

Comments on Scavenging Poultry and Ducks (Papers 25 to 28)

From Hans Askov Jensen <askov@ibm.net>

Comments on the role of Scavenging Poultry (twenty-fifth and twenty-sixth papers)

It is encouraging to read papers on scavenging poultry keeping where information is field documented, as in the papers of Dr. Saleque and D. Tadelle. I can agree on the conclusions and recommendations given in the papers but I wish to make some comments on the choice of breeds and awareness.

Choice of Breeds

It is of paramount importance to have a precisely defined role of the breeds before any genetic alteration is planned. Tadelle and others, reference is made to papers presented at the XX World Poultry Congress, indicate that the purpose of traditional poultry keeping is more than anything else related to reproduction of the flock.

Through natural selection local birds are perfectly developed for reproduction. The egg yield - clutch size - is just enough for one hatch and the egg size is small which increase the number of eggs which the hens can incubate. The production cycle comprising laying, incubation and brooding of the chickens has an optimum length for maximising the reproduction capacity.

The more precise the purpose of keeping poultry can be formulated, the more specific the breeding strategy can be formulated and thereby selection of the most suitable breeds.

As long as the target is to improve the offtake from traditional poultry keeping, it will often be useless, if not harmful, to change the genetic potential either by a cockerel exchange programme or by using improved breeds.

The semi-scavenging model from Bangladesh, as described by Dr. Saleque, is an integrated model which includes artificial incubation. Consequently, egg production traits are of more importance than

brooding traits, which again lead to a different breeding strategy. The breeding target is to increase the genetic potential for egg production under semi-scavenging conditions. This is done by using improved breeds. A cross between Fayoumi and RIR has proved to be superior to commercial hybrids under semi-scavenging conditions.

Although, not formulated in the breeding strategy, the smallholders themselves have developed a system where they have a few local breeds used to hatch and brood chickens based on eggs from the improved hens. The mix of breed (local and improved breeds) have proven to be an essential element in the sustainability of the model.

It is stressed that scientific documentation for the best breeds under scavenging or semi-scavenging conditions is scarce. In particular scavenging and survival traits are seldom included in characteristics of breeds tested under field conditions, not even for local breeds.

Awareness

Scavenging poultry account for by far the largest number of livestock in developing countries, but is more or less neglected as an income generation activity by institutions and by the poultry holder themselves.

Awareness goes for institutional staff as well as for the smallholder. The smallholders shall change their views of poultry from " just something there is around" and which can be useful for festive occasions and when there happens to be surplus for consumption, to recognising poultry as an economic resource with a substantial income generating potential. The development community shall be aware of this potential and in particular the scope for using a poultry programme as poverty-breaker for the poorest section of the rural population. Awareness is as such much more important than sophisticated breeding programmes.

**From Andrew Speedy <andrew.speedy@plant-sciences.oxford.ac.uk>
Comments on scavenging poultry**

We have had quite a number of papers on scavenging poultry and ducks, plus fish-poultry systems, but few comments except from Hans Askov Jensen.

It is a serious indictment of the system if there is so little interest from institutions, animal production workers and nutritionists in the most numerous and important form of livestock in the world. In Africa alone, there must be literally billions of birds. We know little of their natural diet, and particularly how to improve it.

On a recent trip to Vietnam, I was struck with the idea of using manure or similar to stimulate insect larvae production. Has this ever been tried? The only serious review on insects as human and animal food was "The Human Use of Insects as Feed and Animal Feed" by Gene R. Defoliart. Bulletin of the Entomological Society of America 1989, vol.35, no.1 pp.22-35 66.

It must be that insects, insect larvae and other invertebrates (worms etc.) are the most important source of protein for scavenging chickens. Colleagues have told me that there are local practices to encourage maggots by burying rotten food, etc. Does anyone know of deliberate attempts to 'farm' invertebrates for poultry food? We know of earthworm cultivation, of course.

Defoliart mentions: "The development of economical mass-harvesting strategies, controlled mass production, insect recycling systems for converting organic wastes into high protein animal feed supplements, and mass-harvesting strategies for *Locusta migratoria*, grasshoppers, Mormon cricket and other pest species that form destructive aggregations..."

He also summarizes protein quality for rats and poultry which is of course very good.

Andrew Speedy

**From "Hammond, Keith (AGAP)" <Keith.Hammond@fao.org>
Comments on scavenging poultry**

1. Where scavenger poultry are in common use they may offer the most significant, readily available avenue of untapped potential for low-cost, rapid genetic development of animal protein production.
2. Little is known of the relationships between primary fitness traits and production traits in Scavenger poultry populations.

Keith Hammond FAO

**From Stephen Swan <swans@wave.co.nz>
Comments on Rural Poultry Development Priorities**

I have worked in the field of village poultry development since 1974, in the Pacific, Asia and Africa.

Maybe Andrew Speedy (comment of 27 January) is right. But maybe we poultry people are so busy we hardly have time to read the papers let alone respond. I found most of the papers very interesting. I sincerely wish I had more time to digest them and respond more carefully. Here is the result of a relatively off-the-cuff contribution.

