INTERNATIONAL NETWORK FOR FAMILY POULTRY DEVELOPMENT
RÉSEAU INTERNATIONAL POUR LE DÉVELOPPEMENT DE L'AVICULTURE FAMILIALE
RED INTERNACIONAL PARA EL DESARROLLO DE LA AVICULTURA FAMILIAR
www.fao.org/ag/againfo/subjects/en/infpd/home.html

INFPD Newsletter Vol. 14 No. 2, July – December 2004

INFPD Newsletter Editor-in-Chief:
Dr. E. Fallou Guèye, Senegalese Institute of Agricultural Research (ISRA), B.P. 2057, Dakar RP, Senegal, E-mail: <efgueye@refer.sn>
INFPD Coordinator:
Prof. E. Babafunso Sonaiya, Department of Animal Science, Obafemi Awolowo University, Ile-Ife, Nigeria, E-mail: <fsonaiya@oauife.edu.ng> or <fsonaiya1@yahoo.com>

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Guest Editorial

Family poultry and avian influenza

I. Aini

Faculty of Veterinary Medicine, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia, E-mail: <aiini@vet.upm.edu.my>

[Professor Aini's research interests are in the areas of avian respiratory and immunosuppressive diseases. She has been involved in Newcastle disease research since the early 1980's. Together with Professors A. Latif Ibrahim and Peter B. Spradbrow, they developed the thermostable Newcastle disease vaccine, V4-UPM, mainly to overcome the problems of vaccinating free-range village chickens. This vaccine was licensed to a local vaccine company in 1995. Professor Aini continues her association with village chickens in monitoring and control of important poultry diseases.]

Village chickens, also known as family poultry, have been recognised as an important component of poultry production in most Asian and African countries. In some countries, they even contribute up to 80% of the country's source of poultry. The control of diseases in these free-ranging chickens is often difficult and tedious and thus most commonly, no control measures are being undertaken. These groups of chickens are also blamed for the spread of diseases from one place to another.

Beginning in early December 2003, and going through the middle of 2004, a total of nine East Asia countries reported their worst epizootic of highly pathogenic avian influenza (HPAI), caused by a H5N1 avian influenza virus. The nine countries were: Korea, Vietnam, Japan, Taiwan, Thailand, Cambodia, Laos, Indonesia and China. During the 7 month period, not only millions of poultry died or had to be sacrificed but sadly also the causative agent, HPAI, caused deaths in the human population in Vietnam and Thailand. Until August 2004, Malaysia, Singapore and Philippines continued to remain free of HPAI.

Considering the fact that Malaysia shares the same border with Thailand and is very close to Indonesia, which was devastated by the avian influenza outbreaks, it was a wonder that Malaysia was spared outbreaks of this devastating disease. However, the Malaysian authorities, especially the Department of Veterinary Services, were on high alert all the time. The surveillance and emergency response systems were on place to monitor the situations and to control the outbreaks, should the need arise. The teams were mobilized to inspect and collect random samples from all types of chickens, ducks, quail, as well as from pet shops, bird sanctuaries, and other specialized farms, such as partridge and ostrich farms. Wet markets and poultry processing plants were also inspected and monitored.

Dr. Robert Webster from World Health Organization (WHO, www.who.int), who happened to be on the way back to the United States, from Hong Kong, kindly accepted my invitation for a stop-over in Malaysia, in December 2003, to give a talk on avian influenza, to veterinarians and poultry farmers. He strongly stressed then that HPAI was on the way to Malaysia, and it was just a matter of time. He also stressed the importance of collecting samples from wet markets.

The dreaded H5N1 bird flu virus strain finally made its appearance in Malaysia, on 17 August 2004, in the North Eastern state of Malaysia, Kelantan, which borders with Thailand. The affected village is about 100 km from Narathiwat province in Thailand, in which several bird flu cases were reported. The first case in Malaysia was believed to have originated from an infected fighting cockerel, which was brought back from Thailand. Two indigenous chickens, one male and one female, were confirmed to be positive with H5N1. Cock-fighting, though illegal in Malaysia, is still going-on secretly, or the enthusiasts would bring cockerels to Thailand, where cock-fighting is very popular. In some Malaysian villages bordering Thailand, cock-fighting has become a culture, a sporting tradition, handed down from generation to generation. The fighting cocks fetch a very high price as well, even reaching US$2000 or more per bird.

From August to September 2004, five districts in Kelantan were affected with HPAI. Though the number of positive cases was small, this has resulted in about 17,000 chickens, ducks, geese, quails and other pet birds being culled and destroyed within the two months period. The difference with other countries is that, so far, in Malaysia, the traces of positive cases were only detected in village chickens and quails. No positive cases have been detected in commercial chickens.

Japan, Thailand, Cambodia, Vietnam and Indonesia have also reported positive cases in village chickens, quails and ducks, besides commercial chickens. I do not have the exact number of village chickens infected or culled in those countries. It would be interesting if we can gather the information of HPAI outbreaks, which involved village chickens in the affected countries. The control of HPAI involves eradication or a combination of vaccination and eradication. Countries, which export their poultry products, have the choice of eradication only. Eradicating HPAI infection by culling infected poultry is not only tedious, time-consuming, labour-intensive, but also almost impossible where free-ranging village chickens are concerned. Some owners keep their chickens in chicken coops or sheds at night, and some do not. Catching the chickens during the daytime is very difficult. The authorities have to wait for sunset when chickens return to their coops or sheds. Some chickens rest on trees, thus the catchers have to climb trees, crawl under the houses, search in the bushes, etc. Some owners smuggled their prized pet birds, singing birds (such as doves), fighting cockerels and others, out of infected areas, to avoid being destroyed.

Compensation is not easily accepted by many owners, who put very high value on their prized cockerels or singing birds. Thus, they resort to smuggling those chickens and other birds out of the restricted areas. These smuggled chickens were believed to be the source of HPAI spread in other districts in Kelantan. We are still hoping and doing our best to ensure that the disease does not spread to commercial chickens. The volume of business is estimated, in RM (*Ringgit Malaysia*, the Malaysian local currency), at about 3.8 billion [equivalent to US$1.0 billion] only for commercial chickens. The fault of one fighting-cock may destroy the country's poultry industry, if the disease spreads to other states in Malaysia.

Research Reports

Rearing of broilers under semi-scavenging system in rural areas of Assam, India

Rameswar Deka[1] and Niranjan Kalita[2]

[1] *Dairy Development Department, Assam, India, E-mail: <dekarameswar@yahoo.com>*

[2] *Department of Poultry Science, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati – 781022, Assam, India, E-mail: <niranjankalita2004@yahoo.co.in>*

ABSTRACT

The focus of this paper is on the rearing of broilers under semi-scavenging system in rural areas. The objective of this study is to promote economic uplifting of vulnerable sections of rural communities, especially the tribal women of Assam, India. Seven hundred day-old commercial broiler chicks were purchased and reared under intensive conditions until two weeks of age. During the third week, 480 chicks from this flock were distributed to 10 tribal women for rearing under semi-scavenging system. The remaining 220 chicks were reared under intensive system till 9th week of age. Results showed that body weight, weight gain and feed consumption of broilers reared in semi-scavenging system were significantly lower than those kept in intensive system. However, profitability and organoleptic quality of meat from broilers reared in semi-scavenging system are significantly better than those from birds kept in intensive system.

Key words: Broiler, India, semi-scavenging

1. INTRODUCTION

Assam state, North-eastern India, is spread over a geographical area of 78,438 km^2. The total population of Assam was estimated at 26,638,407 persons in 2001, out of which 87.3% live in rural areas. There are several communities of tribal people such as Bodo, Kachari, Mising, Karbi, Dimasa, Rabha and Tiwa who live either in hills or plains. Tribal people are mostly concentrated in the districts of Karbi, Anaglong, N.C.Hills, Dhemaji, Lakhimpur, Kokrajhar, Bongaigaon, etc. All these communities mostly depend on agriculture, animal husbandry and forestry for their employment, livelihood and existence. They are resource-poor and unskilled. With the change of time, the land under forest and agriculture are shrinking and these are encroached by human habitations. Therefore, livelihood becomes a challenge for these communities, becoming more dependent on livestock rearing, especially backyard pig and poultry production. Since tribal women are hard workers and would like to contribute equally with their male counterparts, they consider poultry rearing as a main tool for income generation. However, poultry rearing in backyard system does not give much incentive to them due to poor genetic make-up of birds, lack of technological inputs and negligence from the part of institution. Also, they cannot go for intensive rearing of birds due to required higher initial investment, lack of marketing facilities and infrastructure facilities in rural areas.

The present study was conducted to evaluate the feasibility of different types of farming system (semi-scavenging), which may be more suitable for this disadvantageous group of people living under the poverty line in rural areas. Jensen (1996) stated that

under semi-scavenging system initial investment is low, turn over is fast, and the processing and marketing are simple. Saleque (2000) also reported that poverty alleviation through semi-scavenging poultry rearing is highly encouraging.

2. MATERIALS AND METHODS

2.1. Description of site

The Assam state, India, has a warm and humid climate with hot summer, followed by the monsoon season of heavy rainfall and a relatively cool winter with scanty rainfall. Average rainfall is as much as 1962.5 mm and is mostly concentrated between June and September. Every year, descents of the rivers and their tributaries from the surrounding hills lead to heavy erosion and floods. Silts were then deposited on the alluvial plains.

Tribal people are mostly non-vegetarian and they mostly prefer pork and chicken as their primary source of animal protein. They are not habitual milk drinkers and so cattle rearing among them are not very popular. All the tribal people used to drink home-made wine along with chicken, and residues of wine are offered to poultry. So there is good demand of chickens among them even in remote villages.

