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FIFTEEN YEARS OF RESEARCH AND DEVELOPMENT IN OBAFEMI AWOLOWO UNIVERSITY ON FAMILY POULTRY

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Abstract

Family poultry, kept mainly by women, has been studied for 15 years by the Family Poultry Research Project (FPRP). A chronological report of FPRP's findings is presented. Mean flock size of 16 birds is usually established by purchase for the purpose of sale and consumption. Hens mature at 24 weeks and produce 3 clutches of 10 eggs each, 86% of which are hatched with only 33% of hatched chicks surviving. Of the total cost of production to 24 weeks, 61% is for supplement feed, 20% for replacement stock and 14% for health care. A 50% replacement of growers mash by a simple ration consisting of three non-conventional feedstuffs (palm oil sludge, cowpea testa and maize starch residue) in the supplement feed had no significant effect on performance of birds on-station and on-farm. The proximate composition and metabolizable energy of 10 non-conventional feedstuffs is presented. Newcastle disease (ND) was identified as the major cause of general mortality. On-farm trials indicated that a combination of vaccination against ND and supplementation significantly increased average daily gain by birds and average clutch size of hens as compared with the control treatment. It was concluded that vaccination, supplementation and vaccination + supplementation treatments increased flock size, reduced mortality and increased the number of chicks produced per hen per year. Some natural products (tagiiri –Lagenaria breviflora, dogon yaro - Azadirachta indica, and ewe ipin – Ficus exasperata) were found to be associated with the control of ND, nutritional deficiency and external parasites, respectively. The scavengeable feed resource (SFR) available to birds scavenging on the free range was estimated continually by measurement, calculation and prediction over an extended period. The number of refuse heaps per kilometer and number of insects per square meter were significant predictors of SFR while vegetation cover was not. Genetic evaluation showed that local chickens ecotypes from three ecological zones were not significantly different but were superior in disease resistance to exotic Dahlem Red as indicated by cellular and immune responses. Crosses of Dahlem Red and the "Fulani" ecotype were superior to other crosses but were inferior to the Dahlem Red in all production parameters measured over 5 years. Based on the results of our research and experiences elsewhere, a combination of improvements in vaccination, feeding, housing, breeding and farmers' training and credit support has been developed into a smallholder family poultry (SFP) model for poverty alleviation and food security in Nigeria. The model is currently undergoing field testing, adaptation and adoption.

Key words: Smallholder family poultry (SFP), family poultry, rural poultry, local chickens, village chickens.

INTRODUCTION

Family poultry at 104 million outnumbers all other livestock in Nigeria (FLDPCS, 1992). Commercial chicken holdings account for only 10 million chickens or 11 per cent of the total chicken population of 82.4 million. The bulk of poultry in Nigeria are maintained by families under low-input, extensive systems of management. These extensive systems incorporate: the free-range system also called the traditional system in which birds are free to roam around the homestead; and the backyard system, also called the subsistence system, in which birds are partly confined within a fenced yard (Sonaiya, 1995). Family poultry are important as providers of eggs and meat. The production systems - free range, backyard and small-scale intensive- have flock sizes of 1-20, and 10-50 and productivity of 20-60 and 30-100 eggs/hen/year, respectively (Sonaiya, 1995).

Family poultry (FP) production systems are economically efficient because although the output from the individual bird is low, the inputs are usually lower. This low output is expressed as low egg production, small sized eggs, slow

[illegible] improvements in pro[illegible] have been [illegible] under [illegible] farm [illegible] 99[illegible] 1992b; 1995), Niger [illegible], 1990), Nepal [illegible] 1989), Bangladesh [illegible]nsen, 199[illegible]) Burkina Faso (Guardeo[illegible], 19[illegible]), Nicaragua (de Vries, 1995), Malaysia (Aini, 1990) and Sri Lanka (Gunaratne *et al.*, 199[illegible]).

In socio-economic terms, the aggregate output of FP represents a significant part of the national economy. Annually, FP contributes 43% and 89% of the national egg and poultry meat production with an annual output of 82,000 metric tonnes of eggs and 67,000 metric tonnes of meat, based on the population and off-take rates. These quantities amount to a turnover of N 2.693 billion from a [illegible]ing asset of N 3.120 billion that the family poultry population represents. On the individual household level, family poultry represents significant household savings, investment and insurance. It contributes to family income and nutrition. In poor producer families, poultry products are not consumed but are mainly sold when the household is in need of cash. The income from the sale of poultry is additional revenue to earnings from cash crops from the field. Poultry products which are sold contribute about 15% of the annual financial income of poor rural households (Alam, 1997). Farmers are willing to save for agricultural equipment or other farm supplies like seeds. Livestock including poultry are used as a savings account. The offspring, like chicks, are the interest on the savings.