I would like to throw in something for thought bait, especially after Keith Hammond's comment (of 27 January responded to in para 2 below).

1. While this conference is about, keep in mind that feed is not the most important issue with poultry development, it is disease. It was good to see this emphasised in Rangnekar and Rangnekar's FAO TFCO2 Short Communication of 20 January Genetics and breed improvement rank after these and after housing and management.
2. We should not assume village farmers cannot understand the concept that commercial poultry lay many eggs but make poor mothers. This is the result of a well-known negative genetic correlation between egg number and broodiness. Farmers quickly realise: that these "foreign egg laying machines" can't look after themselves very well, but will produce many eggs if fed and cared for properly; and the local hens can be used as incubator machines to produce more "egg machines" or various

mixtures. In Hans Askov Jensen's comments of 16 January you read that village farmers are supplementing natural brooding with artificial incubation, probably using the traditional rice husk incubator. His research input into the Bangladesh situation has touched the surface of the interesting problem of "which is the best breed combination for profit maximisation?" within the village farming system.

Farmers are usually well aware of the risks involved in losing mothering and survival ability to gain egg number. Thus the concern about loss of local genetic material is not fully justified.

Bangladesh is the best example (FAO TFCOCONF2 Paper 25: BRAC) of a successful village poultry development programme, and there is no chance that they will run out of local broody hens.

From the population genetics point of view you may picture the village poultry population as a pool of genes under pressure from many directions. Disease, predators, lack of feed, poor housing and poor drinking water are the main pressures. Throw a few "high egg number" genes into the pool and what happens? Their correlation with low broodiness will reject them when they try to multiply. Even before this happens, other correlations of high egg number with lack of alertness to predators, poor colour camouflage against predators, and legs too short for fast running will likely cause their number to quickly reduce in the gene pool. If the farmer provides them with expensive food, and accommodation, they may reward him/her with income generated from eggs and meat. The farmer protects them from the natural exposure to the environment which has given us the village chicken.

3. The farmer is unlikely to do any of these things unless he can reduce the scourge of Newcastle Disease, which seems to have very little genetic resistance against its attack. Vaccine is required. The biggest single development in rural poultry has been the advent of heat tolerant Newcastle Disease vaccine. Availability of this vaccine in most developing countries is very low. Peter Spradbrow, of Queensland University, has recently been most effectively active in Asia and Africa in promoting the low-tech production of his I2 strain of this vaccine.

Development projects which include poultry should concentrate first on a stable supply of this vaccine and its distribution and use in the

village, BEFORE looking at other factors such as feed, water, and housing.

4. A farmer will put no efforts/investment towards poultry if he is going to lose 80-90% of his flock every second year. This is why this terribly high-risk sector of the village farming has been left to the women and youth of the village. Developers who succeed with vaccination programmes should take good care to ensure social pressures are available to keep poultry in the hands of women and youth. Emphasis on traditional roles and rights may be effective here. It would be very interesting to learn about the strength of such factors operating in the villages in Western India covered by Rangnekar and Rangnekar's FAO TFCONF2 Short Communication of 20 January. The recent (September 96) Rural Poultry Symposium as part of the Worlds' Poultry Science Congress in New Delhi, had some interesting papers on this of women in rural scavenger poultry development.

Stephen Swan <swans@wave.co.nz>

From Manuel Sanchez <manuel.sanchez@fao.org>

Comments on the use of insects as poultry feed

In order to answer the question of Andrew Speedy on the production of insect larvae for poultry, I can give the example of the activities which have been promoted by the FAO project in Honduras in support of Rural Women (GCP/HON/017/NET). Apart from the support given to womens' organizations, the project is using rural poultry production as the main activity to increase income generation and to improve nutritional standards. The main technology is the construction and operation of a functional poultry house, where birds spend the night, lay and incubate their eggs, get vaccinated, etc. If it is well constructed, this "gallinero" as it is called in Spanish, makes all the difference in terms of bird survival and egg yield. The "jaula criadero" or "rearing cage" for the first few weeks of the life of chicks, which could be associated to the poultry house, require providing feed appropriate for the adequate chick's growth. And what better than earth worms, insect larvae and termites. Insect larvae are produced with kitchen and vegetable residues placed in a set

place to decompose where the various insects come to lay their eggs. Termites are not only collected from nature, but they are also kept near the house in order to gradually take some slices off to feed the chicks. There are even attempts to feed the termites with branches of the trees they use to eat (Francisco Oviedo, Honduras, personal communication).

There is certainly a need to do research in the culture of insects such as cockroaches and termites, both of which have the unique ability of digesting cellulose and synthesizing essential amino acids from non-protein nitrogen. In fact, we are now looking for a researcher who would be interested in this subject.

In some countries in West Africa they already have a primitive way of rearing termites on crop residues (on inverted clay pots or baskets) for poultry supplementation. These practices should be well documented and expanded to other regions.