2.2. Experimental animals and their rearing

The study was conducted in five tribal villages of Assam, India. To conduct the study, 700 day-old commercial broiler chicks were purchased and divided into four batches of 175 each. Each batch was raised under standard management conditions unto 14th day of age on a farm. On 15th day, 120 chicks were selected randomly from the flock and transferred to 10 pre-selected rural families for rearing the chicks in semi-scavenging system. All the families were considered as a single semi-scavenging group, and they were selected from the same socio-economic background. Remaining chicks in the farm were used as intensive group and managed under standard rearing intensive system till 9th week of age. The process has been repeated in similar way for another 3 batches.

For the rearing of birds under semi-scavenging system, an especially designed low-cost bamboo cage was prepared. The floor of the cage was constructed with bamboo mat and was placed at the height of 30 cm above the ground. The sidewalls were also constructed with bamboo mat up to 30 cm height, and the remaining 76 cm height was covered with bamboo netting for free circulation of air. A small door was kept above the floor at the corner of the cage. The roof was constructed with bamboo mat and was covered by polythene sheet. Litter material like paddy husk was placed above the bamboo mat up to 15 cm in depth. Low-cost feeding and water troughs were placed inside the cages at specific location such that birds could find them out even in the dark. Under the semi-scavenging system, birds were allowed to scavenge during daytime; and during night they were housed in bamboo cages. During the hours of scavenging, they consumed earthworms, caterpillars, termites, spilled grains, shoots of grasses, leftover rice, vegetables, etc. In the evening, they were provided commercial feed at 10 g/bird/day from 3 to 4 weeks, then at 15 g/bird/day from 5 to 6 weeks and at 20 g/bird/day for the last three weeks as a supplementary feed. Birds were vaccinated against Newcastle (or Ranikhet) and Infectious Bursal Diseases, and minimum medication was used in semi-scavenging system. No electricity was provided in the cages, except for 2-3 hours every day during the first week.

2.3. Carcass characteristics

For the study of carcass characteristics, 20 birds were randomly selected from the intensive group and 40 birds from the semi-scavenging group, at the end of 9th week. The birds were slaughtered as per improved Kosher Method for assessing the dress yield, eviscerated yield and giblet yield. In order to study the organoleptic quality of meat, a 7-member semi-trained panel of habitual meat eaters was employed. Each sample was evaluated for colour, flavour, juiciness, tenderness and overall acceptability by using a 9-point hedonic scale. Similarly, carcass characteristics were studied in other batches also.

2.4. Statistical analysis

Weekly body weight, body weight gain, feed consumption, mortality, profitability and carcass yields were recorded. Obtained data were analysed statistically by using the method of Snedecor and Cochran (1967).

3. RESULTS AND DISCUSSION

3.1. Behaviour of broilers during scavenging

During the time of rearing of broilers under semi-scavenging conditions, their behaviour was also observed. It was found that all the broilers scavenged together and did not mixed up with indigenous birds. They did not hesitate to go near to the people and they used to go to the kitchens or the places where leftover rice, vegetable etc. are available. They usually went for scavenging during the cooler hours of the day; and during hot hours they took rest under the shrubs, trees, shadows, etc. Predators usually attacked the birds during this period. Moreover they could not run faster and therefore they could easily be tapped-up by predators. During monsoon they could not go out for scavenging due to rain; and they took shelter on one corner of the cage. During the initial period of their life under semi-scavenging conditions they found some problems due to absence of light but gradually they become accustomed to the dark environment.

3.2. Production performance

The average weekly body weight of broilers from first day to 9th week of age is depicted in the Table 1. There is a significant difference between the intensive group and semi-scavenging group with respect to weekly body weight and weight gain from 3rd week to 9th week of age. This is probably due to *ad libitum* supplementation of commercial compounded feeds up to 9th week of age and adoption of standard management practices in the intensive group. Besides, the energy requirement for maintenance may be higher in semi-scavenging group than in intensive group due to involvement of higher exercise during scavenging. Therefore energy obtained out of limited feed resources was utilized mostly in maintenance rather than production, which may result in lower body weight in semi-scavenging group.

Table 1: Body weight, weight gain, feed consumption and mortality of broilers under different rearing systems.

Age	Body weight (g)		Weight gain (g)		Feed consumption (g)		Mortality (%)	
	T_0	T_1	T_0	T_1	T_0	T_1	T_0	T_1
1 day	45.3±0.8		–		–		–	

1st week	115.6±0.9		70.3±0.9		121.5		–	
2nd week	241.8±1.2		126.2±1.0		345.4		–	
3rd week	482.4^{a}±3.4	322.1^{b}±2.4	240.7^{a}±1.2	80.3^{b}±2.0	684.6	415.4	–	–
4th week	783.7^{a}±4.9	417.3^{b}±3.6	301.2^{a}±3.3	95.2^{b}±4.7	1222.8	485.4	–	–
5th week	1190.0^{a}±6.9	530.0^{b}±4.4	325.4^{a}±4.6	112.7^{b}±5.5	1921.0	590.4	–	–
6th week	1469.2^{a}±9.3	658.3^{b}±7.1	360.2^{a}±8.9	123.3^{b}±5.7	2791.5	697.4	–	–
7th week	1840.2^{a}+10.1	884.7^{b}+8.9	371.0^{a}±10.7	226.4^{b}±6.4	3698.8	837.4	–	–
8th week	2252.8^{a}±12.3	1070.3^{b}±10.4	412.6^{a}±10.7	185.6^{b}±7.2	4685.9	977.4	–	7.5
9th week	2628.5^{a}±15.8	1223.7^{b}±14.7	375.7^{a}±12.4	153.4^{b}±9.6	5782.7	1117.4	–	–

Management system: (T_0) Intensive and (T_1) Semi-scavenging

Means bearing different superscripts between groups within a week differ significantly from each other ($P \leq 0.05$).

It is also found that growth was uniform up to 2nd week, but from 3rd week onwards growth of semi-scavenging group declined in contrast to the intensive group. On 3rd week, weekly weight gain was even lower than 2nd week. This was probably due to the limited amount of commercial feed being made available to them and expose to adverse climatic and sub-optimal management conditions. Further during that time, birds were also not habituated to obtain feed through scavenging but gradually they learned the art of scavenging, and weekly weight gain tended to increase in subsequent weeks. On 9th week, weekly weight gain in both groups of broiler took a decline trend.

3.3. Feeding practices

Total feed consumption (concentrate) from first day to 9th week of age in the intensive group was 5782.7 g per bird against 1117.4 g in semi-scavenging group. Apparently, the commercial feed consumption was much higher in intensive group than semi-scavenging group. This was due to supplementation of commercial feed *ad libitum* to intensive group and partial supplementation of commercial feed to the semi-scavenging group. Nevertheless, the birds from semi-scavenging group consumed various insects, grains, kitchen waste, etc. when they scavenged in the homestead. This reduces feed cost substantially. This finding is in agreement with the observation made by Jensen (1996) who interpreted that the availability of scavengeable feed is as such the cornerstone in the semi-scavenging model. The scavengeable feed is the most difficult item to deal with since its amount is unknown and fluctuates over the season.

3.4. Incidence of diseases

There was no mortality in intensive group till the end of experiment. This was probably due to the adoption of standard management practices and the use of required medicines and vaccines. Mortality in semi-scavenging group after 14th day was 7.5%, including losses due to predators. This finding was in conformity with that reported by Fattah (2000). The author observed 7.6% mortality in semi-scavenging cross-bred layers. Mortality was mostly due to the aflatoxicosis and Newcastle disease. This is probably due to the fact that broilers scavenge together with indigenous birds, which usually suffer from Newcastle disease and consume feed resources from damp places. This finding is in agreement with those reported by Sasaki (1996) where he reported that Newcastle disease remains the biggest hindrance in scav-

enging poultry raising in most of the Asian developing countries. Ramdas and Ghotge (1998) also stated that the high mortality of indigenous birds in Andhra Pradesh and Maharashtra is due to two important killer diseases, i.e. Newcastle disease and salmonellosis. About 40% of the mortality is caused by Newcastle disease and approximately 35% due to salmonellosis. Losses due to predators are 2-3 chicks per batch.

3.5. Management-related problems

The major problem in the management of birds under semi-scavenging system was to take care of chicks from third week onwards. During these periods, birds found it difficult to accustom with dark environment, and they scavenge on the fields. Tapped up of birds by predators is also a major constraint during these weeks. Another major problem of birds is during monsoon as birds suffer from cold when they go out for scavenging.

3.6. Economics

The economics of both intensive and semi-scavenging groups on 6th, 7th, 8th and 9th weeks of age is presented in the Table 2. It was observed that profit is higher in semi-scavenging group than in intensive group, and it increased from 7th week to 9th week of age. This is probably due to the fact that in semi-scavenging group body weight increased from 7th week to 9th week of age at faster rate than earlier weeks but the consumption of concentrate feed did not increase accordingly. However, in intensive group, feed consumption also increased in accordance with the body weight. In semi-scavenging group, highest profit was found on 9th week of age due to highest body weight in that week. This finding was in line with the reports of Jensen (1996) who reported that in Bangladesh a successful model has been developed for semi-scavenging poultry holding through the use of crossbred layers. In 1995, more than 6 million smallholders were established with the help of NGOs, and the number of smallholders is increasing by more than one million per year.

Table 2: Cost of production and profit per kg live broiler in intensive and semi-scavenging group.

Economic parameter	(Amount in Rs.*)							
	6th week		7th week		8th week		9th week	
	T_0	T_1	T_0	T_1	T_0	T_1	T_0	T_1
Cost of day-old chick at Rs. 15.50/chick	15.50	15.50	15.50	15.50	15.50	15.50	15.50	15.50

Cost of feed per broiler at Rs. 11.33/kg feed	31.63	7.90	41.91	9.49	53.09	11.07	65.52	12.66
Cost of medicine, vaccines, disinfectants, etc. per broiler	4.66	1.62	5.00	1.83	5.26	2.10	5.60	2.42
Cost of labour, electricity, transportation, etc. per broiler	4.43	1.20	4.91	1.52	5.42	1.75	6.10	2.00
Total cost of production/broiler	56.22	26.22	67.32	28.34	79.27	30.42	92.72	32.58
Cost of production per kg live broiler	38.27	39.82	36.58	32.06	35.19	28.42	35.27	26.62
Profit/kg live broiler at whole sale price at Rs. 50.00/kg live broiler	11.73	10.18	13.42	17.94	14.81	21.58	14.73	23.38**

* Approximately 47 Indian Rupees (Rs.) are equivalent to US$1.

