994), research can be generally categorised according to three purposes; explanatory, exploratory and descriptive. In social science, the research purposes are achieved through one or more research methods or strategies; experiments, surveys, histories, analysis of archival information and case study. Each strategy can be used for all three purposes - exploratory, descriptive and explanatory. There may be exploratory case study, descriptive case study or explanative case study (Yin 1981a, 1981b).

According to Sieber (1973), there are huge areas of overlap among various research methods or strategies. Mead and colleagues (1993), on the other hand, state that the purpose of experiments is to make inferences, as unambiguously as possible, about the effects of treatments applied to experimental unit. Sample surveys allow inferences to be made from a sample about the whole, but always finite, population from which it has been drawn. In this case, "there is no imposition of treatments". Sample surveys should describe certain properties of the population as they naturally exist. According to the same authors, in sample survey, stratification is related to blocking in experiments, both being ways of controlling unwanted sources of variation.

Sutherland (1998) has given a description of transformation in research processes from conventional research in the 1960s based in research stations that was mainly supply driven and often unrepresentative of farmers' conditions to Farming Systems Research (FSR) approach developed in the late 1970s. It placed importance on demand identification via the diagnosis of farming systems, rationalisation of research resources through priority setting, testing new technology under farmers' conditions and developing strong linkages with extension.

From mid 1980s, the FSR approach was criticised as being too linear and prescriptive and the generic approach of farmer participatory research (FPR) was developed. The FPR (Okali *et al.*, 1994) placed particular emphasis on farmer participation and incorporated ideas from related approaches such as participatory technology development (PTD), participatory rural appraisal (PRA) and low external input agriculture (LEIA). Farrington (1997) however, suggests that an FSR-type approach may work well for resource-endowed farmers in higher potential areas. FPR in contrast, would be more appropriate for resource poorer farmers in more marginal areas.

Research is useful only if it is taken up and applied by users of information and technology derived from it. This, according to Garforth (1998), is enhanced by dissemination to 'end users' (farmers, individuals, households, communities, companies, associations) engaged in productive activities, and 'intermediate users' (researchers in international agricultural research centres and national agricultural research systems, others concerned with research and development in non governmental organisations, private sector, extension, and donors)

THE RESEARCH PROCESS

In the next sections, the research process on indigenous chicken will be explained. A diagrammatic summary of the process is shown in figure 1 while figure 2 focuses more specifically on the on-farm research. Table 1 shows various activities of the research process and a description of each. In Table 2, a summary highlighting output generated from the activities is given.

FIGURE 1
The various stages of methodology used in the indigenous chickens study and their interactions