Concerning the use of insects and other invertebrates as feed, useful information, such as short communications and literature reviews, is available in the *Semestrial Bulletin of Information on Mini-Livestock* edited by Prof. Honor. Dr. Ir. J. Hardouin (BEDIM, c/o Unite d'enseignement et de Recherche en Zoologie Generale et Appliquee, Faculte Universitaire des Sciences Agronomiques, 2 Passage des deportes, B-5030 Gembloux, Belgium). In this bulletin, the following reference was quoted:

Ravindran V. and Blair R., 1993. Feed resources for poultry production in Asia and the Pacific. III. Animal protein sources. *World's Poultry Science Journal*, 49, 219-235.

This paper gives some information on the nutritive value of locusts, crickets, termites and other insects as adults, larvae or pupae as source of protein for poultry.

In Volume 1, No 2, 1992 of this bulletin, some information is also given on termites as feed: it reports on the traditional use in many developing countries to supply day-old chickens or guinea fowls with termites and it is even reported that in Togo termites are bred for this purpose.

Manuel Sanchez FAO

From Aichi Kitalyi <fspzim@harare.iafrica.com>

Comments on feed resources for scavenging poultry in the villages of Africa

I am writing in response to Andrew Speedy's remarks on feeding the scavenging chickens.

I have been following with keen interest the contributions on scavenging poultry in developing countries. The role of scavenging chicken as presented by Tadelles Dessie is representative of most African countries. Further, the symposium on rural poultry development at the recent XX world poultry congress in New Delhi underscored the importance of rural poultry in household food security, income generation, employment and gender equity in developing countries. These are all reasons for concern on the little research conducted in this sector.

Little has been done on the scavenging feed resource for village chickens in Africa. This area was forgotten because most poultry scientists wanted all chickens to be fed concentrates or grain based diets for higher production per bird. However, to-date 80 - 100 % of the daily ration of the scavenging poultry is derived from the scavenging feed resource.

Gunaratne *et al.*, 1993, found out that scavenging village chickens of Sri Lanka were getting over 72% of their daily diet from the scavenging feed resource. Roberts (1992) developed a simple model of the scavenging village chicken production system in Sri Lanka. One basic fact from the Sri Lanka research is that the scavenging feed resource base can be the most limiting factor in village chicken production when major diseases such as Newcastle Disease have been taken care of.

Currently there are bilateral and multilateral development programmes working on Newcastle disease control in a number of African countries. Parallel to these disease control programmes, there should be farm-level applied research work on the improvement of the quantity and quality of the scavenging feed resource base.

What constitutes the scavenging feed resource base?

Generally, the scavenging feed resource of village chickens depend on the agricultural production system prevailing in the village. This includes the

cropping pattern, the animal production system and more specifically the eating habit of the society. Tadelle and Ogle, 1996a and b, reported that the scavenging feed resource is highly variable in quantity and quality. Protein is a critical nutrient in dry season whereas energy is limiting in wet season. These findings call for research cost-effective technologies to increase the quantity and quality of the scavenging feed resource base in the villages.

Ravindran and Blair (1993) give an in-depth review of animal protein sources for poultry which include the invertebrates. The review which has 122 refs. gives the chemical composition of the different sources including, insect meals (housefly larvae, housefly pupae, soldier fly pupae, silk worm pupae, bee, Mormon cricket and grasshoppers). Other sources included in the review are termites, earthworm and snail meals. The review is very interesting because it also gives some harvesting techniques.

Farina *et al.*, 1991, reported on research on production of termites in villages in Togo. The harvesting technique is as follows: a hole in the termite mound is covered with an earthenware pot filled with moistened fibrous waste and protected against excessive heat and desiccation. Termite larvae develop in the humid atmosphere and are collected after 3 to 4 weeks. In field visits to Gambia and Zimbabwe, a few farmers indicated that they collect termites for their chickens.

No doubt the population of the invertebrates in the soil can be manipulated by changing the physical and chemical composition of the soil. This is shown by Alvaro Ocampo's contribution to this electronic conference. There is increased access of invertebrate food to scavenging chickens in agro-pastoral systems as you find the chickens scavenging this in the kraals, bomas or any piles of manure. The worm cultivation for fishing in Zimbabwe is another indication of possibility of introducing such technology for scavenging poultry.

It seems the farmers are ahead of the scientist. It is high time researchers and rural development workers come up with appropriate technologies for harvesting and using such novel feed resources. Probably the newly launched FAO/SIDA regional programme, Farm-Level Applied Research Methodology in Eastern and Southern Africa (FARMESA) will

look into this area.

Various techniques have been tested in Asia and Latin America but there seems to be little research in Africa.

In view of the recent developments in livestock production and sustainable agriculture and its relationship to poverty alleviation among the poorest of the poor, I am optimistic that this area will receive due consideration.

Dr. Aichi J Kitanyi FAO Andre Mayer Research Fellow (AGAH).