** Actual profit was much higher than this as the birds from semi-scavenging group were sold at retail price of Rs. 75.00/kg live weight in rural areas.

Poultry rearing under backyard system is a common practice among the tribal and Muslim people. They rear indigenous poultry (chickens) as a supplementary household activity, and income generated out of it mostly accrue to women and children. Thus, the women get some level of economic independence within the family through poultry rearing. This is in conformity with the finding by Kaiser (1990) who observed that village chicken production in Niger has been reported to produce higher income than minimum labour wage. Veluw (1987) also reported that in Ghana village chickens are estimated to contribute over 15% of the household cash income.

3.7. Carcass yield

The percent carcass yield in intensive and semi-scavenging groups slaughtered at 9th week of age was expressed as dressed yield, eviscerated yield and giblet yield, in comparison with pre-slaughter live weight.

(a) Dressed yield: The percent dressed yield of both groups (T_0 and T_1) is presented in the Table 3. Dressing yield was significantly ($P \leq 0.05$) superior in the intensive group (T_0), compared to the semi-scavenging group (T_1). It was observed that percent dressed yield increased with the increase of live weight. Souri *et al.* (1972) also observed significant correlation of live weight with dressing percentage.

Table 3: Percent dressed yield, eviscerated yield and giblet yield of both intensive (T_0) and semi-scavenging (T_1) group.

Group	Dressed yield	Eviscerated yield	Giblet yield
		Mean±S.E.	
Intensive (T_0)	81.96 [a] ±0.21	74.26 [a] ±0.38	4.85 [b] ±0.36

Semi-scavenging (T_1)	78.21 [b] ±0.65	70.15 [b] ±0.82	6.99 [a] ±0.74

Means bearing different superscripts within a column differ significantly (P≤0.05).

(b) Eviscerated yield: The eviscerated yields were found significantly higher in intensive group than in semi-scavenging group. The higher evisceration yield in intensive group (T_0) was probably due to higher body weight gain and higher degree of fleshing of birds as well as difference in evisceration losses.

(c) Giblet yield: The average percent giblet yields were found significantly higher in semi-scavenging (T_1) group over the intensive group (T_0). This was probably due to over exercise of heart and gizzard, which resulted in physiologic hypertrophy of these organs. When scavenging, the oxygen requirement for cardiac and skeletal muscle increased in proportion to the rise in their metabolic rate. This finding was in agreement with the report by Smith and Hamlin (1970) where these authors observed that over exercise, as a result of spontaneous or experimental effect, causes physiological hypertrophy of heart. The gizzard weight may increase in semi-scavenging group (T_1) probably due to over exercise at the hours of scavenging. Birds from semi-scavenging group consumed different whole grains, grits or gravels and shoots of different grasses, which might induce the gizzard to work hard to grind them. This finding was strengthened by the observation made by Sturkie (1970) who reported that the muscularity of gizzard depends upon the type of food eaten by the bird. Groebbles (1932) also found that presence of grits in the gizzard increases the amplitude of contraction.

3.8. Organoleptic evaluation of meat

Table 4 provides organoleptic traits of meat from chickens raised in different rearing systems.

Table 4: Organoleptic traits of meat from chickens raised in intensive (T_0) and semi-scavenging (T_1) systems.

Group	Colour	Flavour	Juiciness	Tenderness	Overall acceptability
			Mean±S.E.		
Intensive (T_0)	4.61 [b] ±0.74	5.31 [a] ±0.75	8.32 [a] ±0.57	5.19 [a] ±0.47	5.75 [b] ±0.20
Semi-Scavenging (T_1)	8.11 [a] ±0.12	6.28 [a] ±0.64	5.95 [b] ±0.34	6.85 [a] ±0.49	8.14 [a] ±0.79

Means bearing different superscripts within a column differ significantly (P ≤ 0.05).

(a) Colour: The mean colour scores of semi-scavenging group (T_1) were significantly superior to those of intensive group. This was probably due to high level of muscular activity and more blood circulation during scavenging, which may lead to more myoglobin concentration. This finding was in conformity with that reported by Lawrie (1979).

(b) Flavour: There was no significant difference between intensive and semi-scavenging group with respect to flavour of meat. This was probably due to storage conditions of meat of both groups (T_0 and T_1) at the same temperature, for the same cooking time and procedure of the meat samples. This finding was in agreement with results reported by Patterson (1974) and Ristic (1987) who observed that the flavour of chicken meat was significantly influenced by temperature, time of storage and cooking procedure.

(c) Juiciness: The mean juiciness scores in intensive group were found significantly (P≤0.05) superior to semi-scavenging group. Gaddis *et al.* (1950) reported that higher contents of intramuscular fats were associated with more juiciness of meat, and this was in

agreement with results obtained in the present study where more intramuscular fats were observed in intensive group (T_0).

(d) Tenderness: There was no significant difference between the two groups, with respect to tenderness. This might be due to the fact that tenderness was mostly influenced by age at slaughter, which was the same in both groups. The findings of the present study were strengthened by the works of Parpia and Dani (1982) who reported that tenderness of meat was largely affected by age at slaughter. The authors reported that feeding, management, breed species and cooking methods could also influence the tenderness of meat. But in this experiment, significant difference in tenderness due to feeding and management could not be established, though numerical mean score was found higher in semi-scavenging group (T_1). It must be mentioned that the strain and cooking method was the same for both groups (T_0 and T_1).

(e) Overall acceptability: The overall acceptability score of meat from semi-scavenging group (T_1) was superior to that from intensive group (T_0). This might be due to superior colour, flavour and tenderness in semi-scavenging groups (T_1). Juiciness score was found significantly ($P \leq 0.05$) superior in intensive group (T_0), which might not contribute to overall acceptability of meat. Rhodes (1970) also observed that tenderness was more important than juiciness in determining the overall eating quality. This higher acceptability of semi-scavenging group (T_0) might be due to differences in the consumption of scavengeable feed resources and in regular exercise during scavenging.

ACKNOWLEDGEMENT

The authors thankfully acknowledge the help and encouragement from Mr. Hans Askov Jensen, Denmark.

REFERENCES

Fattah, K.A. (2000): Poultry as a tool in poverty eradication and promotion of gender equality. In: *Proceedings of a Workshop on Poultry as a Tool in Poverty Eradication and Promotion of Gender Equality* (Dolberg, F. and Petersen, P.H., Eds.), Tune, Denmark, pp. 16-28.

Gaddis, A.M., Hankins, O.G. & Hiner, R.L. (1950): Relationship between the amount of composition of press fluid, palatability and other factors of meat. *Food Technology* 4: 498.

Groebbles, F. (1932): *Der Vogel, Eraster Band, Atmungswelt & Nahrungswelt*. Verlag von Gebruder Borntraeger, Berlin, Germany.

Jensen, H.A. (1996): Semi-scavenging model for rural poultry holdings. *Proceedings, XX World's Poultry Congress*, Vol. 1, New Delhi, India, pp. 61-63.

Kaiser, D. (1990): Improvement of traditional poultry keeping in Niger. In: *Rural Poultry Production in Hot Climates*, 12 June 1987, Hamelin, Germany.

Lawrie, R.A. (1979): The structure and growth of muscle. In: *Meat Science*, 3rd edn., Pergamon Press, Oxford, New York, pp. 39-73.

Parpia, H.A.B. & Dani, N.P. (1982): Animal products. In: *Research in Animal Production*, ICAR, New Delhi, India, pp. 444-446.

Patterson, R.L.S. (1974): Meat in the adaptation of human alimentary tract. In: *Meat* (Cole, D.J.A. and Lawrie, R.A., Eds.), Butterworth, London, UK, pp. 471-479.

Ramdas, S.R. & Ghotge, N.S. (1998): Rural backyard poultry production: An important livelihood of rural women in India: problems, constraints, potentials. *Proceedings, Second Commonwealth Veterinary Conference*, pp. 591-605.

Rhodes, D.N. (1970): Meat quality: Influence of fatness on the eating quality of pork. *Journal of food and Agricultural Science* 21: 572.

Ristic, M. (1987): Influence of lower storage temperature on the meat quality of fresh poultry. *Proceedings, Eighth European Symposium on Poultry Meat Quality*, Budapest, Hungary, pp. 140-143.

Saleque, Md.A (2000): Scaling-up: Critical factors in leadership, management, human resource development and institution building in going from pilot project to large-scale implementation: The BRAC Poultry model in Bangladesh. In: *Proceedings of a Workshop on Poultry as a Tool in Poverty Eradication and Promotion of Gender Equality* (Dolberg, F. and Petersen, P.H., Eds.), Tune, Denmark, pp. 51-71.

Sasaki, M. (1996): Policies and strategies of rural poultry development with particular reference to Asian developing countries. *Proceedings,* XX *World's Poultry Congress*, Vol. 3, New Delhi, India, pp. 283-290.

Smith, C.R. & Hamlin, R.L. (1970): Circulation to skeletal muscle, circulatory adjustment during exercise and cardiac enlargement. In: *Dukes' Physiology of Domestic Animal* (Swenson, M.J., Ed.), Comstock Publishing Associates, 8th edn., pp. 237-248.

Snedecor, G.W. & Cochran, W.G. (1967): Statistical methods. The Iowa State University Press, 6th Edition, Ames, Iowa, USA.

Souri, B.N., Gopalakrishnan, C.A., Khan, M.D.H. & Thilaka Rajan, N. (1972): Studies on dressing data and on relationship of live weight and dressed weight in desi birds. *Indian Veterinary Journal* 49(9): 920-927.