It can be seen that FP production is of importance to the nation and the farm family. Family poultry is as important to the rural areas as industrial poultry is to the urban areas. Under the present circumstances in Nigeria, research and development activities that will increase productivity of family poultry by 10% will far more capital investment. Family poultry is an effective way of transferring wealth from the high income urban consumers to the poor rural and peri-urban producers. Family poultry development should therefore concentrate on rural and peri-urban areas, the specific areas that have been the focus of our research in the last 15 years. In order to solve the problems of family poultry such as high mortality and low productivity, it is necessary to develop cost-effective improvements for application at the household level. This was the guiding principle for our work.

A research project on family (then called rural) poultry production was initiated in 1987. Our objective was to study the whole system of traditional poultry production and to develop practical interventions for enhancing the productivity, efficiency and profitability of the family flocks. Our studies have incorporated surveys, on-station and on-farm research. This paper is the first attempt to summarize the mass of data collected by the research project in one.

SOCIO ECONOMICS AND PROFITABILITY

The initial phase of the FPRP was a series of field surveys carried out, at different times, in 10 states – Delta, Edo, Ekiti, Kano, Kwara, Lagos, Ogun, Ondo, Osun and Oyo. In 1989, at the International Workshop on Rural Poultry Development in Africa (Sonaiya, 1990c), a lot of information obtained from these surveys were presented. The surveys estimated such parameters as number of clutches per year, average clutch size, percent hatchability and average flock size and composition. More survey data on general management, health and productivity of FP have been collected annually (see for example Sonaiya et al, 1992; 1994; 1998b; Obi and Sonaiya, 1995) and are summarized on Table 1.

We found that women and children provide the labour for family poultry, that only personal sources of finance are used, that majority of respondents wished to expand their flock size to about 200 but are constrained mainly by diseases, lack of capital or technical

information and fear of theft. Other constraints like feed, marketing, labour and land are of decreasing importance in that order. Price fluctuation and market locations are the major marketing problems. More than two thirds of all respondents used the extensive system, about a quarter used the semi-intensive system while only about 4 per cent used the intensive system. There were about three clutches of 10 (for hens) to 18 (for ducks) eggs per clutch. Hatchability was 85% or more in both species while replacement value of each clutch was 560% for hens and 1250% for ducks due to a clutch mortality rate of 44 and 31 per cent, respectively which was occasioned by diseases, predators and accidents.

Less than 5 per cent of respondents had had any contact with poultry extension agents mainly because most had never seen one nor received adequate responses on poultry from known extension agents who worked with them on their crop farms. The major sources of information on poultry production were radio and neighbours. Other farmers, relatives and market women also provided information.

Mean age at sexual maturity, number of clutches per year, clutch size and hatchability were non-significantly better in the savanna ecological zones. However, survivability, mortality and marketing were less of a problem in the forest zone.

Table 1. Characteristics of family poultry* flocks in Nigeria

Parameter Group	Parameter	Estimate
A. Flock Structure	Flock size	16
	Hens:Cock	4 – 7
	Growers/Flock	50%
B. Hen Performance	Age at first egg	6 months (24 weeks)
	Body weight at first egg	900g
	No. clutches/year	3
	No. egg/clutch	15
	Clutch formation	20 days
	Incubation period	21 days
	Hatchability	80%
	Brooding period/clutch	56 days
	Interclutch period	24 days
C. Flock Formation	Mortality (Survivability)	30-40%(60-70%)
	Pullets/hen/year	3
D. Nutrition	Daily ME intake	110 kcal
	Daily protein intake	11 g
E. Economics	Flock owners on poverty line	70 %
	%Family income from poultry	15-40

* Figures for chicken flocks. 66% of respondents own chicken only, another 29% have a mixed poultry flock, 2% each own guinea fowl only or duck only flocks, 0.6% own turkeys only and 0.4% own geese only.
Source: Sonaiya, 1990a; 2001.

Mean flock size was 14.4 in the forest and 18.7 in the savanna giving a mean of 16.3 over both zones. The foundation stock was purchased by 73% of the respondents, 10% inherited and 7% were given custody of the birds by others. The purpose for raising family poultry was sale of live birds for 87% of the respondents and sale of eggs by only 3% of the respondents although 82% of them consumed poultry meat and 19% consumed eggs.