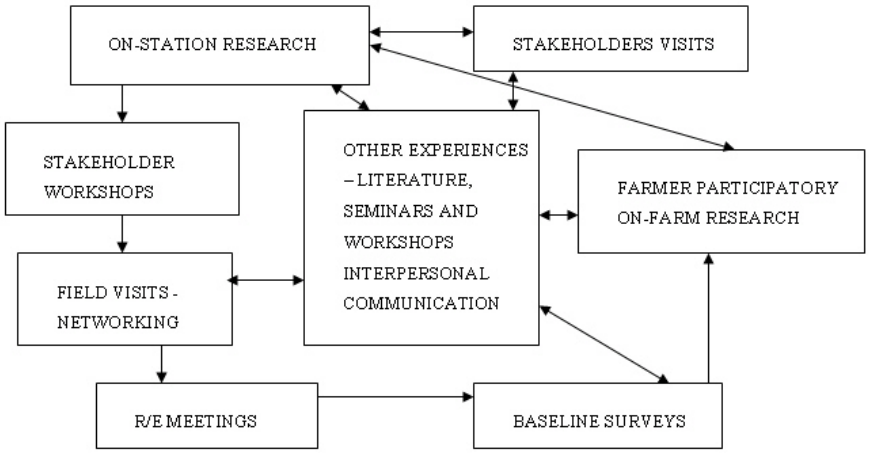


FIGURE 2
On-farm participatory research process methodology

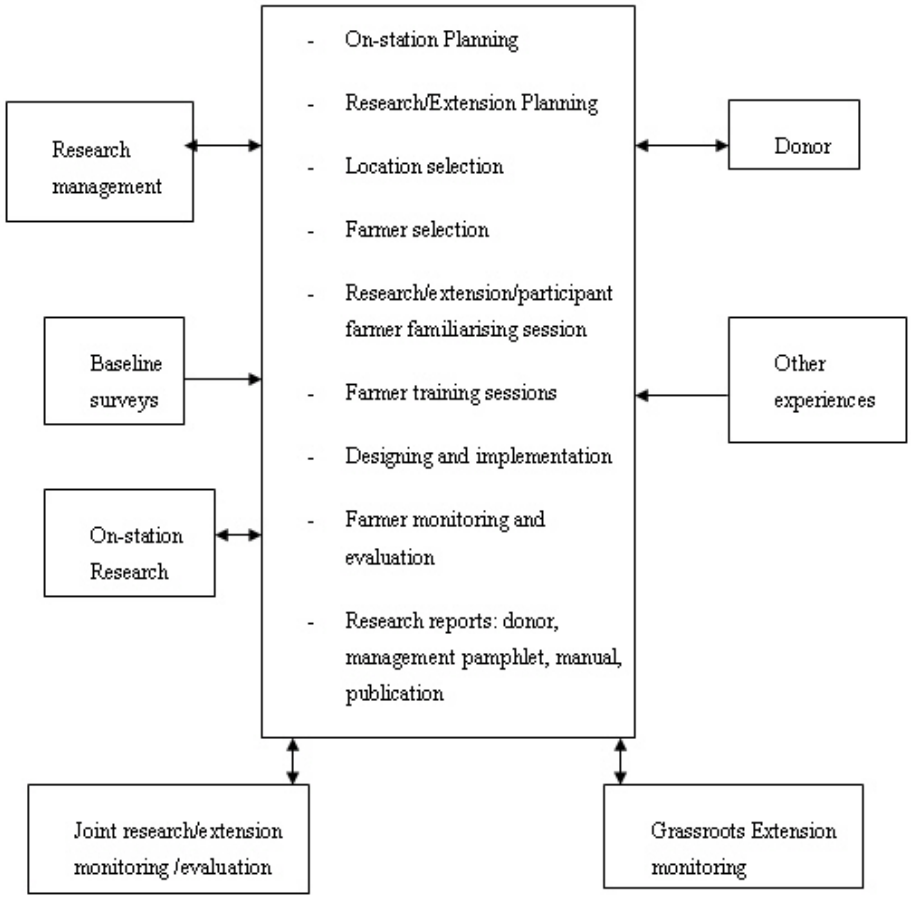


TABLE 1. DESCRIPTION OF ACTIVITIES UNDERTAKEN IN THE RESEARCH PROCESS

Activity	Description
1. On-station research	Main objectives to gain experience and an understanding about characteristics and nature of indigenous chickens and to generate information on potential performance under improved management
2. Stakeholder workshops (SHWs)	Held in 1994. Objective was the need to incorporate divergent views and experiences from a range of stakeholders. This is similar to suggestions by Grimble (1998) and ODA (1995). First workshop (Mbugua *et al.*, 1994), aimed at gathering available knowledge on: major production systems, production constraints, farmer solutions and researchable constraints. Second workshop aimed at: formulation of concrete research goals and project proposals to meet prioritised and achievable goals. SWOT methodology used (based on identification of Strong and Weak points and Opportunities and Threats of research) However, there was inadequate representation of primary stakeholders (the rural poor, subsistence farmer especially women)
3. Field visits – Networking	Undertaken in 1995 (Ndegwa *et al.*, 1998). Objectives were to establish state of the art in poultry industry, share experiences and forge close linkages with several individuals, organisations and institutions (extension, research programmes, universities, development projects, agri-business). Starky (1996) refer to this as 'Networking'.
4. Research and Extension mini-workshop and meetings	Objective was to have more focussed and detailed discussions about actual field work and to strengthen linkages with frontline extension personnel
5. Baseline field surveys	Done in 1996 in five agro-ecological regions (Naivasha, Njoro, Bahati, Ol Kalou and Ng'arua), (Ndegwa *et al.*, 1999). Sixty farmers covered per region divided into four farmer-clusters. A checklist used in semi-structured interviewing of farmers as in PRA. Information about household and poultry production recorded.
6. On-farm farmer participatory research	Study carried out between 1996 and 1999. Objective was to evaluate the effects of improved management practices on performance of indigenous chicken at farm level with a focus on farmer participation (J. M. Ndegwa – personal communication) Involved selection of location (5 regions and 4 farmer-clusters per region) and farmer on willingness basis (10 per cluster), training meetings (selected farmers plus many others and frontline extension personnel), intervention options and implementation by farmer, monitoring (farmer, extension, research), evaluation.
7. Dissemination of information	A continuos process and different modes- existing booklets and manuals, preparation of new materials from information gathered (pamphlets, manual, journal papers), conferences, seminars and workshops. Msc and PhD thesis.

TABLE 2. OUTPUT GENERATED FROM RESEARCH UNDERTAKEN

Activity	Description
1. On-station research	Experience gained helped build confidence to offer advice on management of indigenous chicken Creation of awareness, interest and enthusiasm among a variety of people Encouragement from valuable comments
2. Stakeholder workshops (SHWs)	Three poultry production systems identified: - subsistence mainly indigenous chickens - semi-commercial - small number, mainly exotic commercial chicken breeds and crosses with indigenous mixed with, geese, ducks, turkeys and pigeons - intensive, large scale exotic commercial breeds Constraints across systems: - socio-cultural factors (eggs and chicken meant for guests, low rating, associated with women mainly) - capital - market organisation - institutional support Specific production problems - high mortality, low production, feed shortage and low quality, inadequate technical knowledge
3. Field visits – Networking	Strong linkages formed - a major boon for on-farm participatory research (extension and farmers involved, hence less research time and personnel)Networking expanded scope of work outside research workplans - two Msc (Tuitoek *et al.*, 1999 and Okong'o *et al.*, 1998) and one PhD (on-going) research projects, co-operation with some development projects (GTZ, NPDP, and ASALs) Poultry found to be of much importance in rural livelihoods Recommendation for a survey at farm level to establish status in poultry production
4. Research and Extension mini-workshop and meetings	Mutual trust and a sense of ownership developed due to strengthening of linkages with frontline extension personnel
5. Baseline field surveys	Production characteristics of indigenous chicken under farm conditions established (Ndegwa *et al.*, 1999, Siamba *et al.*, 1998). Farmer management practices and knowledge established. Potential to develop rural poultry production demonstrated.

Activity	Description
6. On-farm farmer participatory research	Close to 500 farmers attended training sessions. Farmers allowed to choose from a variety of interventions to adapt and or adopt.
	Mutual trust created among all players.
	Cluster formation an important farmer organisation- allowed for acquisition of some external inputs (pooling)
	Farmers confidence and interests in their birds created.
	Project rated third best overall at sixth KARI scientific conference (KARI, 1999).
	Data and information collected currently being analysed in a PhD project thesis.
7. Dissemination of information conferences, seminars and workshops	Msc and PhD thesis, new materials from information gathered (pamphlets, manual, journal papers), photographs for gallery exhibition.

CONCLUSION

This comprehensive research process and methodology, is a clear testimony to the extent as to how far attitudes and interests have changed in favour of indigenous chicken as a very important resource available to majority of households with heavy loads of poverty on their shoulders. Proper harnessing of this resource through concerted efforts will enable millions of indigent households in Kenya and elsewhere in sub-Saharan Africa to improve their living standards and establish sustainable livelihoods.

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Participatory strategic approach to development of improved indigenous poultry systems in East Africa

Ndegwa, J. M., Norrish, P. Mead, R., Kimani, C. W., Wachira, A. M, Githinji, M. M.

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ABSTRACT

An on-farm farmer participatory research project was carried out in Kenya to improve the management of indigenous chicken and their productivity at farm level, in five different agro-ecological zones. This paper details the research methodology used and highlights some experiences and lessons learnt. The major objectives of the on-farm research were; to improve management and productivity of indigenous chicken at farm level, to change attitudes towards indigenous chicken, to improve farmers capacity and ability to carry out research (involve them in design, implementation and monitoring activities) using local resources and, to exploit the potential of indigenous chickens to contribute to poverty alleviation among rural landless people mainly women.

The research project was carried out in five different agro-ecological regions. In each region, four clusters (each cluster from a different village) were selected comprising of ten farmers each. This was followed by farmer training workshops that were held at cluster level. Implementation of a variety of improved management practices was done largely by use of local resources and farmers participation. Monitoring and evaluation were done continuously by farmers and on a regular basis by the research team.

Over five hundred farmers were trained on improved management practices for indigenous chicken production, a figure higher than 2-fold the anticipated target. An important achievement was made in the way of creation and enhancement of social capital by bringing together individual farmers and the research team to interact freely and share information, knowledge and experiences. Mutual trust, interest and enthusiasm were generated and were instrumental in the subsequent implementation of the project. Farmers were able to implement a variety of interventions from a basket of options, at their own pace and, with their own locally available resources. Formation of farmer groups (clusters) was a big boon in securing some limited external inputs such as roofing materials and vaccines through joint efforts (harambee).

This paper demonstrates and emphasises that involvement of beneficiaries in anti-poverty initiatives, is an imperative if the objectives are to be achieved.

Key words: Participation, Strategies, Indigenous poultry, improved management, Poverty alleviation.

Production, Management and Marketing Dynamics of the Rural Scavenging Poultry in Uganda

Byarugaba, D.K., Olsen J.E. and Katunguka-Rwakishaya, E.

ABSTRACT

A study was conducted in the districts of Kumi and Bushenyi to collect baseline information about the production, management and marketing dynamics of the rural scavenging poultry in order to design strategies for the improvement of the production and marketing of the rural scavenging poultry in Uganda. A questionnaire was administered to selected rural poultry farmers in the two districts by trained interviewers during the year 2000.

Most of the households were headed by males and all of them were engaged in farming besides other activities, and 97% of them kept chickens and 67% kept turkeys for many years. The numbers of poultry varies from 6-20 excluding the chicks and poults. These poultry are mainly kept under scavenging system (90%) with a few (10%) practicing semi-scavenging system and the daily management is done by women and children (90%).