References

- Farina, L., Demey F. and Hardouin, J. 1991. Production de termites pour l'aviculture villageoise au Togo. *Tropicultura*, 9, 4, 181-187.
- Gunaratne, S.P., Chandrasin, A.D.N., Mangalika Hemalatha, W.A.P. 1993. Feed resources base for scavenging village chickens in Sri Lanka. *Tropical Animal Health Production*. 25. 249-257.
- Ocampo, A. 1996. The African oil palm in integrated farming systems in Colombia: new developments. Eight Paper, FAO Electronic Conference on Livestock Feed Resources within Integrated Farming Systems .
<http://www.fao.org/waicent/FaoInfo/Agricult/AGA/AGAP/FRG/>
- Ravindran, V. and Blair, R. 1993. Feed Resources for poultry production in Asia and the Pacific. !!! Animal Protein sources. *World's Poultry Science Journal*, Vol. 49, November 1993. 219 - 235
- Roberts, J.A. 1995 Assessing the scavenging feed resource base for sustainable smallholder poultry development. Draft. Department of Biomedical and Tropical Veterinary Sciences, James Cook University, Australia.
- Tadelle, D. and Ogle, B. 1996a. A survey of village poultry production in the central highlands of Ethiopia. Msc. Thesis, Swedish University of Agricultural Sciences.
- Tadelle, D. and Ogle, B. 1996b. Nutritional status of village poultry in the central highlands. A survey of village poultry production in the central highlands of Ethiopia. Msc. Thesis, Swedish University of Agricultural Sciences.

From David Farrell <farreld@dpi.qld.gov.au>

Comment on paper by Tadelles Dessie on scavenging poultry (Paper 26)

This is a hugely complex topic not least of all the socio economic implications. Villagers may not view the role of these chickens in the same way as we do. There have been many small projects looking at how production can be improved without any inputs into the system. Others have cost time and money and are usually not accepted by the farmer. By making small changes in management, saleable eggs (as opposed to total egg production) can be increased simply by reducing the numbers of eggs brooded. Irrespective of numbers brooded, traditionally only 3-4 birds reach maturity. Although this is an interesting and an important area, village chicken production is not necessarily only scavenging chickens. In many countries there are small rural chicken production systems which may use improved technology, management, breeds etc and quite successfully. If one looks at the predicted protein demand in developing countries it will come largely from poultry as is already happening. It is clear that in the long term the modern, large scale integrated poultry units are not sustainable. There will not be the feed resources necessary by the year 2010 to meet estimated demand. The long term view is to encourage small-scale poultry farming systems based on local resources as far as possible. This might include the use of native chickens favoured greatly for their meat and eggs and later crossed with improved breeds (see comment by Keith Hammond) that would produce a dual purpose bird. This is a fascinating topic which has exercised the minds of many with limited success but is still worth pursuing because of the enormous potential to assist rural-based communities and to encourage them to stay in villages rather than to migrate to cities.

David Farrell University of Queensland and Queensland Poultry Research and Development Centre

Addendum:

Alternative protein sources for poultry such as insect larvae, earthworms, are great ideas, the problem is harvesting the end product and then fitting

the process into a viable production system. I have seen it work in China but not practised widely. (See article on 'Fly pupae as a protein source' in *World Poultry - Misset* Vol. 12 (10) p69 1966).

From Steven Slippers <sslipper@pan.uzulu.ac.za>

Comments on scavenging poultry

1. In response to Dr. Speedy's question about "farming" invertebrates as poultry food:

Smith (1990) described a technique for growing maggots (larvae of *Musca domestica*) as a food source for poultry, developed by the Kusasi tribe of north-eastern Ghana. Cultivation of earthworms as protein supplement for scavenging birds is also discussed briefly.

[Reference : Smith, A.J., 1990. *Poultry*. Macmillan Education Ltd, London, in co-operation with CTA, Wageningen. p 186-187.]

2. Regarding few comments on scavenging poultry as an indictment of the system:

The scavenging poultry system is an important component of the farming system of smallholders in South Africa (as in many other parts of the world). So the indictment is rather of us as research fraternity that has either failed to investigate scavenging poultry systems adequately (if at all) or has failed to report our results (for lack of time, as one excuse!).

Published information about the role of scavenging poultry systems in South Africa is scant. A survey was recently conducted in the north-east of Kwazulu-Natal province in South Africa, to investigate the scavenging poultry systems amongst smallholders in the subsistence sector (Nhleko et al, 1996).

[Reference: Nhleko, M.J., Slippers, S.C. & Lubout, P.C., 1996. *Poultry production amongst subsistence farm households in Paulpietersburg, Northeastern Kwazulu-Natal*. Proceedings of Joint Symposium on "Local community involvement in breed conservation and utilisation" by the Developing Areas Branch of South African Society of Animal Science, Rare Breeds International and Association for the Conservation of Early Domesticated Animals of Southern Africa. Pilanesberg, 30 September

1996 - 3 October 1996.]