The calculated means of the cost (1992 prices) of supplemental feeding, housing and medication of chickens for 6 months made up 61%, 5% and 14%, respectively, of the total cost of production. The production cost of 4-week-old replacement stock was about 20% of the total cost of production. This was 32% less than the market price of growers. Only 30 per cent of survey respondents purchased replacement stock from the market. The marginal return to labour is very small in family poultry production, being about 6% for a 6 month old cock. Two practices safeguard the FP producer's interest in income from poultry:

Increasing the age of sale to one year instead of 6 months increases returns to about 25%;

Feeding home-based supplements increases returns to more than 60%.

Surveys (Sonaiya et al. 1992; Obi and Sonaiya, 1995) indicated that farmers were willing to pay up to 1/6th the cost of the growers for vaccination and less than 50% of the cost of commercial feed for supplemental feed. As the socio-economic importance of family poultry production is recognised, thorough economic analysis is required to identify and evaluate problems, and plan appropriate interventions for development.

FEEDING AND SUPPLEMENTATION

Feeding

All family poultry depend on human habitation for their feed and the ratio of poultry to farming population is usually about 1:1.3. Free range birds do not receive sufficient feed but survive through scavenging. Here, energy is the first limiting nutrient as the food available on the range contains a lot of crude fibre. During grain harvests, birds usually can scavenge enough energy feed but not in the hunger season. During the rains, they get abundant animal protein by picking up worms, snails and insects. Ayeni (1982) reported that the food of the helmeted guinea fowl in nature consists of 35% grass seeds, 21% insects, 17% cyperus bulbs, 13% fruits, 9% leaves, 2% pebbles and 3% water ingested with food.

Insects are important in the diet of all scavenging poultry. This is why energy supplements, no matter how unbalanced, increase production. Sonaiya (1993b) used successfully, as a supplement for scavenging chicken, an unbalanced ration containing 11% CP and 3800 kcal ME/kg which could not serve as a maintenance ration for confined cockerels. Intake of supplementary feed at a rate as low as 8g/day increased body weight gain of scavenging grower chickens. Substantial research information is now available (see the review by Sonaiya, 1995) to design adequate feed supplements and to demonstrate their economic efficiency.

Scavenging chickens easily develop vitamin and mineral deficiency in the dry periods. This deficiency is signaled by comb and skin rashes. Giving ashes, pounded shells and wilted greens provide some of the minerals and vitamins they need. It can be seen that the low production of scavenging chickens may not be due to inherent ability but to variable seasonal imbalance in the diet: low protein, vitamin and mineral during the dry harvest period and low energy during the late dry season and the rain period.

Supplementation

One important area of regular intervention in the scavenging system is grain supplementation. Maize and sorghum, the grains of choice, are now used by flour mills, breweries and other food industries with which scavenging chickens cannot compete. There is thus the need to evaluate those non-conventional feed ingredients that are available at village level and that can be used in place of grains.

A collection of 25 non-conventional feedstuffs (NCF) was analysed for proximate composition, sugar and starch contents, and apparent metabolisable energy (AME) of each sample was calculated using the equation of

penter and Clegg (1956). The values (Table
obtained for proximate fractions agree with
se of Gohl (1975). Three NCF: palm (*Elaeis*

[illegible] commercial growers mash [illegible], MSR, POS and CT was 44.2, 45.2, 10.7, and 10 g DM, respectively. The intake of LGM was similar to that of MSR, and higher ($P<0.01$) than the intake of POS and CT.

In a growth trial, daily feed intake and gain were similar for cockerels on 0% and 50% POS-CT-MSR mix. However, birds on 100% of the NCF mix had very poor intake and steadily lost weight. The results indicate that diluting the commercial ration with 50% NCF would not affect the performance of cockerels raised in cages (Idowu, 1992). However, birds could not subsist on the 100% NCF (Table 3) as its chemical composition was very different from that of the commercial ration and from recommended allowances for growers in the tropics (Olomu, 1979; Singh and Panda, 1988).

In an on-farm study, ten scavenging flocks in two selected villages with a total of 165 chickens (55 adults, 57 growers and 53 chicks) were allotted to supplementation

treatments of 0g, 30g and 60g of 100%NCF/bird/
day. Supplementation below 60g/day was
insufficient to increase the growth rate of adult
while supplementation at 30g/day enhanced
owth of chicks ($P < 0.05$) possibly because
are not as good in scavenging as older
Sonaiya, 1993b).

llowing conclusions were made

Non-conventional feedstuffs available in the village are promising supplements for scavenging chicken based on their chemical composition.