Sturkie, P.D. (1970): Avian digestion. In: *Dukes' Physiology of Domestic Animal* (Swenson, M.J., Ed.), Comstock Publishing Associates, 8th edn., pp. 526-537.

Veluw, K. Van. (1987): Traditional poultry keeping in Northern Ghana. *ILEIA-December* 3(4): 12-13.

Multi-commodity approach to family poultry production in peri-urban areas of small island countries in the South Pacific Region

Asifo O. Ajuyah[1] and E. Fallou Guèye[2]

[1] *School of Agriculture, The University of the South Pacific, Alafua Campus, Apia, Western Samoa,*

E-mail: <ajuyah_a@samoa.usp.ac.fj>

[2] *Senegalese Institute of Agricultural Research (ISRA), B.P. 2057, Dakar RP, Senegal,*

E-mail: <efgueye@refer.sn>

[This paper was first presented at the XXII World's Poultry Congress in Istanbul, Turkey, 8-13 June 2004.]

ABSTRACT

In the South Pacific island countries, the role of family poultry as an important source of animal protein is related to their versatility, namely adaptation to the traditional or indigenous farming system and the local environment. However, in recent years, the average number of village chickens per family in most island countries has been estimated to be dwindling at a rate of approximately 1-2 percent per year, mainly as a result of the "destruction or erosion" of their scavenging areas. The integrated farming system (IFS) approach has successfully been used to improve agricultural productivity in countries where there is conflict between alternative land use for agricultural and non-agricultural purposes. This is because IFS is usually based on synergism between two or more farming systems with the ultimate objectives to produce multi-commodities, at low and affordable cost of production. Regarding family poultry, the economic potential is based on reduction of mortality, control of the reproductive behaviour of the flock in terms of numbers of clutches per hen per year and saleable chickens. For example, at the Alafua Integrated System (AIS) pilot project in Samoa, it was estimated that potential revenue could be increased by as much as 6 fold and could become highly significant if combined with income from other multi-commodities – eggs, ducks, crops and fish. Consequently, the IFS might provide great opportunities for interventions in family poultry in order to contribute to sustainable development and growth in South Pacific island countries by meeting the increasing requirement for cheap and affordable animal protein plus employment and income generation in rural and peri-urban areas. However, further research works are required to properly understand the principles of integration, the role and extent of each of the subsystems and contribution of such integrated systems to sustainable economic production under different production, environmental and socio-cultural conditions.

Key words: Family poultry, integrated farming system, fish, South Pacific island countries

1. INTRODUCTION

The twelve small island countries of the South Pacific region are located in the area between longitude 127° East to 130° West, and latitudes 30° South and 20° North. The area traverses 5 time zones and covers over 33.5 million km^2. The countries include the Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tuvalu, Tonga and Vanuatu. Their combined land area, population and average gross domestic products are 68,580 km^2, 2.0 million and the equivalent of 2130 US$ in 2004, respectively. The largest island country is the Solomon Islands occupying 44.6% of the total land area (27,540 km^2) with 22.2% of the total population (approximately 444,000 people), while Tokelau is the smallest country with less than 0.02% or 10 km^2 of total land area and 0.1% of total population (approximately 2000 people). In contrast, Fiji has the highest population with 44.1% of total population (approximately 882,000 people) living on less than 29% of total land area (approximately 19,000 km^2). However, in all the island countries, over 80% of the people (approximately 1.6 million) are involved in agriculture, and 90-100% of arable and non-arable land in rural areas are used for agricultural activities, which contribute significantly to the economy and growth of the island countries (Ajuyah, 1999).

The livestock sector constitutes an important segment of the agricultural industry. The keeping of pigs and chickens by local communities has been practised for many generations. Pigs and chickens contribute significantly to the nutrition, health, economy and culture of the South Pacific islanders. Village chickens are the most abundant livestock in the region with an average

flock size of 4-5 per ménage. For example, the total population of village chickens in Samoa is estimated at 431,090, compared to 167,316 pigs, 27,883 cattle and 1993 goats (Tamate, 2001). The role of village chickens as an important source of animal protein is related to their versatility in terms of adaptation to traditional farming system, which is usually characterized by low or no input, namely housing, feeding, disease control and management. However, in recent years, the average number of village chickens per household in most island countries has been estimated to be dwindling at an annual rate of approximately 1-2 percent. The major causes of this decline includes "destruction or erosion" of scavenging areas, from human activities, which include alternative land use (buildings, roads, etc.), high incidence of predators (dogs, cats, etc.) and losses from diseases (internal and external parasites), adverse weather conditions (cyclones, hurricanes, flash floods, etc.), thefts, accidents (cars) and other unknown causes.

When immediate scavenging areas are eroded, chickens automatically increase their scavenging base. These birds become then more vulnerable to predators, accidents, thefts, etc. because they have to travel longer distances, and it takes extra time to get back to the safety of their homes or roosting places at night. This is in addition to the loss of natural vegetation, which provides shade, security and comfort, especially during the dry months from April to September when daytime temperature ranges from 28°C to 30°C and in extreme cases might go as high as 35°C. Consequently, the integrated farming system (IFS) approach using family poultry as a sub-system (livestock) linking two or more different farming systems (fish and crop) together is currently being promoted in some island countries for the following reasons:

(i) to enhance the productivity and income-generating potentials of family poultry using the multi-commodity approach;
(ii) to reduce risk factors associated with the “erosion” of scavenging base and mono-farming;
(iii) to improve rural health by improving nutritional status of local communities; and
(iv) to improve the capacity of the environment to sustain the increasing demand for food protein.

2. THE IFS APPROACH

The IFS approach has long been used to improve agricultural productivity in developing countries, especially when there is conflict between alternative land use for agricultural and non-agricultural purposes. For example, during the Ming dynasty in China in around the 14th and 17th century, integrated farming was introduced as a result of rising population and need for the efficient utilization of land resources. In recent years some countries that include Bangladesh, Burma, India, Indonesia, Iran, Korea, Philippines, Laos, Nepal and Bhutan are actively promoting IFS as intervention strategies towards food security and proper nutrition (Csavas, 1992). Regarding the South Pacific island countries, except for Fiji and Samoa, a ‘loose’ kind of IFS is practiced. In this system, farmers keep chickens, ducks, pigs, crops and sometimes fish as separate or mutually exclusive farming entities, with little or no symbiotic relationship or benefits between and within the systems. Common types of integration include the following:

(i) [village poultry (ducks/chickens) – aquaculture – food/tree crop];
(ii) [livestock (goats/pigs/cattle) aquaculture – food/tree crop]; and
(iii) [village poultry (ducks/chickens) – livestock (goats/pigs/cattle) – aquaculture – food/tree crop].

IFS has been shown to offer an alternative and efficient method for sustainable agriculture because of the interactions among sub-systems. For instance, in an integrated system [village poultry–aquaculture–crops],

the waste or droppings from the poultry provides nutrients to the crops and fish, while the fish and crops provide shade, water and supplementary feed to the poultry. The cumulative effects of this synergism result from the control of air, land and water pollution from agricultural waste (Devendra, 1996), reduction in feed and labour cost, as opposed to the sum of their individual effects. This is in addition to economic and nutritional benefits from multi-commodity production or diversification in rural areas (Anwar, 1992; Mazid and Alam, 1995).

3. THE ALAFUA INTEGRATED SYSTEM (AIS)

This system is designed as a model for the South Pacific island countries, and it is located at the School of Agriculture, University of the South Pacific, Alafua Campus, Samoa (Figure 1). Established in 2001, it was composed of the following sub-systems: - (i) village poultry (chickens and ducks), (ii) fish, and (iii) crops (vegetables and cassava). This paper will discuss only the chickens' component of the family poultry sub-system, namely the effect of integration on number of clutches per hen per year and pertinent production traits of the village chicken.

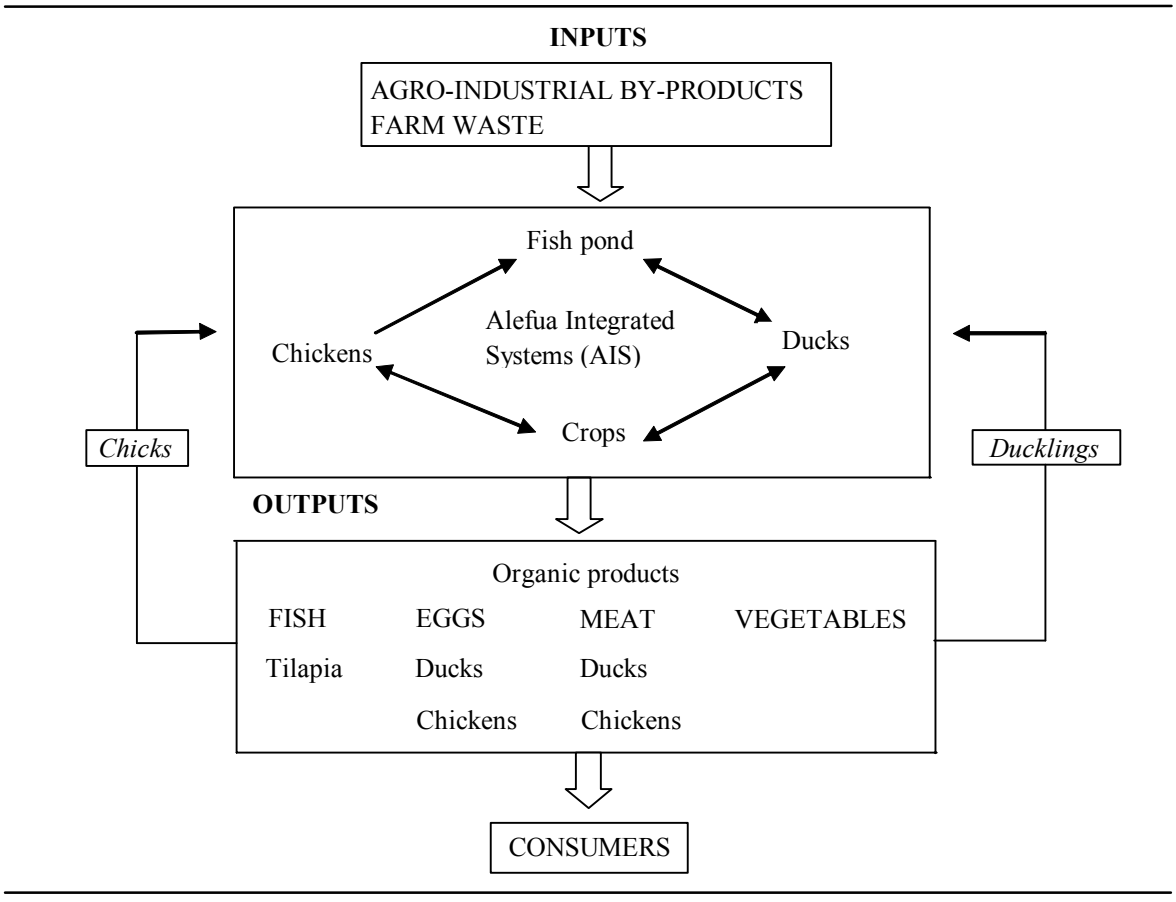

Figure 1: Alafua Integrated System (AIS): Duck-Fish-Chicken-Crop Complex.