Some of the results of Nhleko *et al.* (1996) are summarized below. Six to eight households per induna ward (ngesigodi) were randomly selected from fourteen wards (izigodi) in the Paulpietersburg district. Thus 96 households were surveyed. All households surveyed kept one or more species of poultry. The species distribution by household was:

Species	No of Households	% of Households
Chickens (indigenous)	96	100
Ducks (muscovy)	12	12.5
Geese	6	6.2
Pigeons	2	2.1
Turkeys	1	1.0
No of households surveyed	96	

The species distribution by number of birds was :

Species	No of birds	% of bird numbers
Chickens	2135	95.0
Ducks	47	2.1
Geese	40	1.8
Pigeons	23	1.0
Turkeys	2	0.1
Total	2247	

Results indicate that 81.2% of households kept a single species (indigenous chickens); 15.6% of households kept two species (9.4% chickens and ducks, 4.2% chickens and geese, 2.1% chickens and pigeons); 3.1% of households kept three species (2.1% chickens, ducks and geese, 1.0% chickens, ducks and turkeys). Indigenous chickens clearly play a dominant role in poultry production in the survey area, with waterfowl favoured as secondary species (ducks or geese or ducks and geese, in descending order of priority). There seems to be

considerable (technical) potential for further integration of waterfowl in the poultry production systems of subsistence households, in view of the much higher foraging capacity that waterfowl enjoy over chickens (a major advantage in systems where scavenging for food is the rule). However, the cultural acceptance of waterfowl must be carefully considered. For example, the followers of the Shembe religion in Kwazulu-Natal do not keep ducks for religious reasons.

In those households which kept a particular species (one or more), the average flock size was 22.2 $sd \pm 13.8$ (indigenous chickens), 20.0 $sd \pm 14.1$ (pigeons), 3.9 $sd \pm 1.4$ (ducks), 3.7 $sd \pm 1.6$ (geese) and 3.0 $sd \pm 0$ (turkeys).

Women were responsible for poultry husbandry in 74 households (77.1%), with men responsible in 22 households (22.9%). The average age of poultry keepers was 45.7 years ($sd \pm 11.8$) for women, and 49.8 ($sd \pm 14.0$) for men.

Such factors, especially the gender issue, should be considered by policy makers and development agencies, when allocating extension workers and targeting receivers, for poultry development projects in the survey area.

The dominant role of women in poultry husbandry was also evident in other countries, as reported earlier in this conference, by Rangnekar & Rangnekar (India; third short communication); by Tadelles (Ethiopia; twenty sixth paper, part one); by Saleque & Mustafa (Bangladesh; twenty fifth paper, part one).

The predominant poultry keeping systems can be described as follows, in 50 households:

System	% of households
Scavenging, without housing, with nests	50
Scavenging, with housing, without nests	22
Scavenging, with housing and nests	18
Free-range (confined scavenging), with housing & nests	10

The supplementary feeds used in 50 households, were mainly white maize (70% of households), yellow maize (24% of households), or a

combination (1:1) of white and yellow maize (6% of households). In a few cases commercial concentrates were fed, mainly for chicks in a creep system. Reasons quoted by farmers for using white maize, included:

- It is always available and is planted by them (12%)
- Traditional use by ancestors (26%)
- Fattens chickens and ensures good growth (58%)
- Ensures high hatchability of eggs (4%)

Reasons quoted by farmers for using yellow maize, included:

- Chickens grow well (10%)
- Fattens chickens and makes them lay more eggs (60%)
- Can be planted and is resistant to drought (30%)

Other aspects covered by the survey, include reasons for keeping poultry, mortality rates, prevalent diseases, egg hatchability, and predators. The results will not be presented here, for brevity's sake. The survey was followed up with on-station and on-farm experiments. The results are currently being analysed.

In conclusion, the scavenging poultry production scene in north-east Kwazulu-Natal appears to correspond in many respects to that of other countries, judging from the papers, short communications and comments contributed earlier in this conference.

Stephen Slippers, Senior lecturer, Animal Production Department of Agriculture, University of Zululand, Private Bag X1001, KwaDlangezwa 3886 South Africa

From Stephen Swan <swans@wave.co.nz>

Comments on Aichi Kitalyi's comments on scavenging poultry

1. The use of unusual feed resources to expand the scavenger poultry feed resource base is very useful in terms of meeting the needs of farmers (as Dr Aichi Kitalyi says in her comments) because "... *the scavenging feed resource base can be the most limiting factor in village chicken production when major diseases such as Newcastle Disease have been taken care of.*"

2. I would again like to take an opportunity to emphasize that while (again from Dr Aichi) "Currently there are bilateral and multilateral development programmes working on Newcastle disease control in a number of African countries", there is often a conflict because of resource limitation.

3. I have worked with projects in many countries which try to develop the full package of feeding, management and genetic improvement programmes **ALONGSIDE** those aimed at Newcastle vaccine production and distribution. Often what suffers, as limited resources try to cover all aspects (and while the veterinary department (vaccines) are giving some of their valuable large-animal time to these "relatively unimportant" small-sized little chicken animals) is the vaccination aspect.

4. Another factor working against the success of vaccination programmes is that sustainable vaccine supply lines extending to village level are not visible or easily evaluated. In contrast, poultry structures (houses) for genetic improvement programmes, and live poultry distribution programmes, which are often given away or heavily subsidised, are **VERY** visible and popular with the village farmers. The farmer will always accept a gift which can be quickly sold if sickness visits the compound.