2. Palm oil sludge, cowpea testa and corn starch residue singly or in composite rations can be used as supplements for scavenging chickens.
3. A 50% dilution of proprietary feed by POS, CSR and CT is acceptable to Backyard chickens without a significant loss in performance but with significant reduction in feed cost.
4. The 100% NCF ration is acceptable as a supplement to scavenging chickens.
5. Supplementation below 60g/bird/d is insufficient to increase the growth rate of scavenging adult birds while the growth of scavenging chicks (i.e. below 100g body weight) increases with a supplementation rate of 30g/bird/d.

Table 2. Composition of some Non-conventional Feedstuffs.

Feedstuff	Per cent Composition					
	Dry Matter	Crude Protein	Ether Extract	Crude Fibre	Ash	Calculated Metab. Energy (Kcal/Kg DM)
Leaves						
Talinum triangulare	10.0	23.9	4.0	9.6	19.7	923
Seeds						
Carica papaya	14.2	27.4	0.4	27.2	3.6	1308
Talinum triangulare	43.5	18.6	5.0	20.6	4.2	1362
Amaranthus graecizans	65.1	16.0	0.2	5.5	3.2	922
Testa						
Glycine max	28.6	16.6	4.0	25.4	2.7	2096
Vigna unguiculata	24.4	17.0	2.6	20.3	1.5	1005
Pulp						
Carica papaya	13.4	6.5	0.9	6.0	4.0	3396
Citrullus vulgaris	43.0	8.6	4.3	31.1	20.6	1148
Processing By-products						
Palm oil sludge *(Elaeis guineensis)*	30.2	4.3	53.2	7.5	7.2	5680
Maize starch residue *(Zea mays)*	21.6	16.8	7.8	4.2	0.5	1642

Source: Sonaiya, 1995

Table 3. Experimental rations and the performance of cockerels

Parameter	Rations		
	1	2	3
Chemical composition			
ME, kcal/kg	2300	3100	3800
CP, %	12.7	13.1	11.0
CF, %	6.3	6.5	7.2
EE, %	3.6	14.5	25.4
Tannin, mg/kg	9.2	8.2	6.4
Performance			
ADG, g	14.1[a]	13.5[a]	
DFI, g	95.0[a]	92.0[a]	
F/G	7.1[a]	6.9[a]	

Source: Idowu, 1992.

1 =100% CGM (= 0% NCF). 2 = 50%CGM, 27.5%MSR, 17.5%POS, 4%CT, 1%BM (=50% NCF).

3 = 55% MSR, 35% POS, 8% CT, 2% BM (= 100% NCF). CGM = Conventional Growers Mash, POS = Palm Oil Sludge,

MSR = Corn Starch Residue, CT = Cowpea Testa, BM = Bone Meal. NCF = Non-conventional feedstuffs.

HEALTH MANAGEMENT

High mortality and high parasite load due to inadequate housing and health care are problems of extensive poultry production. Many diseases plague family poultry including Gumboro, coccidiosis, fowl pox, fowl typhoid, fowl cholera and pediculosis (Adene, 1990). Less than 4% of respondents use Veterinarians and, instead of treating the birds, most will either do nothing (12.5%), kill diseased birds (12%) or sell them (6.8%). Culling of birds is indexed on cash needs, old age of the birds and sickness or other reasons such as the need for sacrifice. Poor productivity is only used by less than 25 per cent of respondents as an index for culling. Newcastle disease (ND) is the most important disease causing very high mortality. Newcastle disease is predominant in chickens and is most common in the dry and cold months (November to January). Therefore, vaccination against ND is an obvious priority.

A series of on-farm study focused on the effect of vaccination against ND and of offering a supplement of commercial growers mash on the productivity of scavenging village chickens. The results (Figures 1 and 2) indicated a >50% increase in growth rate, 12.5% increase in number of eggs hatched and 10% increase in chick survival and >40% reduction in mortality with vaccination alone. Chickens on the vaccination + supplementation treatment had the highest average daily gain of 4.55 g/bird/day which was 65% higher than the gain of birds on the control treatment (2.75). The average clutch sizes of hens on the supplementation and vaccination + supplementation treatments (9.3 and 8.8 eggs) were significantly higher than the clutch sizes of hens on the vaccination and control treatments (6.70 and 6.33 eggs). Chick survival was highest (93%) in the vaccination + supplementation treatment and lowest (76%) in the control treatment (Sonaiya et al., 2002b). In summary, vaccination, supplementation, and vaccination + supplementation treatments consistently increased flock size, reduced mortality and increased the number of chicks produced per hen per year.