The production system has an effect on the number of clutches per year. When hens are allowed to scavenge freely, they produce at most 3 clutches per year compared to at least 5 clutches per year when they are kept and raised under integrated farming system (Table 1). In the integrated farming system, birds are

provided with supplementary feeding and adequate housing. The significantly higher number of clutches per year observed when village chickens are kept under the integrated system of production is mainly due to the reduction in the duration of natural brooding, from 3 to less than 1 month. Artificial incubation was used to complement natural incubation. Compared to non-integrated system, there were a higher number of clutches per year in the integrated system (Table 1).

Table 1: Effects of integration on reproductive parameters.

Production system	Laying period (days)	Incubation period (days)	Brooding period (days)	Total cycles (days)	Estimated no. of clutches/year
Non-integrated	15	21	60-90	96-126	2.9-3.8
Integrated	12	21*	10-20	43-53	6.9-8.5

*Artificial and/or natural incubation.

There is a significant reduction in mortality as a result of integration (Table 2). The integration encompasses improved management, namely housing, supplementary feeding and protection from predators. All these interventions have a positive effect on production parameters. The cumulative effect enhances income generation through higher levels of product outputs and sales.

Table 2: Effects of production system on some production parameters.

Parameter	Non-integrated system	Integrated system
No. of eggs/clutch	10-12	12-15
No. of chicks/clutch	8-10	9-13
No. of growers/clutch	5-7	9-12
No. of adults/clutch	3-5	9-10
Average mortality, %	50-60	0-23
Major causes of mortality	Predators, adverse weather, cars, diseases, thefts, dogs.	Drowning in ponds and crushing during feeding.

The following sections relate to the environmental and economic impact assessments of the AIS.

3.1. Environment Impact Assessment (EIA) of the Alafua Integrated System (AIS)

This is an in-house assessment based on the following factors:

1. *Proper waste management*

   The major source of feed for village poultry is the agro-industrial waste from the breweries and desiccated coconut meal produced by coconut cream manufacture. In the past, both are either used as compost materials, dumped in the ocean or landfills. Consequently, their use in the AIS as feed for the production of animal protein reduces problems previously associated with their efficient disposal.

   The droppings from the ducks and chickens serve as organic manure or fertilizer for both the plants and ponds. The viability of the fish serves as a biological environment indicator for the

pond water quality, in terms of organic loading and other quantitative information.

2. *Control of soil erosion from flash flooding*
   Trees and plants in the system assist in the control of soil erosion and flash flooding by functioning as water breaks and holding the soil together through their root network system. This is in addition to providing shade and additional feed resources for poultry.

3. *Fish – insect control*
   The fishpond tends to concentrate certain insects that require water for their breeding. In return, the presence of fish in the pond is very effective in the control of mosquitoes and therefore constitutes a biological control agent.

4. *High output/unit of land area*
   Combining four production systems together facilitates a symbiotic relation by minimizing labour costs and maximizing output, as a result of effective utilization of land. This is in addition to efficient natural resource management.

5. *Low mortality - <1.0% per year*
   The very low mortality rate observed in the AIS mitigates problems usually associated with the disposal of dead carcasses.

6. *Organic system and product*
   The use of agricultural by-products as feed resources is usually associated with the production of organic produce, namely poultry meat, eggs, vegetables and fish that are free from biological and chemical contaminants.

3.2. Economic Assessment (EA)

The potential returns for village chickens in integrated and non-integrated systems are shown in Table 3. Income increased by approximately 6 fold. The calculation is based on an average of 3 and 7 clutches multiply with 4 and 9 saleable chickens per hen per year for a non-integrated and integrated system, respectively. When income from the ducks, fish and crops are added together, financial returns might become significant. For example, a fish pond with a standing crop of 800 g and growth period of 4 months or 600 g harvest weight will generate a revenue of approximately US$2,667 per year. The synergism between all the subsystems will further improve the profit margin, mainly as a result of savings from feed.

Table 3: Potential returns in integrated and non-integrated systems per year per production unit.

Parameters	Non-integrated system	Integrated system
*Chickens (60% of total)	7	38
Projected revenue (at US$2.81 per chicken)	US$ 19.6	US$ 106.7
Projected revenue per year for a farmer with 10 hens	US$196.5	US$1066.7

*Calculation based on data from Table 1 (clutches/year) and Table 2 (adults/clutch).

However, for realistic profit margin, it is important to factor the cost of labour and period of time that it will take to recover capital investment for ponds, housings, equipment, etc.

CONCLUSION

The integrated farming system might provide great opportunities to family poultry. With the context of appropriate interventions, it can contribute to enhance sustainable development and growth in South Pacific

island countries. This technology can contribute significantly to meet the increasing requirement for cheap and affordable animal protein for human population, in addition to providing employment and income generation for rural producers. Practitioners of IFS do not require specialized skills to elaborate management of natural resource management since it encompasses traditional farming systems and supplementary feeding based on agro-industrial waste. The driving force in the system is based on the synergism between and within all the sub-systems. However, further research studies are required to properly understand the principles of integration, the role and extent of each of the subsystems and contribution of such integrated systems to sustainable and economic production under different production conditions.

REFERENCES

Ajuyah, A.O. (1999): Integrated pig production in the South Pacific Region. Proceedings of the Commonwealth Veterinary Association Workshop on Livestock Production in the South Pacific Islands, pp. 93-103.

Anwar, M. (1992): Integrated fish-livestock production systems problems and prospects in Pakistan. Proceedings of the FAO/IPT Workshop on Integrated Livestock-Fish Production Systems, Institute of Advanced Studies, University Malaya, Kuala Lumpur, Malaysia.

Csavas, I. (1992): Regional review on livestock-fish production systems in Asia. Proceedings of the FAO/IPT Workshop on Integrated Livestock-Fish Production Systems, Institute of Advanced Studies, University Malaya, Kuala Lumpur, Malaysia.

Devendra, C. (1996): Overview of integrated animals-crops-fish production systems: Achievements and future potential. Proceedings of a Symposium held in conjunction with 8th AAAP Animal Science Congress (Hayakawa, H., Sasaki, M. and Kimura, K., Eds.), Chiloa, Japan, Japanese Society of Zootechnical Science and FAO.

Mazid, M.A. & Alam, M.G.M. (1995): Appropriate technologies for sustainable and environmentally compatible aquaculture development in Bangladesh. Proceedings of the UNESCO - University of Tsukuba International Seminar on Traditional Technology for Environmental Conservation and Sustainable Development in the Asian - Pacific Region, held in Tsukuba Science City, Japan.

Tamate, A. (2001): Status and breed of the poultry and pig industry in Samoa: Production constraints and scope for future growth and development. Paper presented at the Regional Training Workshop for Pig and Poultry Small Holder Farmers, 24 - 28 September 2001, Apia, Western Samoa.

The smallholder family poultry model and community development in Nigeria

E. Babafunso Sonaiya

President, World's Poultry Science Association-Nigerian Branch

Coordinator, FAO's International Network for Family Poultry Development

Obafemi Awolowo University, Ile-Ife, Nigeria, E-mail: <fsonaiya@oauife.edu.ng>

[This extended summary is from a paper presented at the National Symposium on the Potentials of Family Poultry in Nigeria, Calabar, Cross River State, Nigeria, 25-27 August 2004. An earlier version of the full paper was published under the title "Small Poultry Holdings, the Family and Community Development - Ethology, Ethics and Self Interest" in: "Livestock, Community and Environment". Proceedings of the 10th Conference of the Association of Institutions for Tropical Veterinary Medicine, Copenhagen, Denmark, 2001, also available at: www.aitvm.kvl.dk/C_poultry/Sonaiya.htm]

EXTENDED SUMMARY

Agricultural development has to be concerned with the search for peace, economic prosperity, environmental renewal, human health and population stabilization (Future Harvest, 2001). Agriculture is so closely linked to communities that while it must cater for the world's food needs, women-friendly methods, and vitamin-enriched crops it must also emphasise community development, poverty alleviation and job creation. The lowly chicken has a role to play in community development in Nigeria.

Early studies (Hill and Modebe, 1961; Nwosu et al., 1985) indicated that the local chickens raised in cages attained body weights of 1.0 – 1.1 kg at 20 weeks and 1.3 – 1.8 kg at 52 weeks. Other studies showed that local hens in cages laid up to 116 eggs per year (Akinokun and Dettmers, 1976) but produced 60-80 eggs on deep litter and only 45 eggs per year under a scavenging system. At the Obafemi Awolowo University, a Rural Poultry Research Programme was initiated in 1987 to study the genetics, nutrition, disease control and management of poultry as reared by smallholder rural families.