Production also varies with seasons associated with outbreaks of Newcastle disease while the markets are variable ranging from 2,000- 3,000 Ugshs depending mainly on the weight of the birds. Turkeys go for a much higher price (5,000- 15,000 Ug shs) and have been observed to survive during Newcastle disease outbreaks. These farmers experience problems of disease (especially Newcastle disease and parasites). It was apparent that these farmers require support in extension services to advise them on improved management, and disease control with the available technologies.

Key words: Rural, village, scavenging, poultry, production, marketing, management

INTRODUCTION

Poultry provide an acceptable form of animal protein to most people through out the whole world with their perceived healthfulness of their meat in human diets and their competitive costs in most countries (Gueye, 1998). Despite the tremendous expansion of the commercial poultry sector in the last three decades, scavenging poultry have not undergone drastic improvement but still account for more than 80% of the total poultry production in developing countries in Africa, Asia, Latin America, and South Pacific (Sonaiya, 1990). They are kept in rural areas contributing substantially to annual egg and meat production. The total fowl population in Africa was estimated at 1,868 million in 1995 producing 1,695,620 metric tones of eggs and 2,096,000 metric tones of meat (FAO, 1996). In Uganda the poultry population was estimated at about 30 million of which rural

scavenging poultry were estimated to represent 26 million (about 90 % of the total) in 2000 and until recently very little attention has been paid to them (FAO, 1996).

While poverty reduction interventions that the rural poor especially women can profitably undertake are difficult to identify, there is high positive impact on women's and children's lives recorded in impact studies of the semi-scavenging poultry model developed and applied in projects in Bangladesh (Alam, 1997). Despite this enormous potential of scavenging poultry for alleviating poverty and improving the quality of life of the hardcore poor and their children, who account for about 45% in Uganda, little attention has been paid to it as judged by records of scarce funding and limited expertise, and less regard of smallholder poultry as an area of importance in terms of political aspects or scientific prestige.

This study was therefore designed to collect baseline data about production, management, marketing practices and diseases in scavenging poultry in order to be able formulate appropriate strategies to improve their production and health in order to improve the quality of life of the poor people through improved poultry production.

MATERIALS AND METHODS

Study area

A survey was carried out in the districts of Kumi and Bushenyi, which are, socio-economically, geographically and climatically distinct. A questionnaire was used to gather baseline data about the management, production and marketing dynamics of the rural scavenging poultry. The demographic data of the owners was also collected.

Selection of households

The two districts were considered as the target distinct populations on the basis of their differences mentioned above. The number of households to be included in the study per district was 100 households selected randomly from a list of households from two villages that were also selected randomly.

Data analysis

Data was coded and entered into a computer and analysed using the Statistical Programme for Social scientists (SPSS). Frequencies and means were compared.

RESULTS

Household demographic characteristics

The household were mainly headed by males (80%, n=203) aged between 21 to 50 years most of who were married (83%, n=203) with a few widowed (3%) and separated or divorced (1%). Most of the household heads had attained primary level education (41%), and other attended secondary education (27.6%) and 17 % had attended tertiary institutions, while a reasonable number (10% had not attended any formal schooling).

Household Activities

All the households were engaged in farming (100%) and almost all of them (97%) were keeping local scavenging chickens, while 67% of them also kept turkeys (with other livestock like cattle (55%). The households also kept crops which varied from millet, sorghum, bananas, cassava and several cereals. Others were engaged in formal employment such as civil service (13%).

Poultry Keeping

Over 75% of the households have been keeping the local poultry (97%) for more than five years. Eighty percent of the household keep 6-20 chickens (this excludes chicks) and only a few (1.5 %) keep over fifty chickens. The number of cocks in the flocks ranges from 1-5 (80%) with about 5-10 hens (75%). The chickens are kept by most households because of ease of management (96%), resistance to disease (20%), growth rate (10%) and several other reasons such as availability, ceremonials and religious reasons. The sources of chickens are usually from markets by purchase (75%) and a few as gifts or inherited. The number of turkeys kept ranged from 2-25, with an average of six.

Management

The chickens are managed almost entirely on free range system (90%) with only a few (10%) practicing semi-intensive management. The management is mainly done by children (60%), women (30%) and the husband only participates little (10%).

Housing

The chickens are not housed (96%), but the few who house the poultry do so in kitchens (55%), separate shelters (30%) or in the sleeping houses (15%).

Feeding

Fourty seven percent of the farmers provide supplementary feeds which are mainly leftovers from the house or cereal grain during bumper harvests. This is done any time of the day but more so in evenings as the chickens come back home. No water is provided to the chickens (90%) because most farmers (89%) think that the water is not necessary.

Problems encountered in management.

Eighty percent believed that disease was the biggest problem while predators also contribute significantly (49%). Others problems associated with management include quarrels with neighbours and thefts. These problems lead to low morale (60%) and eventually they resort to keeping a few birds.

Chick losses

All the farmers experience chick losses caused by diseases (95%), predators (95%), accidents (2%). Often more than 50% of the chicks are lost before they mature.

Disease control

Most of the farmers make no effort to control disease (60%) and the rest make attempts. Those who control diseases do so by use of indigenous knowledge (60%) such as herbs and application of paraffin to control external parasites, while 20% using modern medications while some use both. Many of them do not control predators. All the farmers required advice on how to control Newcastle disease.

Extension Services

The farmers (80%) rarely get advice from extension agents about poultry management as they are not regarded as an aspect that requires serious attention. It is only for a few of the farmers who are going into semi-intensive that go to seek for advice

Production.

The chickens begin laying at six to seven months, laying 11-20 eggs per clutch and no nests (97%) are provided for this. The chickens normally have three clutches per year. Most of the hens are left with 10-15 eggs for hatching of which 45-75% may hatch into chicks. The rest of the eggs are usually either eaten or sold. The eggs for hatching are usually (99%) from the household flocks. Often less than 50 of the hatched chicks survive to maturity and farmers never bother to sex the chicks and neither do they consider them as chickens until they are about ready for sale or laying, so quite often they are not even counted. Few farmers (41%) realise the change in production with season as such except in association with outbreaks of diseases that almost wipe out the flocks especially Newcastle disease which comes during certain seasons.

Marketing

The major products for sale in the rural chickens are mainly the chickens and eggs. Accordingly about 32%of the farmers sell eggs while the rest do not. The eggs are mainly sold at the trading centres at a cost of between 50 and 100 Ug Shs and 52% of the farmers think that the market for eggs is not reliable. The chickens are mainly sold off in large numbers at periods when they expect Newcastle disease outbreaks, that is, in January, and November. There are also higher sales around festival periods such as Christmas. The prices vary between Ug shs 2000 - 4000 for cocks and 2000 - 3000 Ug shs for hens depending on the size/weight of the chickens and the season. The turkeys fetch much higher prices vary from 5,000 to 15,000 Ug Shs. The majority (60%) believe that the marketing is not sufficiently organised and hence there are problems of low prices (80%) and the buyers are sometimes few also or not available when wanted.

Improvement of Production

Eighty one percent suggested that housing could tremendously improve production and many also indicated that besides housing, feeding and disease control also need to be improved to increase production especially control of Newcastle disease. Extension services were highly demanded (65%) to train the farmers how best to improve their production and marketing.