GENETIC IMPROVEMENT

Many types and varieties of FP are usually differentiated by feather colour and other external characteristics. Some, however, are reported to possess other characteristics that are of economic importance. Such characteristics include: ability to handle fibrous feeds; pronounced sexual dimorphism in favour of the male (e.g. Geese and Muscovy ducks); and possession, by chickens, of the genes which affect adaptability and productivity in hot climates. Examples are the genes for bare or featherless neck - Abolorun (Yoruba) or Pingi (Hausa); dwarf body type (Arupe or Durugu) and frizzled feather (Asa or Shazumama). While most of these varieties are yet to be developed into pure breeds there have been attempts at selection. Olori (1991) from FPRP team indicated that the chickens of the pastoral Fulani or Bororo of Nigeria have been selected for meat and hardiness. Considerable work has been done (Nwosu, 1990) on the crossbreeding of local breeds with exotics.

Between 1992 and 1997, the FPRP team participated in a cooperative research project funded by the European Commission's Science and Technology Development Programme. Our particular objective in Nigeria, within the larger project objective, was to evaluate how local poultry populations vary in their ability to resist diseases and in their productivity. A total of 28 populations (1,570 locals and 1,192 exotics) were evaluated, over 72 weeks, on the University Teaching and Research Farm, for physical appearance and production performance traits – age at first egg, egg production and egg weight, percent hen-day egg production and percent laying mortality. We also searched for genetic differences between collections from ecological zones in Nigeria - Kaduna and Jos from the Guinea savanna; Makurdi and Ilorin from the Derived savanna; and Nsukka and Sagamu from the Rain forest zones. For all the traits, there was no significant difference between the chickens from the three ecological zones. Hence, the local chickens from these zones do not belong to different genetic groups (Adedokun and Sonaiya, 2001).

Investigation of disease resistance status

Fig. 1 Effect of feed supplementation and vaccination on the mortalities of chickens in different ages in southwestern Nigeria

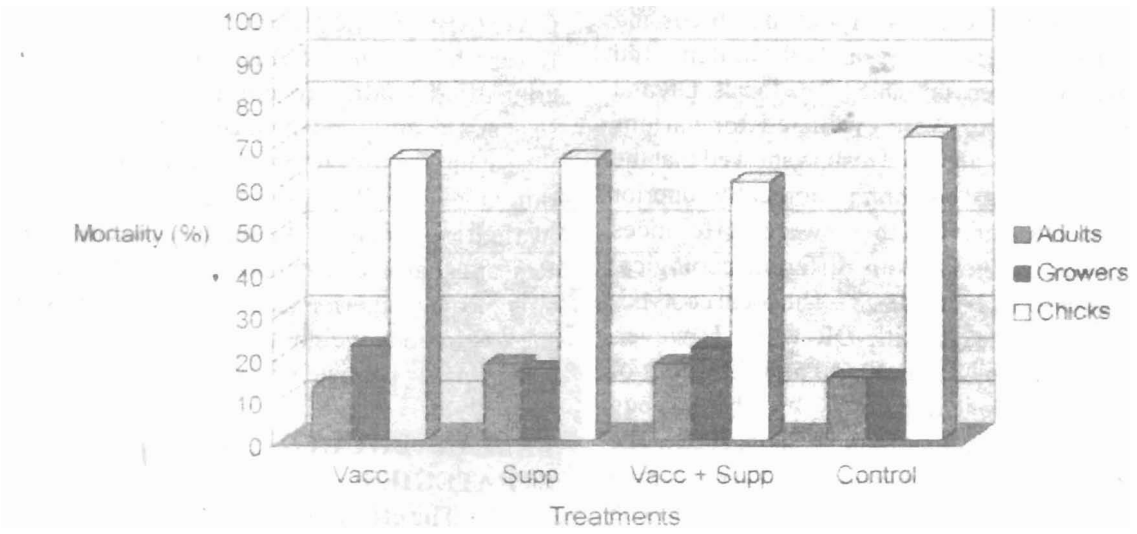
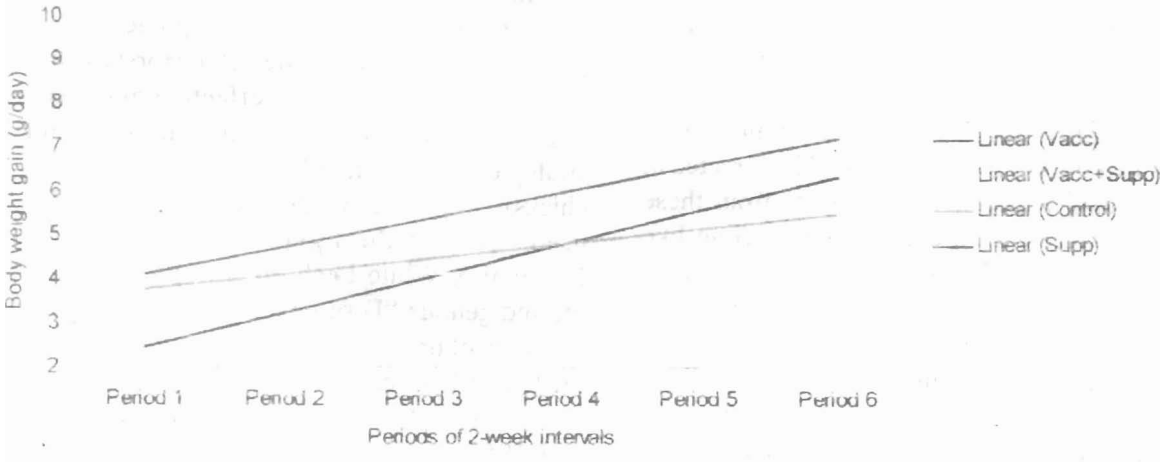