In an European Union-funded collaborative project with German and Belgian institutions, we collected and characterized local chicken ecotypes from the five agroecological zones in Nigeria. All characteristics were studied: from feathering type (normal, frizzled, short flight and naked neck), body types (dwarf, normal and „Fulani" - Fu), body weights and shank lengths up to 72 weeks (highest in Guinea Savanna > Derived Savanna > Rain Forest) to the level of heterozygosity or genetic mix-up (greatest in Guinea Savanna > Rain Forest > Derived Savanna). Analysis of genetic relationship showed that all Nigerian local chicken ecotypes were related to the *Rhode Island Red* and were not distinct strains. Crosses of local chicken (LC) X *Dahlem Red* (DR, a variety of *Rhode Island Red* from Dahlem area of Berlin, Germany) were compared with pure LC, DR and *Shika Brown* [SB, a Nigerian breed developed by the National Animal Production Research Institute (NAPRI), Shika area, Zaria]. Crosses of Fu X DR were superior to all other crosses in body weight, egg production and laying performance. A comparison of the ecotypes with DR and SB showed SB as clearly superior to the local ecotypes and the DR. In 2000, NAPRI released the SB as a layer parent stock with the following outstanding characteristics: fertility (73%), mortality (0%), age at first egg drop (131 days), percent peak production (85%) and average hen house production (80%) during the first quarter of the laying cycle.

In nutrition, the scavengeable feed resource (SCFR) available on the range was assessed annually for 12 consecutive years, the last 4 years of which were promoted by a research agreement with the Food and Agriculture Organization of United Nations (FAO, www.fao.org) and the International Atomic Energy Agency (IAEA, www.iaea.org) in Austria. SCFR was found to be about 20g per day in south western Nigeria. Analysis of the crop revealed that 64% of the content came from the household leftovers while 36% came from the environment (16% worms, 13% grass and 7% stone grits). Compared to the SCFR measured in Sri Lanka, 30g per day, SCFR in south western Nigeria is lower, and feed supplementation is required to ensure adequate production. This supplementation can be in cafeteria choice system.

For diseases, several surveys funded by the International Development Research Centre (IDRC, www.idrc.org) and later by an FAO letter of agreement, indicated that Newcastle disease (ND) was the most important health problem. Repeated trials showed that vaccination reduced the incidence of ND and that vaccination coupled with supplementation supported very good production by the chickens.

These research results were brought into sharper focus by first hand experience in Bangladesh with the Semi-

scavenging Poultry Model. The experience was made possible by sponsorships from the Royal Agricultural and Veterinary University (www.kvl.dk), Copenhagen and the FAO's International network for Family Poultry Development. Interactions with rural poultry producers, the trade union – NULGE (national and Osun state chapter) contributed further to the current state of the Smallholder Family Poultry Model for Nigeria.

Smallholder family poultry (SFP) provide supplementary food, income and employment and contribute to poverty reduction. Raised on the free range or in the backyard, SFP cocks and hens exhibit their natural behaviour, avoid stressful conditions, reduce aggressive acts (of the cocks) and eliminate escape behaviour (in the hens). SFP on the free range or backyard, therefore, serve ethologic as well as economic interests. While rural poultry is believed to be a viable and promising source of income for rural households, there is uncertainty about its economic importance due mainly to ND epidemics. In order for SFP to make significant contributions to the economic advancement of the poor, the family and the rural and urban communities, sustainable ND control programmes must be established.

The SFP model is therefore based upon empirically tested technical and socio-economic factors. The specific objectives of the SFP model in Nigeria are:

- Economic empowerment of women;
- Upgrading of the value of the birds used for production;
- Prevention of common poultry diseases;
- Improved scavenging-based rearing; and
- Provision of micro-credit and technical services.

To move from a poverty cycle to an income cycle and thus begin to make a real contribution to overall economic development, smallholders need market access, business support tools, training in collective actions and information on prices. The model points out that provision of real-time market information has significant benefits for SFP producers, the traders and the community.

REFERENCES

Akinokun, O. & Dettmers, A. (1976): Genotype and environment interactions in an exotic commercial egg strain and the local chicken of Nigeria. *Ife Journal of Agriculture* 1: 57-62.

Future Harvest (2001): Annual Newsletter, 29 June 2001, www.futureharvest.org

Hill, D.H. & Modebe, A.N.A. (1961): Poultry production at the University College, Ibadan: 1950-1958, Tech. Bull. No. 2, Faculty of Agriculture.

Nwosu, C.S., Obioha, F.C. & Gouson, F. (1985): A biometrical study of the conformation of native chickens. *Nigerian Journal of Animal Production* 12: 14-16.

News

Domestic Animal Genetic Resources Information System

The Domestic Animal Genetic Resources Information System (DAGRIS) has been developed and managed by International Livestock Research Institute (ILRI, www.ilri.org) to facilitate the compilation, organization and dissemination of information on the origin, distribution, diversity, present use and status of indigenous farm animal genetic resources from past and present research results in an efficient way. Such

information provides the necessary basis for developing breed improvement as well as conservation programmes in developing countries. So far DAGRIS covers three livestock species and countries in Africa. Currently the database is being expanded to cover more livestock species and selected developing countries in Asia. As part of this, we are developing a suitable data capture system for inclusion of poultry (chickens, geese, turkeys and ducks) into DAGRIS.

The DAGRIS team in ILRI is pleased to inform members of International Network for Family Poultry Development (INFPD, www.fao.org/ag/againfo/subjects/en/infpd/home.html) and The Danish Network for Smallholder Poultry Development (DNSPD, www.poultry.kvl.dk) of this important development. It is believed that the database as a public good should be developed jointly by all stakeholders, including INFPD and DNSPD. Along this line we would appreciate if you provide any available information on recognized indigenous poultry (chickens, geese, turkeys, ducks, etc.) breeds, strains or ecotypes in developing countries which can be of a help to develop comprehensive list of breeds.

DAGRIS Team can be contacted through

Dr. Tadelle Dessie, Animal Genetic Resources Group, International Livestock Research Institute (ILRI),
P.O. Box 5689, Addis Ababa, Ethiopia
Tel: (+251) 01 463215 Ext. 194 (Office), (+251) 09 603057 (Mobile phone), Fax: (+251) 01 461252
E-mail: <t.dessie@cgiar.org>

Domestic Animal Diversity Information System

The Domestic Animal Diversity Information System (DAD-IS) has been developed and managed by the Animal Genetic Resources Group, FAO Animal Production and Health Division. DAD-IS is the key communication and information tool for implementing the Global Strategy for the Management of Farm Animal Genetic Resources (AnGR). It is being developed first to assist countries and country networks, and also serves as the virtual structure for the Strategy. It will increasingly provide extensive searchable databases, tools, guidelines, a library, links and contacts. DAD-IS objectives are to:

- involve, co-ordinate and assist Governments, NGO's, training and research groups in all countries and international agencies operating within and across world regions; and
- help achieve better management of all AnGR used for the production of food and agriculture in all countries, in accordance with the World Food Summit Plan of Action and the United Nations Convention on Biological Diversity.

DAD-IS offers countries:

- a clearing-house for both information and data with its built-in security;
- control over both maintaining and accessing their data; and
- an advanced communication and information tool.

DAD-IS provides:

- guidelines to assist countries manage their AnGR;
- databases and updating functionality, to assist countries develop and implement their Action Strategy;
- a forum for exchange of ideas and techniques;
- a means for developing a Global Early Warning System for AnGR;

- country, regional and global contacts; and
- briefings on the management of AnGR.

DAD-IS facilitates:

- co-ordination of the country, regional and global effort in AnGR management;
- training and education in the sustainable use and conservation of AnGR; and
- access to AnGR.

BREEDS DATABASE

It contains about 5300 breeds of 35 species reported from 180 countries. For each breed, details relating to following parameters are given: origin, population, risk status, performance and morphology. Countries decide when and what breed data are released.

Detailed information relating to DAD-IS can be obtained from:

Animal Genetic Resources Group, Animal Production and Health Division, Food and Agriculture Organization of the United Nations (FAO), Viale delle Terme di Caracalla, 00100 Rome, Italy
Tel: +39.06.570-53540, Fax: +39.06.570-53927; E-mail: <DAD-IS@fao.org>
DAD-IS Website: www.fao.org/dad-is
Contact person: Ms. Beate Scherf, FAO Animal Production Officer, E-mail: <Beate.Scherf@fao.org>

National Symposium on the Potentials of Family Poultry in Nigeria – An update

INFPD Newsletter Vol. 13 No. 2 carried information about this symposium planned for Lagos State in August 2004 to be held as a part of the 1st Nigeria International Poultry Summit (NIPS). The format of the meeting was changed into a workshop, NIPS was postponed (until February 2005) and the venue was changed to Cross River State. Below is the report of the workshop written by the INFPD Coordinator, Prof. E. Babafunso Sonaiya.

PROMOTING SMALLHOLDER FAMILY POULTRY MODEL IN NIGERIA

A national workshop to promote the Smallholder Family Poultry (SFP) model in Nigeria was held at the Metropolitan Hotel and the Cross River State Library Complex, Calabar from 25 to 27 August 2004. The objectives of the workshop were:

(i) to introduce, formally, the smallholder family poultry (SFP) model in Nigeria as a key development tool in poverty reduction especially in the rural areas;
(ii) to demonstrate how the SFP works as a sustainable strategy for the economic empowerment of the core poor in the rural and peri-urban communities; and
(iii) to recruit potential agents for dissemination of the SFP concept throughout Nigeria.

The idea of a national presentation of the SFP model was mooted by Adebola Adekiitan Kuyoro more than two years ago when he first read about the model in Prof. Sonaiya's office (see extended abstract of Sonaiya's paper at the workshop). Since then, Kuyoro had worked very hard making contacts, seeking collaborators, partners and sponsors. Finally, he got the government of Cross River State (one of the 36 States in Nigeria) to sponsor the workshop and the Nigeria Economic Summit Group (NESG), which organizes the annual national Economic Summit, to organize it in conjunction with the following non-governmental

organisations: Enterprise Nigeria Foundation (ENF), Poverty Reduction Initiatives Nigeria (PRIN); and the FAO's International Network on Family Poultry Development (INFPD). Prof. Sonaiya, coordinator of INFPD was chair of the scientific committee for the workshop.