DISCUSSION

Domestic fowl are the most important type of poultry kept in Africa. Because of low productivity, indigenous fowl production in Africa has been neglected and is frequently considered by farmers as an insignificant occupation compared with other agricultural activities. Nevertheless, village fowl provide the population with a vital source of protein and income. In addition, they play an important role within the context of many social and /or religious ceremonies. Rural scavenging poultry contribute more than 90% of the total poultry population in Uganda and like in many other countries there is still little information available on these forms of poultry.

This study therefore collected baseline data about rural scavenging poultry, which would form a basis for prioritising research and intervention strategies to improve the production as well as marketing. The study revealed that the rural household have kept poultry for many years basically on scavenging system of management similar to other areas in Africa and in Asian countries (Gueye, 1998). The households keep flocks of between 6 and 20 chickens per household excluding chicks and growers, with very few who keep over 50 birds under semi-scavenging system of management. Similar numbers of turkeys are often kept along with chickens. Flock sizes over 100 chickens were reported in Tanzania (Kitalyi, 1996) which was attributed to vast empty land available as opposed to other countries. In this study, this was observed between Kumi and Bushenyi where the numbers were relatively more in Kumi (average 15 chickens) as compared to Bushenyi (average 7 chickens) due to the differences in the land availability and utilisation.

The numbers of poultry vary with occurrence of certain diseases such as Newcastle disease, which wipe out more than 60% of the chickens when it strikes. Farmers therefore sell many of the birds prior to such disease occurrence in order not to make losses from the outbreaks. This creates differences in the flock structures at different times of the year and thus the flock dynamics. At the time of this study the flock structure was on average 12.6 hens, 4.3 cocks, 14.2 growers and 20.3 chicks with an approximate ratio of hens to cocks of three to one cock. Due to the vulnerability of the chicks to several problems of disease and management the flock characteristics change the desired flock ratios. These are also influenced by egg production.

The study showed egg production to range from 11-20 per clutch, which is similar to what has been reported for other countries such as Tanzania. (Minga, et al, 1986) BurkinFaso (Bourzat and Sauders,1990). Some countries however have reported higher egg production of upto 50 eggs per clutch. This was attributed to management practices that discourage brooding and could be used to increase egg production. While egg production and chick survival are the major determinants of flock productivity, chick mortalities account for very high losses in most villages. Management practices that minimise chick losses therefore could be used to increase output from the scavenging chicken. Egg production is also a function of egg production per hen and the proportion of mature laying hens in the flock. The proportion of laying hens in this study was on average 24%. This factor can also be manipulated to increase the proportion of the laying hens and egg production and hence output.

The hatchability of the scavenging chicken has been considered to be low. This study showed hatchability of between 45-75% and this falls within the range reported by others

(Wilson, et al., 1987, Van Veluw, 1987). Some have even reported up-to 100% hatchability (Minga, et al., 1989). Improved management such as provision of nests for laying could help achieve optimal hatching potential of these birds.

The poultry are generally raised on a free-range system and they survive as scavengers. Women and children play a key role in their day today management (90%) with very little of men participation (10%). Supplementary feeding sometimes is given in form of leftovers from household surplus. There is very little information regarding feed resources in Africa. A few studies (Musharaf, 1990) that have reviewed feed resources for the rural poultry include data on crops such as cassava, millet, plantain which are considered unconventional energy feed resources which seem to be cheaper that the commercial rations with no significant differences in growth rate (Sonaiya,1993). Rudimentary coops or shelters may be provided to give some protection against bad weather and night predators. This is the typical low input low output system affordable even by the poorest social strata of the rural populations.

One of the major constraints to village poultry production in Africa is undoubtedly the existence of various diseases (Ojok, 1993, Minga and Nkini, 1986). The problem of diseases in village chickens is compounded by the interaction of different entities that are of significant importance to disease epidemiology. There are uncontrolled contacts in the villages between birds from different households as well as frequent introduction of birds from markets, gifts or other purchases. These and other wild birds may play a significant source of infection as they roam freely in villages.

Among the diseases most commonly recognised is Newcastle disease, which was ranked the most important. Besides Newcastle disease, there are also parasites both external and internal, which are well recognised by the farmers. Some of the parasites such as stick tight fleas are known to cause serious losses especially in the chicks. In these villages, local remedies are usually used to treat many of these diseases such as use of paraffin to clean off external parasites and many herbs for internal parasites. Because of virtually no extension services there is very little of modern medicine used in control of diseases. As a result Newcastle disease has continued to wipe out many of the chickens when it strikes although vaccines are available.

According to reports from the various countries including Uganda, the most prevalent diseases include Newcastle disease, respiratory disease complexes, fowl pox, diarrhoea, salmonellosis, collibacilosis, fowl cholera, parasites and several others (Thitisak, et al.,1988, Sirinivasa, et al., 1989, Ojok, 1993). Rearing losses are very severe, with high mortalities in the young being an important component. It is estimated that mortality of indigenous poultry under scavenging conditions is 70% and above in chicks up to 8 weeks of age (Sonaiya, 1999, Thitisak,et al.,1988). These high cumulative levels of mortality influence the structure of the flocks whereby 30-50% of flocks are normally chicks. Efforts to increase productivity through improvements in health, feeding, housing, genetics and management have been very minimal until recently (Scola, 1992; Kitalyi, 1996; Gueye, 1998).

While rural poultry do not rate highly in the mainstream national economies because of lack of measurerable indicators of its contribution to macroeconomic indices such as domestic gross domestic product, it has been recognised in national economies of developing countries regarding its role in improving the nutritional status and incomes of many rural poor families (FAO, 1982, Bembridge, 1988, Creevey, 1991, Mokotjo, 1990).

There is still paucity of quantitative data regarding the rural poultry systems and its importance. Sustainable production systems for rural poultry must be dealt with on a systems approach as they form part of an integrated farming system in most rural settings. The two highly ranking problems of the system as identified in this study were Newcastle disease control and management. The tools and technologies for tackling these problems are available and have been proved elsewhere and wait to be directly adopted with a few modifications while further baseline studies continue.

For the control of Newcastle disease, there are currently several vaccines available including the thermostable vaccines while management will involve all aspects including providing appropriate housing using local cheap materials, and proper use of all the available feed resources. The resistance and survival of turkeys during Newcastle outbreaks was an interesting observation that is being investigated. If the findings are favourable, turkeys will be another poultry species deserving promotion as it fetches higher prices and its meat is healthier. In conclusion, the strategy for improving production in rural poultry requires community participation through farmer training programmes by extension agents for increasing management skills and control of diseases.

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TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF THE HOUSEHOLDS

Sex of the household:	Male 88% Female 12%
Education of household head:	Primary 55% Secondary + 45%
Age of head:	< 30 years 26% 31-50 years 50%
Marital status of head:	Married 83.7% Single 16.3%
Occupation of head:	Farming 75% Other 25%
Family size:	<5 35% 6-15 62.5%

TABLE 2. ACTIVITIES OF THE HOUSEHOLDS

Farming	100%
Keeping scavenging poultry	97%
Keeping turkeys	67%
Keeping cattle	55%
Crops	100%
Other activities	several

TABLE 3. FLOCK STRUCTURE

Number of eggs laid	11-20
Clutches per year	3 per year
Number of cocks	2-5
Number of hens	5-15
Number of growers	15-25
Number of Chicks	10-40
Number of turkeys	2-25

Some issues in family poultry development

Oluyinka A. Olukosi

There is no doubt that family poultry (FP) is an important tool in alleviating poverty among the "poorest of the poor" in developing economies. This is in view of its popularity in many places (about 90% of rural Africa population keep poultry) and its ease of operation. In order to use this tool effectively, there are some issues (health, nutrition, productivity and socio-economics) that have to be considered. These have been discussed in this conference, I only wish to elaborate on some other aspects of these issues, which may be relevant in the FP development.