Fig. 2 Effects of vaccination and feed supplementation on the body weight gain of scavenging chickens



of local birds was carried out using 20 birds per ecòtype. Humoral immune responses were measured by hemagglutination inhibition (HI) test using sheep red blood cell. Cellular immune response was assayed by delayed hypersensitivity test (skin test). For genetic upgrading of local populations, purebreds and F_1 crosses between local and Dahlem Red populations were produced. The locals, DR and their F_1 crosses were evaluated for various performance traits. The results showed that the local chickens were immunologically superior to the DR and that there were differences between chickens from different ecological zones (Sonaiya et al, 1998). The local ecotypes and their crosses with DR were, however, inferior to the DR, at 20, 40 and 72 weeks of age, in shank length, body weight and egg production (Adedokun and Sonaiya, 2002). The genetic distances determined by genotyping based on 20 micro satellites, ranged from 0.05 to 0.16 within the ecotypes but were 0.32 to 0.38 between the mean of the ecotypes and the DR (Wimmers et al, 1999).

FAMILY POULTRY RESEARCH AND EXTENSION REQUIREMENTS

1. Feed

There is need to intensify the search for new feed resources to replace grains which are not cost-effective under the prevailing economic situation. Since yams and cassava have higher productivity in the humid tropics than all the grains, effort should be directed at producing feed-grade ingredients from these tubers. Such ingredients should be grain-like (e.g. gari) to facilitate their use in traditional feeding systems as well as in feed milling. If such grain substitutes can be coated or impregnated with proteins, vitamins and vaccines, they can become a complete supplement for family poultry production.

2. Extension

Group marketing has advantages. The dynamics, management and viability of FP groups should be studied. Radio was identified as the most important means of obtaining technical information. Families will be well served by radio programmes devoted to the provision of information for poultry development.

3. Health

Appropriate vaccination protocols and housing systems must be studied.

4. Genetics

Selection for adaptive traits has been achieved in the development of the Shika Brown Layer (SBL) by the National Animal Production Research Institute, (NAPRI), in Zaria. Carefully controlled studies to compare the effect of seasons, location and management on the SBL in the savanna and forest zones have been carried out. The FPRP team carried out a 2 year evaluation of the SBL on the Teaching and Research Farm. Our studies showed that the SBL was clearly superior to the local ecotypes and the DR in body weight gain and egg production and in laying persistence, respectively (Sonaiya, et al 1998).

FAMILY POULTRY DEVELOPMENT STRATEGIES

The effort to develop Rural Poultry (i.e. Family Poultry in the rural areas) started in Nigeria as far back as 1919 (Sonaiya, 1989). Various schemes have been executed but most had used a single (mostly genetic) improvement approach rather than a combined improvement approach. Hence, the most widespread strategy was the cockerel exchange programme (CEP).