5. However the priority for the farmer is first to prevent the regular disease outbreaks which make poultry such a high-risk element of the farming system.

Stephen Swan <swans@wave.co.nz>

From Alessandro Finzi <finzi@unitus.it>

Comments on scavenging poultry

I am surprised only Keith Hammond underlined the importance of primary fitness traits and production traits when discussing on scavenging poultry. In fact genotype must be considered when nutrition problems are under examination.

I have observed that in hot climates lighter hens (local or Leghorn type) are much more active than heavier birds (Rhode Island Red or other

breeds producing brown eggs). Light birds are still scavenging when the heavier ones are already standing panting in the shadow and they also begin early to scavenge in the afternoon. This means that lighter breeds have both lower maintenance needs and a higher capacity to nourish themselves by scavenging in the hot hours of the day. This is one of the reasons we indicated to explain the failure of a project in Somalia aiming at the substitution of local chicken with Rhode Island Red (Good and Finzi, 1987). In fact morphological traits of R.I.R. were not maintained in the flocks and the brown colour of the shell also disappeared rapidly from the eggs which also become smaller as at the beginning of the project. In the meantime the number of the birds was regressing to the original one of about three for each human family in the villages and six to twelve in the rural areas. This standard number was explained according to quantity of feeding resources scavenging poultry can find around each inhabited hut.

If these observations are confirmed, it should be advised not to try to substitute local scavenging breeds until scavenging is considered a worthwhile management practice for poultry (see comment by David Farrell). When some feed integration is offered to the animals, the perspectives are better if the goal is to increase individual productivity than to increase the number of the raised animals (Finzi *et al.*, 1985).

References

- Good A. and Finzi A., 1987. Contributo allo studio dei problemi del miglioramento genetico nell'allevamento rurale avicolo in Somalia. *Boll. Sci. Fac. Zoot. e Vet., Muqdisho*, 8, 49-53.
- Finzi A., Barre H. G. and Sabriye M.C., 1985. Dhaqshada digagga ukunta ce xaasaka soomaaliyed (Breeding lying hens in the rural system in Somalia). Ed. Univ. Naz. Somala, Muqdisho.

Alessandro Finzi, Rabbit-Breeding Experimental Centre Animali Production Institute Universita' della Tuscia 01100 Viterbo, Italy Tel. 0039 (0)761 357436 - Fax 357434 E-mail: finzi@unitus.it

From Rena Perez <71055.111@compuserve.com>

Comment on feeding poultry with earthworms

1. Many years ago a Cuban ambassador to the Philippines told me an interesting tale about how a small-scale, near-Manila, farmer fed his chickens. The farmer had three plots of earthworms and morning and night he simply opened the gate and let his 20-30 chickens into the area to fend for themselves!

2. Several years ago while visiting CIPAV in Cali, Colombia, I was taken to the sugarcane/animal farm of Didimo Guzman some 2000 metres up in the mountains. Didimo produced earthworms on cattle dung and fed his 30-40 chickens on cane juice, *Trichanthera gigantea* forage and 3 wheelbarrows of digested cattle dung/worms/humus, which he simply dumped on the earthen floor of the chicken yard. The chickens devoured the worms and at the same time their pecking and scratching dried out the humus which he collected daily for use as organic fertilizer for planting sugarcane.

Rena Perez, Cuba

From Bayer <wb.waters@link-goe.de>

Comment on scavenging poultry and pest control

I'm following with great interest the contributions and discussions on scavenging chickens and ducks. What a change over recent years! Five or six years ago it was very difficult to find anybody to work in this area. I still miss one aspect. Poultry can control pests. In the BOSTID book on micro-livestock (National Academy of Science, 1991, *Microlivestock - little known Small Animals with a Promising Future*. Washington: National Academy Press), it is mentioned that Canadian farmers achieve a 80-90 percentage fly control in enclosures such as calf rooms or piggeries with muscovy ducks. The economics are very good. A 35 cows dairy farm needs \$ 150-390 worth of chemicals to control flies - a muscovy chick costs about \$2 - and can be sold or eaten after some time.

I observed myself how chicken in cattle kraals eat ticks. I even saw chickens jumping up to a cow, taking off ticks. Grasshoppers, and flies

around houses are eagerly eaten both by ducks and chicken, reducing the insect pressure on land. Ducks can be used to control snails in fields etc. I myself have not made any detailed studies of these effects, but I wished to mention it. More intensive housing of poultry would impair this function.

Wolfgang Bayer, Ann Waters-Bayer, Rohnsweg 56, D-3708 Goettingen, Germany. Tel: +49-551-485751; Fax: +49-551-47948

From Rene Branckaert <Rene.Branckaert@fao.org>

Comments on feeding poultry with earthworms and on scavenging poultry and pest control

1. Feeding poultry with earthworms:

Various experiments have been conducted on the use of earthworms for feeding poultry, especially in Benin (see Vorsters) and in the Philippines (see Barcelo and Barcelo, University of La Union). Most results were disappointing: the reason is that earthworms are intermediate hosts for Cestodes, like *Davainea* or *Railletina*. There are two possibilities:

- To kill and dry the earthworms before using them as feed.
- To deworm poultry on a regular basis.