Most of the past efforts in FP development have placed emphasized on a unilateral genetic improvement of the local chickens, but because of lack of a whole-system approach, they failed. Genetic improvement will not work, when it is not backed by the improvement of the whole scavenging system. Introduction of a superior breed of chickens to an unimproved scavenging system only exposes them to hazards of poor nutrition, poor health status, poor predator-avoidance ability, and inability to adapt to the precarious conditions associated with scavenging. Hence a holistic approach to FP development is necessary, and it should also be stepwise.

NUTRITION

Results of surveys carried out in various regions of Africa, Asia and South America have shown that FP depends very largely on scavenging. This is both an attraction and an advantage of the system. In my own work, I have found that many FP owners believe that their chickens will do very well on scavenging alone, and hence supplementation is a waste of resources. Some do practice feed supplementation, but this is irregular and meager. Obviously, FP has subsisted on supplementation for centuries, but if there is an expectation of improved performance, there should be a corresponding increased input of the flock owners.

Hence, there are the questions relating to supplementation such as, what to supplement, when to supplement, how to supplement, how much to supplement, and which category of chickens to supplement. Basically, there are two types of supplementation; the quantitative supplementation (nutrient supplemented) and the quantitative supplementation (quantity of feed supplemented). The supplementation that is practiced by most flock owners presently is the quantitative type. Hence, it may not address the whole issue of supplementation needs. While protein may be deficient in some situations, vitamins may be the limiting nutrient in some others. A careful study of what is available to chickens to the range will be a good indicator of what to supplement at various periods.

On the other hand, quantitative supplementation is important to augment what scavengable feed resource base (SFRB) there is. The pioneer work of Gunaratne et al (1993) is important in determining the quantity of SFRB. The implication of the scavenging system is that there is a finite supply of scavengable feed in any location at any time period. Besides, it is not all the SFRB that is available to the scavenging chickens; factors such as distance of homesteads to farms could limit availability of chickens to harvest gleanings, while local regulations could impose restrictions on the chickens' movement, hence there is the concept of available SFRB, rather than total SFRB.

The formulas of Gunaratne et al (1993) for estimating the SFRB raise some questions. How should the SFRB be expressed (g/chicken, g/flock, or kg/meter2)? Should household leftovers be used as a reference point for estimating the SFRB? Clearly, there is SFRB even in an open field where there are no houses. Sonaiya et al (2002a,b) suggested and describe the use of SFRB predictors (by direct measurement of number of insects, vegetation cover, household leftovers, etc) as well as bird unit in estimating the SFRB as well as expressing the quantity. These are not final solutions to the problems, but open the subject to more discussions.

HEALTH

The issues in health relate more to diseases and endo-parasites. Newcastle disease (ND) has been singled out as the greatest single threat to FP production. Efforts at combating ND in village flocks have yielded encouraging results. In two studies in southwestern Nigeria to assess the effectiveness of feed supplementation and vaccination against ND, the best performance of chickens was reported when there was intervention in both health and nutrition Sonaiya et al (2002b). However, as soon as ND is under control, other diseases become very important too. Thus, health intervention should be holistic, rather than being too fixated on the control of ND.

PRODUCTIVITY

The productivity of chickens in the scavenging system has been generally poor. The parameters for measuring productivity that have been discussed are mostly in terms of hen-day egg production, number of eggs/clutch, clutches/year, hatchability, and chick survival. Cumming (1992) and Sonaiya et al (2002) gave a graphic description of assessing FP productivity. It made use of an input-output relationship for estimating productivity of FP. Such analysis is needed in assessing the productivity of chickens, otherwise we may not be fair to them.

Energy (fuel or food) is an important input in any production, hence a consideration of the energetics of production is important in evaluating the productivity of FP system. In an on-farm study in southwestern Nigeria, factors such as multiple-hen incubation (one set of eggs incubated by more than one hen) and hens laying away from home were observed to contribute to low productivity. It will seem that the use of home-made kerosene incubator will improve the productivity, but the energy cost of running the incubator puts it at a serious disadvantage, the efficiency of the incubator is 23% of the efficiency of natural incubation. Further similar studies will be needed to ensure the relevance of FP development strategies.

SOCIO-CULTURAL

There is the socio-cultural aspect of FP development. The implication of the prevalent culture, or the use to which a product is deemed necessary could limit the effectiveness or relevance of any development strategy. No matter how relevant a model is in statistical or mathematical terms, unless it addresses peoples' perceived needs, it may not be acceptable.

CONCLUSION

It is important to consider the various issues that have a bearing on the FP development. The basic characteristic of any sustainable system should be its versatility.

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Improving Family Poultry Farming in Morocco: Constraints and Possibilities

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INTRODUCTION

Family poultry farming plays a major role in the economy of rural Morocco. It provides cash income,job opportunity and remains one of the most popular and economically rewarding mean of supplying animal proteins to local communities. Population growth, urbanization and successive years of drought have further led to increased reliance on such traditional low risk production sectors.

In addition to the aforementioned factors small holder family poultry (FP) constitutes an important contributor to food security in rural Morocco where 70% of the farms have less than 5 ha. This sector contributes over 22% of the poultry meat produced in the country and nearly one egg out of four is laid in FP farms. In recently conducted investigations, the ratio of village chicken to human populations was slightly over 1:1 (4) and almost doubles in favorable seasons. Current constraints to FP systems were poor management practices; lack of feed or unbalanced supplementary feeding, prevalence of diseases, lack of extension and health services. (2 and 4)

Previous improvement programs have essentially been based on introduction of new genotypes leading to heavier birds, higher productivity, but did not emphasis enough environmental adaptation. The new concept is rather the implementation of sustainable projects in harmony with natural resources and to alleviate somehow existing pressure on the environment. Lack of detailed appropriate data hinders however significant projections. It has not been possible to correlate existing statistical data with any major limiting environmental factor. These issues are briefly addressed in the present contribution along with few guidelines for improvement in the local conditions.

CHARACTERISTICS OF FAMILY POULTRY PRODUCTION SYSTEMS

Women play a major role in FP development through provision of labor, management practices and decision making concerning the use of resources. Most flocks were owned and managed by women (in 75% of the households) in these systems characterized by low investment and and practically no involvement of state services. At the opposite of other animal flocks, no association or share of any kind existed in these productions which were all privately owned and managed.

Flock composition in FP was essentially dominated by chickens (82% of the household surveyed raised chickens) as reported by 1 and 4. The birds raised in these extensive hus-

bandry systems had rather low productivity compared to others. Detailed descriptions of these systems have been reported by 3 and 4. The majority of the birds raised were hatched on the farms while a growing number of households used random crosses with commercial improved strains.

Socio economical status of the household affected flock structure and technical level of management as reported elsewhere (6,7). Very rarely and except when cooperatives were involved, some professional organizations were available lacking credit facilities. Most of the information circulated verbally. Women managing flocks aimed to maintain sustainability rather than stress productivity; thus several did not feed their children eggs to keep fertile eggs for setting. No taboo of any kind against eating any poultry product was observed.