Single (Genetic) Improvement Approach

Theoretical studies (ter Horst, 1987) showed that CEP is less effective and more expensive than other genetic improvement strategies such as distribution of fertile eggs or chicks of improved breeds. In Comorros, the CEP used cocks of the Egyptian Dokki (itself a Fayoumi X White Leghorn cross) and hens of the indigenous "Fermiers" but there was high mortality of breeder stock and great variability in the F_1 and F_2 (Kassimo, 1990).

In Sudan, CEPs were mounted in 1928 and 1956 for 3 consecutive years each but upgraded stock was susceptible to disease and not adaptable to traditional poultry management. Distribution of hatchable eggs was then used but this was hindered by low hatchability under natural breeding and the difficulty of distributing hatching eggs in rural areas. Attempts at distribution of day old chicks failed due to limitation of breeding stock, of hatching and brooding facilities, high cost

of chicks production and difficulty of distribution. Earlier, selection of indigenous cocks based on phenotypes had to be abandoned as it did not increase egg production (El Zubeir, 1990; Musharaf, 1990).

The Black Australorp Village Poultry Improvement Programme initiated in Malawi in 1969 sold 320,000 6-week old growers of both sexes to farmers every year but the results were not evaluated (Upindi, 1990). In the Gambia, CEP using RIR failed due to improper control of ND. On the other hand, the pilot Rural Poultry Improvement Programme (RPIP) in the Upper River Division engaged in disease control, information dissemination through farmer training, construction of poultry houses, use of locally available feed and development of marketing outlets for birds and eggs. This was so successful that the World Bank's Women In Development Project is to replicate RPIP in 200 villages throughout the country (Andrews, 1990).

In Kenya, the National Poultry Development Programme (NPDP), a joint venture between the governments of Kenya and the Netherlands, started CEP in 1977 and by 1 had increased egg production by 52% (Mbugua, 1990). A pullet exchange programme (PEP) was also initiated in 1985 but has not yet been evaluated. It should be noted that NPDP has always been involved in applied poultry research, marketing studies and training and extension. It has been very successful in training poultry production specialists who now serve as poultry production officers in most districts. This successful approach has been continued by the National Dairy Cattle and Poultry Research Programme (NDCPRP) which is also supported by the Dutch and had been focused exclusively on Rural Poultry research (Sonaiya, 1998).

Combined Improvement Approach

Wherever genetic improvement strategies have been combined with vaccination, feeding, housing improvement or farmers training, better success had been achieved. Even the short-lived UNDP/FAO-sponsored Poultry Development and Extension Project started in Somalia in 1989 introduced to 100 women ND vaccination, improved cleanliness and ventilation of poultry housing, protection of chickens for the first eight weeks and provision of supplementary feed (Ahmed, 1990). The North Togo project in Kara region combined CEP with ND vaccination, shelter and feeding improvement (Aklobessi, 1990).

The Rural Poultry Programme of the Christian Rural Service of the Church of Uganda had CEP and improvement in poultry management skills as its objective. One of the few CEP to be evaluated, it was deemed successful in developing interest but only participant with good hen houses and feed obtained increased egg production and flock size. Government veterinary services provided drugs and vaccines, prepared recipients of cockerels and gave management advice (Olaboro, 1990).

The Bouake Poultry Extension Programme in 34 villages in Katiola and Dabakala counties of Côte d'Ivoire was initiated in the late 1980s. Major programme actions were meetings, demonstrations and free provision of vaccines, chicks and cockerels. Extension messages were developed on: provision of night shelters, use of litter, distribution of poultry products and *ad libitum* water provision. It has increased average egg production by 25%, decreased chick mortality from 50 to 20% and reduced adult mortality (Boye, 1990).

Prospects for the Combined Approach

This combined approach to family poultry development can also run into problems as it did in Cameroon. In 1981, the Office Nationale pour le Developpement de l'Aviculture et du Petit Betail (ONDAPB) was created with the mandate to produce and distribute 6 miliion improved day old chicks, 50,000 tons of feed, supply veterinary drugs, process and package poultry products (Ngoupayou, 1990). It has been facing technical and managerial problems not unrelated to its nature as a government parastatal. This points to a shift toward the use of cooperative, non-governmental, or farmers associations to provide input services.

In Senegal, the "Sauvegarde de l'Aviculture traditionel" campaign started in 1991 was intended to carry out a baseline survey, to

train village auxilliaries to vaccinate against ND and fowl cholera and to organise and train village poultry producers economic groups in poultry management and in the collection, slaughter, processing and sale of poultry products. Similarly in Zaire, the World Bank assisted Programme de Sante Animale de Base started in 1989 involved village associations in nominating village vaccinators for training.