2. Scavenging poultry and pest control:

Ducks can be used for the control of snails in rice fields, especially the Golden snail which is rapidly spreading throughout South-East Asia but also *Limnea* sp. which is the intermediate host of cattle liver fluke. An interesting trial is presently conducted in Central Luzon University (Munoz, Philippines) by Ms. A.G. Caguan.

Rene Branckaert FAO

From David Little <little@ait.ac.th>

Comments on scavenging poultry

The comments on scavenging poultry have all been very interesting so far and I have found Stephen Swan's comments a real education.

Over the last few years we have looked at the scavenging poultry interactions and their potential integration with fish culture in Northeast Thailand. We followed 7 households in detail through an annual cycle after they expressed interest in using the poultry waste as a pond fertilizer. Whether these two minor parts of the farmers' livelihood systems reinforce each other and lead to further productivity increases was our main interest.

What became quickly clear was that in the context of the farmers we worked with, both are minor elements in terms of cash but have important roles within the household.

Although mixed poultry flocks were the norm, village chickens dominated.

Disease was a major issue. Over the year farmers lost around 60% of their poultry, 17% were eaten by the household and 23 % sold (usually within the village on a reciprocal basis). Of these mortalities, over 85% were just hatched or starters, so, on a weight basis the loss was much less (22%). Over 70% of mortalities were related to diseases and parasites, with accidents and animals (chiefly dogs) taking care of another 12 %.

50% of poultry is consumed at these gatherings which are intimately linked to agricultural activities and more than 20% to other "parties, ceremonies or festivals". Less than 20% are eaten as everyday food. Among the households followed they produced over 90% of their own needs.

Perhaps this part of Northeast Thailand, or Thailand generally, is atypical of others in the region in that the broiler industry is so well developed and might be expected to reduce opportunities for marketing village chickens - but the opposite appears to be the case. Farm gate prices for village chickens are high and in addition to a healthy demand in the village, middlemen scour rural areas to buy them for urban consumption.

Vaccines are available, although purchasing and using them for small

batches of naturally incubated chickens makes their adoption sporadic and efforts to promote them, as Stephen Swan said, are undermined in many ways. Diseases apart from Newcastle appear to be important so even if the heat tolerant vaccine was available it would surely not be a magic bullet. Ectoparasites were also an important source of mortality in young birds, but one that farmers could to some extent control through easily available drugs and changes in husbandry and management can alleviate.

Surely a critical point is that if there was improved survival of scavenging poultry chicks in the village - would there be adequate supplementary feeds to support them?

From the perspective of the Northeast Thai situation, it is clear that paddy grain and ricebran, the key feeds used, would be insufficient to support a larger flock size. As it is, farming households appear to allow for high early mortalities, and the productivity of the surviving breeding birds allows an average production of between 1-2 birds per week in all of the households followed. This appears to satisfy the farmers' needs. A major role of the poultry is to provide convenient and high quality "feast food" to serve/support agricultural work that requires contracting of labour. Culturally, hiring labour for rice transplanting, or field crop harvest requires the farmer to lay on good food. Village poultry, and farmed fish are conveniently available nearby and are considered high quality.

The point here is that profit maximisation is not an issue, for either poultry or fish subsystems, but rather the cultural value attached to ensuring good relationships with hired agricultural labourers, who may often be neighbours and friends. This is particularly important in the context of high demand for manual labour during the peak agricultural periods (transplanting, harvest). Labour is now scarce and expensive and the land owner can ill afford time to go off-farm to obtain wild fish and poultry from local sub-district markets - at this time home produced food is of especial value.

Surely the point is that any attempts to "improve" poultry systems probably needs to consider both the overall needs of the farming households and off-farm context, in addition to disease and feed issues.

From Farrell David <FarrelD@dpi.qld.gov.au>

Comment on paper by B.X. Men on the role of scavenging ducks, duckweed and fish in Vietnam (Paper 27)

I was most interested in this paper. The description of the system is essentially the same as many integrated duck/wet land rice producing systems elsewhere (South China, Indonesia). My information from duck farmers in the Mekong Delta region is that the improved breeds (Cherry Valley, Khaki Campbell) were in fact coping very well with the local environment and capable of foraging in the rice fields, despite differences in physical characteristics compared to local breeds. Their productivity was better but this may also reflect better management, feed etc. My information is that the majority of ducks in Vietnam are kept for eggs. While meat ducks are raised mainly during the post rice harvest period when they collect fallen rice.

A major problem with scavenging laying ducks is a regular supply of calcium. They can obtain snails, shell fish, etc in the flooded fields but not after harvest. Thus strategic feeding should complement what ducks are obtaining from scavenging i.e. high energy grain after harvest should require protein/Ca, and conversely when the fields are flooded.