Several technical possibilities are available to improve rural poultry production. Flock productivity is based on various husbandry parameters relating to reproduction, mortality and flock management. Any suggested mean for improvement should bear in mind the importance of traditional practices in maintaining the resource base while accessing to productive techniques and new markets.At the household level, we should continue to improve production efficiency, adopt new technologies. Poultry housing using local materials and properly designed for each region should reduce mortality and increase productivity.

The availability of year-round feed and water resources (in some areas) in appropriate quantity and quality constitute one of the major limiting factor to a sustainable production. Suitable watering and feeding systems are to be developed saving water and at the mean time improving its quality. Training and education will help understand feeding needs of birds at various ages and species. Scavenging might be a good source of free nutrients but with a little imput,particularly in unfavourable times.

RESEARCH AND DEVELOPMENTS

Research in this area has a key role to achieve in order to not only avoid mistakes of the past (projects sustainability, introduction of unsuitable genotypes, copying of success stories from elsewhere.) but also to strengthen food security and increase income through original means, adapted to environmental needs, to alleviate poverty, to increase employment, to promote gender equality where it is the most needed.

To reach such goals and promote FP, regional approaches are needed where the local population remains the key player with sound,efficient,cost effective integrated programs. Developing specific tools or appropriate research methodology in this area remains an important challenge. Commitments of more resources to successful programs will then become a prority. Multidisciplinary approaches in coordination and complementary to existing or on going programs must be the angular stones of new research projects. Coordination of research goals to extension and training programs is an achievable goal.

Genetic improvements

Improved chicken genotypes have been introduced in previous programs (5). The successes and failures of these operations remains a topic of controversy. Their longterm impact on FP systems productivity has been rather limited. In a time where bio diversity and preservation of genetic resources is a world priority, these introductions of new genetic pools are of great concern.

Improvement of local flock performance can be attained however through planned and controlled selection and crossbreeding. Previous studies conducted on rustic breeds in local conditions have demonstrated that crossbred performed better than local chickens and had specific advantages compared to commercial lines. (5) To improve biological productivity of FP genetic resources, continuing on-farm performance monitoring is required to quantify efficiency and genotype-environment interactions.

Disease control

Inadequate housing facilities, low quality and insufficient feed supply, lack of awareness and above all unavailability of environmentally suited chicks all contribute to high mortality and reduced productivity which can be substantially improved through appropriate disease control strategies. Major diseases and constraints conditions limiting FP should be evaluated in relation to the investigated areas rather than copying stereotyped models developed elsewhere. Sound surveillance services, regional epidemiological networks,simple evaluation and monitoring systems and a stable supply of the strictly needed products to remote areas are key factors to long-term success.

Practical bio-safety measures, specifically designed control programs and availability of products suitable for FP are all prerequisites to efficient control programs. Sensitizing veterinary services to develop effective, adapted control methods for the main diseases encountered is only a part of sustainable projects. These realistic strategies and others will increase prevention and control of major poultry diseases encountered.

Numerous possibilities for improvements of FP can be tried such as training, products diversification,extension and credit availability services. The main priorities are to be selected for each region according to its particular needs.

Products marketing

FP farming should be oriented more toward quality in a broad sense including product quality, environment preservation instead of quantity oriented mass production. Development of niche markets to increase added value products, creation of "Appellation d'origine contrôlée" and "label products" in addition to diversification are few of the possibilities. Poultry products obtained from these systems have a good image; their acceptability is not hindered by any of the usual stimuli of consumer environment. Local policy makers currently placing a growing emphasis on developing traceability systems for intensive animal productions should extend their concerns to FP products.

Governmental support

A three fold mission for government role can be assigned: - establishing clear standards and regulations which benefit all chain participants; - co-ordinating efforts of agencies, NGO's,state and international services, mass media operating in FP sector, - developing harmonious long-term collaboration, building partnership, mutual benefit relationships with the farmers. In the institutional process, better linkages should be established among FP farmers, government participants and markets. These combined efforts will promote FP and increase food security. Extension and information, training and continuing education are usually among state duties. Strengthening through education, training of human

resources in their respective functions and amplifying access and transfer of knowledge for FP managers are the priorities.

Appropriate teaching materials specifically designed for target populations should be developed using local languages. There is an increasing need for information and communication, effective extension materials and tested methodologies.

RECOMMENDATIONS

There is a tremendous potential for developing FP production in Morocco. It is sobering to remember that these systems are operating with environmentally friendly production methods which is an absolute prerequisite for their durability. By their integrated nature, FP systems are already quite sustainable and supply precious protein sources in periods of scarcity. In order to strengthen sustainability, preparedness to drought, introduction of appropriate low -cost available technologies, affordable measures can limit the impact of factors constraining production.

FP raising remains a low cost, important and efficient way to significantly reduce poverty and enhance food security particularly in poor areas and for low income populations. Food availability and poverty alleviation are goals that require full attention and co operation from all interested parties in this sector. Tested strategies for effective improvements means should be implemented. Outlining directions for future work in relation to other areas (of agricultural or non agricultural) development is also an urgent necessity. Recommendations focusing on projects implementation, past experiences and difficulties with the application of participatory approaches, development of agribusiness strategies should be thought of in advance to insure the success of FP projects and their sustainability.

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Commercializing rearing of village chicken in Kenya

Thomas Junne Kaudia and Aichi Kitalyi

SUMMARY

A field study on the status of village chicken was carried out in Nyando district in the Republic of Kenya to document flock characteristics, management methods, and identify constraints and opportunities in rearing village chicken in the area. Village chickens are reared under scavenging systems mainly as a source of income and food. Flock population per household was 24.2 chicken with 50% chicks and hen to cock ratio of 2.6 to 1.

Good productive hens lay an average of 15.4 eggs having 3.1 clutches per year and a hatchability of 87.5%. However, chick mortality at weaning after three months is high at 62.4%. Main causes of chick mortality are disease and predators. Chicks take 6 months to attain market weight of about 1.2 kg. Most of the farmers apply no specific techniques to boost production. Women own, manage, sell and receive money from chicken sales in most of the households. Constraints to rearing chicken are disease, predators, poor housing, poor management and lack of feed, low market prices and lack of markets.

It was concluded that the potential for village chicken as a source of wealth and development, promotion of gender equity and poverty alleviation is enormous and can be harnessed by training farmers, improving management and marketing systems.

Key words: indigenous chicken, mortality, scavenge, disease, gender equity.

INTRODUCTION

Indigenous chicken is dominant in developing countries (Mopate and Lonny, 1998) despite the introduction of exotic chicken in the 1920s and represent 74% of the number of chicken in Kenya (GOK, 2001).

According to Roberts (1992), village chicken can break the vicious cycle of poverty, malnutrition and disease. Chicken meat is rich nutritionally providing protein, fats, minerals and vitamins. Indigenous chicken can be a good source of cheap nutrition for resource poor households, the sick, malnourished and children under the age of five (Kitalyi, 2002: Personal communication).

But village chicken suffers very high mortality (Aini, 1990; Pandey, 1992) due to causes that are preventable (Wilson et al., 1987). Newcastle Disease (ND) is however believed to be the major cause of mortality in indigenous chicken in Africa and Asia (Bell, 1992).