Two countries have achieved outstanding success in Family Poultry development - Bangladesh and Burkina Faso. The famous Projet pour le Développement Aviculture Villageois (PDAV) in Burkina Faso concentrated on the training and placement of "vulgarisateurs villageois volontaires" (V.V.V.) although its broad objective was improvement in hygiene, housing, feeding of rural poultry and in the transport and marketing of its products (Ouandaogo, 1990). In ten years (1979-1989), 1,821 V.V.V. were trained, and they administered 13 million ND vaccinations and 1.2 million anti-helminth treatments, among others. It is estimated that in 3 years, the programme resulted in the production of 1 million additional poultry. The last years of the programme were devoted to training and retraining of V.V.V. and publicity campaigns through slide shows in villages, debates in schools, pamphlets distribution, V.V.V. meetings, farmers visit to livestock centres and technical conferences of livestock agents. This large programme covered 15 provinces (out of 30 in the country), 4,378 villages (7,500) and 5,646,125 beneficiaries. A major factor responsible for the success of this programme was the political will and commitment of the government to rural development in general and agriculture in particular (Sonaiya, 1992).

In Bangladesh, the government Department of Livestock Services and the Bangladesh Rural Advancement Committee (BRAC) an NGO, have, in the last 20 years, focused on Family Poultry as a vehicle for providing employment and socio-economic development for rural peoples. Their FP programme has reduced poverty level by 32% per year amongst the poorest of the landless poor (Alam, 1997).

FAMILY POULTRY DEVELOPMENT REQUIREMENTS IN NIGERIA

Development of family poultry production which accounts for 80% of the poultry population will significantly improve family nutrition and incomes, employment opportunities and promote equity for women. World Bank projects have shown that small poultry farms can be competitive especially when using low cost by-products (de Haan, 1992).

Where there is a consistent government policy to support the economic advancement of the family, family poultry development has succeeded. Family poultry development has been found to be ideal for rehabilitation of refugees and victims of disasters and wars. Somali nomads, who lost most of their cattle to drought, accepted poultry and poultry products as substitutes for cattle and beef, respectively. Widows of the Ugandan civil war were rehabilitated by the Catholic Church of Uganda through a rural poultry programme initiated in 1987.

In Nigeria, the federal and state governments have policies promoting agriculture as a vehicle for poverty alleviation, food security, employment creation and expansion of the private sector. Generally, family poultry production has received insufficient attention. This is due more to the lack of access to the available information and development ideas for this subsystem in the complex farming system. FAO and the world poultry community now recognize that development of family poultry requires a multifaceted intervention in vaccination, housing, feeding, marketing and genetic improvement. Both public and private involvement is necessary. Government livestock institutions (including universities and research institutes) must agree to be involved in:

- training of trainers in poultry production (poultry subject matter specialists) who will then train village extension agents and farmers;
- carrying out applied research particularly in the use of locally available housing materials and non conventional feedstuffs;
- production and delivery systems for

vaccines and health intervention; and

production of improved breeding stock.

The private sector (including for-profit and not-for-profit non-governmental organizations, cooperatives and village associations) should be developed and entrusted with the tasks of:

- production of vaccines, pharmaceuticals, feed and housing materials;
- training village operators (vaccinators, extension agents, input suppliers, etc);
- distribution of vaccines, drugs, feed and housing materials; and
- the assemblage, processing and marketing of products (Sonaiya, 1992).

These paradigms along with our research results were brought into focus by the first hand experience with the Bangladesh Semi-scavenging Poultry Model. The interaction of FPRP team with family poultry producers and members of a trade union, the National Union of Local Government Employees (NULGE), contributed to the development of the Smallholder Family Poultry (SFP) Model for Nigeria. The general objective of the SFP Model is to enhance the income earning capability of very poor women. The Nigerian SFP Model will provide an entry point for these very poor women to diversify income earning and employment opportunities and, through training in poultry activities, to improve their socio-economic situation.

The specific objectives are to:

1. enable village women, through SFP rearing, to earn a monthly income of N500 to N5000;
2. supply birds of high yielding variety (e.g. Shika Brown Layer) to upgrade the local birds and so increase their production of eggs and meat;
3. prevent common poultry diseases and reduce mortality from 40-85% to 15%;
4. train SFP owners in improved scavenging-based rearing; and
5. provide micro-credit and technical services through government agencies and NGOs for SFP enterprises suitable to the hard core poor.

The SFP Model is currently undergoing field testing, adaptation and adoption in at least 2 states of the federation.

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