Mr Men has identified a major problem. Changes in rice cultivation practice, new cultivars, high inputs of pesticides, fertilisers as well as the introduction of threshing machines in the Mekong Delta. This will tend to concentrate fallen rice. The current traditional duck raising system is under threat and this will probably lead to greater intensification at increased cost. The traditional scavenging systems depend on low inputs and cheap labour. Inevitably duck products will increase in price. These small duck farmers, perhaps with flocks of only 50-100 ducks need assistance. They have no voice at a national level but their sole livelihood may depend on duck eggs or meat. Like village and scavenging chickens it is a complex problem, requiring a detailed knowledge of the whole system. I wrote an article recently on these systems and nutrients requirements of table eggs laying duck (see *Poultry and Avian Biology Reviews* 6(1) 55-59 1995) because this has been an ongoing interest of mine for 15 years. Duck meat is the fastest growing poultry meat; it increased by 25% each year over the past two years.

David Farrell University of Queensland and Queensland Poultry Research and Development Centre

From Bui Xuan An <an@sarec.ifs.plants@ox.ac.uk>

Comments on scavenging poultry

I agree with the conclusions and recommendations given by Tadelle and Men. As you know, Vietnam ranks second in the world in the number of domestic ducks raised. Traditionally domesticated ducks are kept in paddy fields and production is closely integrated with rice cultivation. This system have been applied in many southeast and east Asian countries and the system has several advantages (Men's paper).

In recent years, farmers have been encouraged to adopt modern farming systems using high-yielding rice varieties, chemical fertilizers and agricultural chemicals, and modern breeds of duck. As a result, a lot of serious issues have been raised, including lowering land productivity, health hazards and environmental pollution. At the same time, the traditional combination of rice culture and duck farming is disappearing.

The time has come to reassess the value of the Asian duck-rice farming system. There were some on-farm experiments on this system in Vietnam carried out by VACVINA (Vietnam Integrated Farming System Union). According to Tran Van Nhu (VACVINA Haiphong SAP-center, 1995), the result was a [rice] yield of 120% and farmer's income of twice as much as that of the ordinary farming system.

The question is how to disseminate the information. There are many problems and constraints. The development needs to be based on the whole system including not only rice and ducks, water and soil, but also socio-economic factors, institutional and organisational ones.

Bui Xuan An, University of Agriculture and Forestry Thu Duc, Ho Chi Minh, VIETNAM e-mail: an@sarec.ifs.plants@ox.ac.uk

From Stephen Swan <swans@wave.co.nz>

Further comments on points raised by David Little on scavenging poultry

Concerning scavenging poultry and fish culture, David Little states that they are minor elements in terms of cash but have important roles within the household. I would like to add that small animals represent easily liquidisable assets, and are attractive because of this.

David Little's figures on poultry mortality sound typical. Poor nutritional status of baby chicks leaves them more open to disease attack. Also Tadelle comments heavily on this in his MSc work in Ethiopia where I was also able to work with him. This can be overcome with a creep feed system using the fish trap shaped like a cone, made of bamboo cane strips with gaps large enough for a chick to get through but not the mother hen.

Concerning the high farm gate prices for village chickens reported by David Little, I think broilers are soft and tasteless to the "village" -chicken- educated palate. Thus it must appeal to a different market niche. Village chicken usually attracts a big price margin per unit of body weight.

Concerning the vaccines, surely the Newcastle Disease (ND) heat tolerant vaccine IS available in NE Thailand? Peter Spradbrow <P.Spradbrow@mailbox.uq.oz.au> should be able to tell where. He is providing his non-commercial I2 seed heat tolerant strain to our FAO TCP project in Myanmar (I hope).

I think ND *is* the single most important cause of mortality in village poultry, and the other diseases can be resisted with a better nutritional status provided to the chicken, compared to ND which rips into the healthiest chicken regardless.

Concerning ectoparasites, leg mites can be treated with a mixture of waste engine oil and kerosine painted onto the legs and mothballs mixed with ash as a dust bath is a good feather mite treatment.

David Little asks: *"If there was improved survival of scavenging poultry chicks in the village - would there be adequate supplementary feeds to support them?"*

Or alternatively, from the farmer's point of view, if the chickens would only stop dying from ND, it might even be profitable to invest in some grain/oilcake to supplement their scavenged feed. Evening supplement of a choice of either will allow their very accurate diet awareness to select whichever was lacking in their day-time foraging.

If there is no place for supplementing in the farming system, which is certainly the case in some refugee resettlement camps, then at least with a controlled ND situation, one can be sure that the chickens are fully utilising the Scavenger Feed Resource Base and birds surplus to this available supply can be sold.

David Little states: *"Surely the point is that any attempts to "improve" poultry systems probably needs to consider both the overall needs of the farming households and off-farm context, in addition to disease and feed issues."*

Agreed, but I think this traditional system has evolved around the need to live with the high losses associated with ND and poor baby chick nutrition, and I see nothing too invasive about offering options which allow the traditions to continue, but having a greater cash flow.

Feed supplementation of scavenger poultry offer an income generating opportunity to Extremely Vulnerable Individuals (EVI) in the village situation (such as widows, women-headed households etc.) to start into the livestock field, adding this important element to their farming system.

Stephen Swan <swans@wave.co.nz>