To harness the potential of village chicken, Kitalyi (1998) suggests a new approach, aiming at increasing flock productivity through improved extension services, farmer training and preferential treatment of chicks.

The Objectives of the Survey

The objectives of the survey were: To document; productive characteristics of local chicken, management practices used by the community to rear village chicken, constraints and opportunities in rearing indigenous chicken and facilitate community members design action plans for the improvement of indigenous chicken in the area.

Field Work Approach

The fieldwork was carried out in five zones within Upper and Lower Nyakach divisions of Nyando district (Kusa) in Nyanza province of the Republic of Kenya. Focus Group Discussions (FGD) and person-to-person interviews were used to gather information. A one-day seminar was held at the end of the survey. To estimate quantitative levels of supplementation, each system used to scoop feed was calibrated by weighing. Data was analyzed using Statistical Package for Social Scientists (SPSS) computer program.

RESULTS AND DISCUSSIONS

General overview

Most of the households rear village chickens under scavenging system mainly as a source of income (39.4%) and food (36.2%). Women own and mange most of the flocks. But chicken meat is only consumed when important guests visit the family. Most farmers (62.5%) prefer chicken with brown plumage color mainly because it lays many eggs and sells faster at the market.

Average flock per household was 24.12 chickens with 50% chicks at a sex ratio of 2.9 hens for one cock. A core of breeding hens is kept to maintain the flock. Some (26%) households did not have a cock. Mopate and Lony (1998) observed a hen to cock ratio of 6:1 in Chad. In general the number of chicken per household was high.

Management Practices

Most of the farmers share their houses with chicken housing them either in the main house and/or in the chicken. The main bedding materials used where chickens are enclosed in the night are soil, sacks and mats with most farmers using soil. The bedding material is swept and/or removed every morning mostly by women. A woven basket locally known as Otete is used for covering chicken in the night to confine them in one part of the house. Few farmers have built poultry houses but are inappropriate.

Feeding

Ninety-eight percent of the farmers feed supplements to chicken. Most of the supplements are bought and fed to chicken in the morning mainly by women. Supplements are spread on the ground when feeding chicken The feed resource base (FRB) consist of maize, kitchen wastes, vegetables, sorghum, rice bran, ants, local fish meal, commercial feeds, flour and milling wastes lacking in vitamins and proteins. More than 75% of the farmers were supplementing with carbohydrates. Fishmeal, which is the main sources of protein, is only occasionally fed to chicken. The total quantitative supplementation is about 3.30 kg per week given mainly during harvest time.

Chickens are given water in all the households mainly by women. Water containers, except dishes are secured in a hole dug in the ground. These containers are seldom removed for cleaning and sanitation. Water is simply refilled when the level goes down.

Flock Health

The mortality is oftentimes more than 50% rising to 100% in most of the farms with an average of 89%. Forty six percent of the farmers had noted a mortality of 100%. Ninety-eight percent of the farmers treat sick chicken with diverse types of drugs including traditional concoctions. 56.7% used traditional methods, 26.9% used modern drugs including non veterinary drugss, 11.9% vaccinated chicks while 4.5% used pesticides to control external parasites.

The most worrying disease symptoms are swollen heads, white diarrhea, closed eyelids, mucus salivary exude from the nostrils and mouth and wheezing and coughing.

From the symptoms described by farmers, it was clear that Newcastle disease (ND), Infectious Bronchitis (IB), Infectious Coryza and Fowl Pox, Fowl Cholera (Common during cold weather), Infectious Bronchitis, Coccidiosis, Fowl Typhoid (Common during warm weather affecting both chicks and adult birds) and Pullorum Disease are common poultry diseases in Kusa. Most (95.7%) of the households bury dead birds while 4.3% throw dead birds, which are eventually picked up by scavengers.

Flock Production Characteristics

Hens lay an average of 15.4 eggs per clutch with 3.1 clutches per year. Few farmers wean off chicks at day old and reported 5 clutches per year. Households consume about 18.5% of the eggs laid. Selling of eggs is not common. The average hatchability was good at 87.6% with 62.9% chick mortality. Hens spend 270 days brooding chicks in a year.

The causes of mortality in chicks were predators (42%), disease (18.3%), a combination of disease and predators (36%) and drowning (3.1%).

Constraints to managing indigenous chicks

Main constraints to rearing chicks and adult birds are lack of feed, lack of proper housing, disease outbreaks, predators and poor management Figure 1.

The solutions to these constraints that could be pursued according to farmers' perspectives are constructing proper poultry houses, making feed at home, vaccination and treatment with modern drugs, training and forming poultry groups.

Marketing and Marketing Constraints

Households sold an average of 10.6 chickens earning a month income of US$ 1.575, which is below poverty level. Income can be increased through training to reduce mortality, increase number of clutches per year and improve rate of growth. Only three hens are required to earn above poverty level (Table 1). Main marketing constrains are low prices (56.9%), lack of market (25%), disease outbreak (12.5) and high cost of transport to other markets (5.6%). Feeding expenses worked out from 3.3-kg supplements fed per week.

FIGURE 1
Constraints to managing chicks and adult chicken

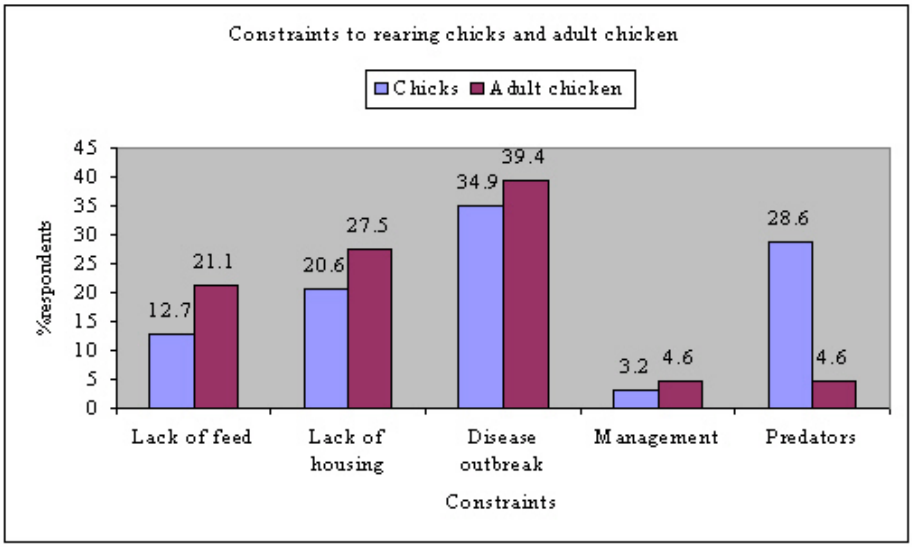

TABLE 1. INCOME PROJECTIONS FROM VILLAGE CHICKEN UNDER IMPROVED MANAGEMENT

With three hens a farmer is already above poverty line.

Farmers need training to be able to control disease, improve management and increase size of flock. Most of the farmers have not reared exotic breeds of chicken because they lack skills and capital.

The activities on the action plans were vaccination, training, building poultry houses, marketing and provision of market information, extension services, exchange tours and starting a community livestock resource centre.