Present at the workshop were experts and other stakeholders in the development community drawn from the media, civil society, industry, government and the academia. The Governor of Cross River State, Mr. Donald Duke declared the workshop open, while the keynote address was delivered by Alhaji A. A. Abdulahi on behalf of the Federal Minister of Agriculture, Mallam Adamu Bello. Her Excellency, Mrs Onari Duke, the wife of the governor of Cross River State, the Honourable Speaker, Cross River State House of Assembly and two members of the National Assembly Committee on Agriculture also attended the workshop.

Presentations were made by leading experts, including Prof. E.B. Sonaiya (see the extensive summary of his paper under the "**Research Reports**" section); Dr Mrs L.H. Lombin, Director, National Veterinary Research Institute; Mr. Emmanuel Ijewere, Chairman of the NESG Agricultural Policy Commission, the President of Nigerian Red Cross; and Prof. B.O. Asuquo, University of Calabar. There were foreign resource persons. Ir. Hans Askov Jensen, a freelance poultry consultant from Denmark and Ir. Jens Christian Riise, Director of the Danish Network for Smallholder Poultry Development. Through the part sponsorship of the Danish Network, there were field reports from two West African countries: Senegal, by Mr. Demba Mansare, Managing Director, l'AAJAC/COLUFIFA in Sedhiou; and Benin, by Dr Christophe Chrysostome of Department of Animal Production, National University of Benin, Abomey-Calavi. Dr. Ed Wethli of South Africa was invited but could not attend due to flight difficulties.

The workshop was so well attended because there was a very strong media plan. Advert campaigns started running on the Cross River state TV and radio services and Nigerian Television Authority Calabar station more than a month before the event. There were a lot of other media exposures of the workshop on African Independent Television (AIT), Channels TV and MITV, all on DSTV satellite service. *Business Day*, an economic daily newspaper, featured many write-ups on the workshop and was an active partner during the event supplying free copies to all participants every morning. About five other print media houses covered the event and have regularly been publishing reports. *ADC Airlines*, a private Nigerian domestic and international carrier was the official airline and offered a substantially reduced air ticket cost to all workshop participants wherever they were coming from. Certainly, Adebola Kuyoro, who is coordinator of PRIN, found many friends for family poultry!

A lot of key personalities were invited. These included federal cabinet ministers, presidential advisers, political party leaders and captains of relevant industries and businesses. *Shell Petroleum, Mobil Oil, Chevron* and *Nigerian National Petroleum Corporation (NNPC)* represented the oil industry. *First Bank* and *Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB)* represented the financial sector. The National Planning Commission, Nigerian Investment Promotion Commission (NIPC), National Poverty Eradication Programme (NAPEP) and the Presidential Assistant on the Special Programme for Food Security (SPFS) represented the Presidency. Indeed the quality and spread of the participants were impressive. Eight government states including Benue, Ogun, Ondo, Gombe, Katsina, Zamfara, Jigawa, Akwa-Ibom and Oyo paid the registration fee of US$300 for one or two of their officials to attend the workshop. Various specialized agencies and parastatals such as Raw Materials Research & Devel-

opment Council (RMRDC), Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), Niger Delta Development Corporation (NDDC) and several NGOs also attended the workshop.

To ensure in-depth analysis and discussion by all these participants, after the plenary session, the workshop went into four workgroup sessions as follows:

(i) Basic Framework and Development Strategy - Prof. Sonaiya, Chair; Dr. Chrysostome, Resource Person.

(ii) Breeding, Productivity and Management Technology – Prof. Asuquo, Chair, Prof. E.A.O. Laseinde, Federal University of Technology, Akure, Resource Person.

(iii) Health and Diseases – Dr Lombin, Chair; Prof S.S. Baba, University of Maiduguri, Resource Person.

(iv) Social and Financial Capital – Mr Ijewere, Chair; Mr Jensen and Mr Riise, Resource Persons.

From the various discussions during the two-day workshop key recommendations were made, and follow–up actions to be carried out by federal and state governments as well as the NGOs and organised private sector were identified.

KEY RECOMMENDATIONS FROM THE WORKSHOP

- Government at all levels to provide the enabling environment through capacity building, policy and legislative initiatives.
- Wives of State governors and Local Government Chairmen should adopt and monitor the model in their areas of jurisdiction.
- Government should mount intensive public enlightenment campaign about the SFP.
- Existing structures (like women's associations, Nigerian Red Cross, women's club, various village social clubs, etc.) should be the take-off platform.
- NGOs should be identified as the engine for services (credit, training, inputs provision) in the implementation of the model with active government support.
- Establishment of Public – Private partnership is imperative.
- The SFP model should be initiated with local poultry ecotypes. The productivity (number, size and hatchability of eggs) of the local birds will improve with better management.
- Government to provide funds to the National Veterinary Research Institute (NVRI) to develop appropriate disease control methods and to produce sufficient quantity of vaccines required for the implementation of the model.
- The Nigerian SFP model should involve the participation of all stakeholders namely: government, universities and research institutes, organized private sector, the non-governmental organizations and the smallholder farmers.
- The State governments should procure conventional vaccines from NVRI and provide them to the rural smallholders at economic rates until the private sector can provide this service.

FOLLOW-UP ACTIVITIES

(a) Establishment of the SFP Pilot Project in Cross River State of Nigeria

The pilot programme is targeting 525 households or beneficiaries per community for 12 months from 21 Communities, 7 each in 3 Local Government Areas of the State at a unit cost per beneficiary of Naira40,000–50,000 (US$300-400). It is expected to produce the following benefits for the State:

(i) Reaching an estimated 5,000 households (30,000 primary beneficiaries) annually.

(ii) The development of small-scale but commercial-oriented poultry systems across the State.
(iii) Contribution to the attainment of food security – with regard to good quality animal proteins.
(iv) Employment generation for about 10,000 persons who will be involved in the model.
(v) Revenue generation for the State, and
(vi) Sustainable economic development for the rural areas.

The programme is being executed by PRIN, ENF and the Cross River State Government.

(b) Memorandum of Understanding for SFP Programme in Osun State

The Osun State government has signed a memorandum of understanding with the Obafemi Awolowo University to be the technical partner in the implementation of various agricultural development projects in fiscal year 2005. An SFP project to cover 900 beneficiaries in each of 3 Senatorial Districts of the State is one of such projects. The SFP model has been adopted and will be implemented in collaboration with the Seventh Day Adventists Church Relief Agency (ADRA).

(c) SFP Training for Local Government Officers in Ondo State

A 2-day training programme was held October 4-5, 2004 for Development Officers and Legislators in all the Local Government Areas of Ondo State at the Local Government Training Centre, Ita-Ogbolu. A full half-day was devoted to the SFP model in a programme to challenge the officers on innovative ways to bring social development and poverty alleviation to their areas. The programme was jointly organised by the Local Government Service Board and a private firm. INFPD Coordinator was the main resource person for the SFP training.

International Rural Poultry Centre

The Kyeema Foundation is a not-for-profit organisation based in Brisbane, Australia. *Working to build a sustainable future for all* is the mission statement of the Kyeema Foundation. Objectives of the Foundation are (1) to assist in improving the livelihood and standard of living of individuals in developing countries; (2) to aid in the development of treatments and cures for diseases affecting plants, animals and people living in developing countries; and (3) to aid in the development of technology to assist in improving the living standards of individuals in developing countries. The International Rural Poultry Centre (IRPC) is a subsidiary entity within the Kyeema Foundation.

WHY VILLAGE POULTRY?

Rural poultry production is recognised as an important activity in all developing countries. Chickens in traditional village poultry systems provide scarce animal protein in the form of meat and eggs, and are available for sale or barter in societies where cash is not abundant. They are generally owned and managed by women and children. Village chickens also fulfil a range of other functions for which it is difficult to assign a monetary value. They are active in pest control, provide manure and are required for special festivals. To meet social obligations, they are essential for many traditional ceremonies and traditional treatments of illness.

Although the output of traditional village chickens in terms of weight gain and number of eggs per hen per year is low, it is obtained with minimum input in terms of housing, disease control, management and supplementary feeding. Any cost-effective strategy that increases the productivity of these birds will assist

in poverty alleviation and the improvement of food security. The increased availability of village chickens and eggs results in an improved intake of protein by farmers and their families and an increased access to cash and other resources. Chickens are often essential elements of female-headed, poor and HIV/AIDS-affected households. This is a particularly important contribution in areas where child malnutrition is common. Malnutrition has wider implications for development because protein energy malnutrition in children inhibits their growth, increases their risk of morbidity, affects their mental development and reduces their subsequent school performance and labour productivity. People living with HIV/AIDS have a higher requirement for dietary energy and protein. Village chickens can be raised by households affected by HIV/AIDS as, unlike ruminants, chickens require few labour or financial inputs and provide high quality nutrition to their owners.

ORIGINS OF THE IRPC

The IRPC groups the specialists involved in I-2 thermostable Newcastle disease vaccine development and its field testing under village conditions, within one unit, and allows its services to be available to the developing world. The IRPC works closely with the University of Queensland (UQ) and the Australian Centre for International Agricultural Research (ACIAR), the two organisations responsible for the development of the I-2 vaccine.

AIMS OF THE IRPC

The IRPC was set up to promote cost-efficient and sustainable improvements to village poultry production and to help ensure a sustainable supply of the I-2 master seed. Training provided by the IRPC will ensure the production of good quality I-2 vaccine, its successful use in the field by trained government staff and community animal health workers by raising awareness of simple and cost-effective husbandry practices that can further improve production.