CONCLUSIONS AND RECOMMENDATIONS

Rearing of village chicken in Kusa like in many parts of Africa is not developed like other agricultural sub-sectors. Village chickens are reared on traditional scavenging systems with minimal supplementation. The chickens are reared mainly as a source of income and for food. Unfortunately, chicken meat is consumed only when there is an important guest.

Productivity and hatchability are high despite poor housing, inadequate feed resource base and high mortality and general poor management. Women are playing crucial role in rearing of village chickens in the area. The potential of village chicken as a source of poverty alleviation, improvement of nutrition and promotion of gender equity is high and realizable. There is need to encourage villagers to consume more chicken meat and scientists to develop appropriate interventions to improve production of village chicken and also develop training materials in various local languages.

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Semi scavenging poultry model - the experience in Benin

Chrysostome Christophe, Riise Jens Christian and Anders Permin

INTRODUCTION

In Benin, with its 120.000 km^2 and close to 6 million inhabitants, approximately 80% of the population is presently involved in agriculture. Livestock production in Benin is mainly based on traditional smallholdings. As for poultry, 90% of the estimated 29 million poultry are kept in smallholder systems by almost all families, with 10-20 poultry per family. Activities are normally controlled by women.

As a traditional activity, the village based poultry production system provides meat and eggs of high nutritionous value for home consumption and for the complementary monetary income of women peasants, notably by the sale of these products.

Interventions to improve the small-scale production system, should assist the small-scale farmers, notably women, in improving the livelihoods. For this reason, DANIDA in the period 1997-2002 has financed a Agricultural Sector Support Programme (Programme d'Appui au Développement du Secteur Agricole, PADSA), with a specific component on village poultry (Programme d'Appui au Développement de l'Aviculture Villageoise au Benin, PADAV) with the aim of using small-scale poultry in the struggle against rural poverty and food insecurity in two provinces in Benin.

The overall strategy, involves creating a favourable enabling environment, with a suitable micro-credit system to reach the resource-poor, well targeted technical services (training and coordination of stakeholders) and a network of services to provide the veterinary services and other necessary inputs all the way to village level(GAHOU 2002).

The development of solidarity groups at village level, supporting the development of the interdependent micro-credit credit system with support and training giving by the NGOs are one of the main pillars of the Benin semi-scavenging model, just like in the Bangladesh and the Malawian models.

THE BENIN MODEL

The model is organised around tree pillars, the production, the service and the supply pillar. The institutional structure behind the model in the pilot phase of 18 months in the Mono province (districts Bopa and Houéyogbé) and the Donga province (districts Ouaké and Djougou), are two national NGOs, APRECTECTRA and GRAPAD. The first NGO, APRECTECTRA, is in charge of technical development of a viable chicken production system at village level, and the second NGO, GRAPAD, for the financing of the production inputs, group formation, credit training and follow-up.

However, for a good conduct of actions, the two NGOs are highly dependent on the collaboration of private veterinarians, of craftsmen supplying poultry keeping facilities in local materials, of the personnel of the "Direction d'élevage" for the technical support; and of scientists of Faculté des Sciences Agronomiques of Abomey Calavi University and the Network for Smallholder Poultry Development in Denmark for the specific supports in research and for the development of the system. The tree pillars of the model have specialized functions and tasks.

The pillar of production: It constitutes of smallholders, who each have a small farm with only 8 to 10 hens, mainly local breeds. The hens are kept under semi scavenging conditions and fed less than 40% by locally supplemented feed.

Supply pillar: This pillar is composed by Village Vaccinators (VVV), who are local poultry keepers trained specifically to vaccinate birds. Vaccine against Newcastle Disease is supplied by private veterinarians and the VVVs charge a vaccination fee. Another member of the supply pillar is the poultry seller. A poultry seller collects poultry and market them in the nearby towns. Poultry keepers may also sell their chickens themselves in the village. Some peasants are specialized themselves for the construction of poultry equipment, housing, perches, drinkers etc. for the poultry keepers. Due to the lack of a parent stock and subsequent sustainable delivery of Day-Old-Chicks (DOCs) in Benin, it was decided to use a simple supply model in Benin, focusing on local breed and the delivery of vaccines and medicals.

Service pillar: The pilot phase of the project presently covers 10 villages in the North (department Donga) and 10 villages in the South (department Mono). Each village has 40 members, i.e. total of approximately 800 farmers plus 40 VVV. The involved NGOs form small village groups with 5 members. The groups hold weekly meetings to discuss relevant subjects. New poultry keepers are allowed to join the village group (AVPAT: Association Villageoise de Producteurs d'Aviculture Traditionelle) only after receiving 2 to 3 days training programme held by the NGO for the poultry holder and by the university staff (FSA) for the VVV and extension workers of the involved NGOs.

Technical extension is provided by APRETECTRA and financial extension are provided by GRAPAD. Depending on the activities (poultry keeper, VVV, poultry seller) each member is provided with a small loan of 30,000 FCFA for producers and 25,000 F CFA for VVV and poultry sellers. The repayment period is 1 year for a poultry producer and 6 months for the others. The interest rate is 12% per semester while the rate of saving is 18% per semester and a rate of penalty of 2% the month on the capital remaining due.

For the pilot phase (2000-2002), the model will be developed further, based on the ongoing evaluation of gaps on the technical or financial side, the Network for Smallholder Poultry Development Copenhagen and scientists of Faculté des Sciences Agronomiques of Abomey Calavi University will develop training material, other documents and a scientific resource for semi scavenging poultry holdings.

Preliminary results

20 AVPATS are created and function for the promotion of the traditional poultry production.

40 VVVs, chosen on the basis of very definite selection criteria, are trained in vaccination and medication (APRETECTRA 2002). All are very active in the field and some have achieved substantial beneficiary profit margins.

Data from baseline studies enables a comparison of the mean poultry flock size and structure before and after the PADAV intervention with training and vaccination campaigns in the Northern department Donga (Ouake and Djougou). From table 1 it is clear that the effect on reducing the natural mortality of the chicks is pronounced (from 90 - 100% to an estimated 5 - 10% after vaccination campaigns)

The adoption of new simple technologies by the smallholders (troughs in terracotta, improved nests, utilisation of local feed stuffs, grouped marketing of products) is well established in most villages, giving a sustainable effect.

Preliminary results on the use of credit (table 2) shows two remarkable tendencies for the smallholders: 1) Very little (13%) of the initial loans are spend on feed, and 2) 25% are spend on poultry housing, not initially included in the budgeted expenditures. If smallholder's spending patterns are not well balanced, severe effects may be found on the repayment of the loans and the sustainability of the model.

CONCLUSION

From an organisational and training point of view, the relatively simple "Beninoise" poultry model is highly successful, even after only one year's intervention. However, running evaluation of the model performance is crucial to the long-term success on a larger scale.

See Tables 1 and 2.

TABLE 1: SIZE OF POULTRY FLOCKS IN DEPT. DONGA BEFORE AND AFTER PADAV INTERVENTION

Year	Cocks	Hens	Pullets	Chicks
2001	4	8	12	22
2000	2	6	11	0

TABLE 2: USE OF CREDIT-PRELIMINARY RESULT

Feed	13%
Vaccination	4%
Deworming	3%
Other medicine	20%
Poultry house	25%
Birds	19%
Other	16%

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