The IRPC can be contacted at:

- *Mailing Address*

  Celia Grenning

  Administrator, GRM international Pty Ltd, GPO Box 449, Brisbane QLD 4001, Australia

  Tel: +61 (0) 7 3025 8574 (office), 61 (0) 438 723829 (mobile); Facsimile: +61 (0) 7 3025 8555,

  E-mail: <celiag@kyeemafoundation.org> or <ruralpoultry@kyeemafoundation.org>;

  Website: www.kyeemafoundation.org

- *Other Contacts*

  Dr Robyn Alders

  Board Member, Tel: +258-82-306513 (mobile); Fax: +258-1-477586; E-mail: <robyna@kyeemafoundation.org> (Regular) or <robyn_alders@yahoo.co.uk> (Travelling)

  Stewart Routledge

  Board Member, Tel: +971 4 3312 034; Facsimile: +971 4 3312 359; E-mail: <routledg@emirates.net.ae>

  Dr Mohamed Harun

  Board Member, Tel: +258 1 477 585; Fax: +258 1 477 586; E-mail: <fullbreak@yahoo.com>

4th International Poultry Show and Seminar in Dhaka, Bangladesh

The 4th International Poultry Show and Seminar was held at Bangladesh-China Friendship Conference Centre (BCFCC) in Dhaka, Bangladesh, from 10-12 March 2005. This biggest poultry industry event of Bangladesh was organised by the World's Poultry Science Association - Bangladesh Branch (WPSA-BB, www.wpsa-bb.com). The exhibitors from different international and local companies exhibited their products in the show. The scientific programme of this important event contained the following themes: (1) Poultry Industry and its Prospect, (2) Advancement in Feed and Nutrition, (3) Breeds, Breeding and Genetics, (4) Waste Management, (5) Poultry Health and Hygiene, (6) Disease Diagnosis and Biologics, (7) Biosafety and Biosecurity, (8) Poultry Housing and Management, (9) Processing, Marketing and Export Possibilities, (10) Quality and Safety of Poultry Products, and (11) Small-Scale Family Poultry. High standards of the seminar and show were explained by good attendance and active participation from honourable scientists and industry people from home and abroad.

Further information relating to this International Poultry Show and Seminar can be obtained from:
Dr. Quazi M. Emdadul Huque, Convener, Technical Committee
Director General, Bangladesh Livestock Research Institute, Savar, Dhaka -1341, Bangladesh
Tel: 8802 - 7708326; Fax: 8802 - 7708325; E-mail: <dgblri@bangla.net> or <qmehuque@bangla.net> or <techcom@wpsa-bb.com>

Publications

A Technology Review: Newcastle Disease

This paper has recently been published by the FAO Animal Production and Health Division. Significantly, it is subtitled "with special emphasis on its effect on village chickens." This technical review is written by three of the foremost experts in the field of Newcastle disease in developing countries, namely D.J. Alexander, J.G. Bell and R.G. Alders. It presents the latest understanding of Newcastle disease, its characteristics, epidemiology, symptoms and control. The first chapter reviews the virology and epidemiology of the disease, including its history and the molecular basis of virulence. Then the methods for the diagnosis of the disease are given, followed by a thorough discussion of the different types of vaccine and vaccination strategies. The next and most detailed chapter is devoted to Newcastle disease in village chickens. It treats epidemiology in the villages, the control of the disease in village situations, including the social aspects and the organisation of extension, and gives a further discussion of vaccines. It then goes on to discuss the planning of vaccination campaigns.

This reference work differs from previous publications on Newcastle disease through the attention it gives to village chickens. This is most appropriate because in fact the disease is now largely controlled in industrial poultry units, and it is in the village sector where the most attention is now required.

Since the control of Newcastle disease is an indispensable element of any intervention in family poultry this publication will be most useful for anyone working in the family poultry sector and wishing to control this disease, whether as a veterinarian, or in develop-

ment projects.

Copies of this publication (FAO Animal Production and Health Paper 161, 2004) may be obtained from:
Dr Emmanuelle Guerne Bleich, Animal Production Officer, AGAP/FAO, Rome, Italy
Tel: +3906-570-56660; Fax: +3906-570-55749; E-mail: <Emmanuelle.GuerneBleich@fao.org>

A Basic Laboratory Manual for the Small-Scale Production and Testing of I-2 Newcastle Disease Vaccine

Written by Sally Grimes, the manual summarizes the laboratory techniques used to produce and test experimental I-2 Newcastle disease vaccine at the John Francis Virology Laboratory, University of Queensland and associated workshops held to transfer technical skills in developing countries. The manual can be downloaded from the FAO Animal Production and Health Commission for Asia and the Pacific (APHCA) website at:
www.aphca.org/publication/book.html

Thanks to the Animals

[Original Spanish title 'Gracias a los animales': Analysis of small-scale livestock keeping in Latin America, with case studies from the Valleys and the Plateau of Bolivia. By Katrien van't Hooft (ed). AGRUCO/CIGAC/ETC/ PLURAL Editors, La Paz - Bolivia, 480 pages.]

This beautifully illustrated book (150 line-drawings and 70 pictures, mainly in colour) presents the most important subjects related to family-level livestock keeping in Latin America. It is based on case studies conducted in the Bolivian valleys and Altiplano. Some 30 rural families and 25 professionals have participated in this edition. The aim of the book is to present a holistic analysis of family-level livestock rearing, based on the experiences of rural families as well as projects working with them. It explains the rationale behind the rearing of livestock by families, with the hope of improving communication between farmers and professionals. It aims to break away from the common perception that low input small-scale livestock production is 'backward', and needs to be transformed into a more specialised and market-oriented system for development to take place. Indeed, development can be based on the strategies and knowledge of farmers themselves.

The book starts with a description of the differences between the western and Andean visions of life and technology. Chapters 2,3 and 4 present an analysis of the different systems used in family-level livestock keeping, varying from diversified livestock keeping to more specialised livestock keeping systems, and the logic behind each of these systems. The major part of the book (chapters 5 to 15) presents case studies of family livestock keeping of 11 commonly used animal species: milk cattle, pigs, fowl, sheep, goats, llamas, alpacas, guinea pigs, angora rabbits, bees, and fish (carp). Chapter 16 presents an analysis of the advantages and disadvantages to human health that the rearing of livestock brings to poor families, with a description of the most important diseases that are transmitted from animals to human beings.

This publication can be used as a textbook by students and teachers in agricultural schools, professionals of local NGO's, members of local organisations of livestock producers, as well as rural teachers and community animal healthcare workers. Many fundamental aspects of the livestock keeping systems described in this book, as well as the case-study

methodology to research them, are directly applicable in other ecological circumstances within and outside the Andean region.

The book can be ordered (costs 20 US$ - excl. mailing costs) at:
AGRUCO, Av. Petrolera km 4½ , Casilla 3392, Cochabamba, Bolivia, E-mail: <agruco@agruco.org>
Website: www.agruco.org

International Diary

Opportunities for village chickens to assist with poverty alleviation with special emphasis on the sustainable control of Newcastle disease

An International Conference on "Opportunities for village chickens to assist with poverty alleviation with special emphasis on the sustainable control of Newcastle disease" will be held in Dar-es-Salaam, Tanzania, from 5 to 7 October 2005.

TOPICS

- Updates on village chicken research, development and challenges in Africa, Asia and Latin America;
- Sustainable models of Newcastle disease (ND) control trialed and evaluated by the AusAID Southern Africa Newcastle Disease Control Project (SANDCP; Malawi, Mozambique and Tanzania);
- Impact of ND control in rural areas participating in SANDCP;
- Gender issues relating to the benefits of village chicken production;
- Tools for effective dialogue with smallholder farmers;
- The role of village chicken production in HIV/AIDS mitigation; and
- Options for the prevention and control of highly pathogenic avian influenza in the family poultry sector.

SUBMISSION DATES

Abstracts must be submitted to the conference organisers by 30 June 2005. Oral presentations will be selected from the abstracts submitted. Abstracts not selected for oral presentation may be presented as posters. Full papers for oral presentations must be submitted by 31 August 2005.

FOR FURTHER DETAILS

Visit the website: www.kyeemafoundation.org

ORGANISERS' CONTACT DETAILS

E-mail: <sandcp@tropical.co.mz >; Fax: (+258) 1 477586

INFPD Personalities

[Source: Website of Rural Poultry in Developing Countries: www.vsap.uq.edu.au/ruralpoultry/news.html]

Peter B. Spradbrow

The Tech Museum Awards 2002: Each year the Tech Museum of Innovation in San Jose, California, honours innovators who are applying technology to improve the human conditions. Emeritus Professor Peter B. Spradbrow of the School of Veterinary Science, University of Queensland was chosen as one of five laureates from a field of 450 candidates from 56 countries in the Economic Development Category. Professor Spradbrow has been recognised for developing a vision for improving the economic circumstances of poor farmers in developing countries by controlling Newcastle disease in their village chickens using locally produced thermostable vaccines.

The Prestigious Vietnam Medal was awarded to Professor Spradbrow by the Ministry of Agriculture and Rural Development, in recognition of his contribution to agriculture in Vietnam. Professor Spradbrow has been involved with the Australian Centre for International Agricultural Research (ACIAR, www.aciar.gov.au) and the Australian Agency for International Development (AusAID, www.ausaid.gov.au) projects that have delivered vaccines against Newcastle disease in chickens and duck plague (duck viral enteritis). Congratulations Peter!

Robyn G. Alders

Kesteven Medal: The Kesteven Medal is awarded by the Australian Veterinary Association and the Australian College of Veterinary Scientists in recognition of distinguished contributions to international veterinary science in the field of technical and scientific assistance to developing countries. The recipient of the Kesteven Medal for 2002 is Dr Robyn G. Alders, an Australian veterinarian based in Maputo, Mozambique. Dr Alders has directed projects in several countries that have improved the productivity of rural poultry mainly by controlling Newcastle disease through the use of locally produced thermostable vaccines. Congratulations Robyn!