2.4.6 SUB MODULE 6: INDEGNOUS CHICKEN PRODUCTION

Poultry production and in particular indigenous chicken (IC) production plays a significant role in the economic and social life of resource-poor households, contributing to cheap source of animal proteins and cash income. Indigenous chicken are highly adapted to the harsh scavenging conditions, inadequate nutrition and disease and/or parasite challenges. IC presents opportunity for exploitation of their high genetic diversity and are popular among the Kenyan consumers. Low productivity however hinders exploitation of IC in Kenya.

Indigenous chicken (IC) in Kenya are kept for various reasons and apart from food they serve social-cultural, nutritional and economic uses. Despite increasing demand for IC products by local consumers, their low productivity, attributed to high disease incidences, inadequate nutrition, low genetic ability and poor marketing channels, reduce their contribution to rural development.

Origin of indigenous chicken in Kenya

Chicken (*Gallus gallus domesticus*) are generally considered to have evolved from the jungle fowl (*Gallus gallus*) inhabiting India, Indo-China, South China, Philippines and Indonesia. They are thought to have been domesticated in South-East Asia from where they were distributed in the course of human migration to all parts of the world.

Population and Importance

Kenya has an estimated poultry population of 29 million birds, out of which about 28.7 million (98%) are domestic chicken. Although other poultry species are increasingly becoming important, they are comparatively few (2%) and include ducks, turkey, pigeons, ostriches, guinea fowls and quails. Out of the domestic chicken, about 22 million (77%) are indigenous or crosses with exotic breeds while the rest are commercial broilers and layers (Table 2.56).

Table 2.56. Indigenous chicken populations and distribution

Province	Commercial Layers	Commercial Broilers	Indigenous chickens	Others	Total
Nyanza	230,000	99,000	5,683,000	47,000	6,059,000
Rift Valley	437,000	258,000	5,623,000	128,000	6,446,000
Eastern	165,000	113,000	3,865,000	23,000	4,166,000
Western	113,000	18,000	2,644,000	236,000	3,011,000
Central	1,085,000	1,437,000	1,967,000	49,000	4,538,000
Coast	230,000	637,000	1,947,000	94,000	2,908,000
North Eastern	300	200	165,000	0	165,500
Nairobi	188,000	1,607,000	141,000	10,000	1,946,000
Total	2,448,300	4,169,200	22,035,000	587,000	29,239,500

For the last 20 years, IC population has increased by more than 75% while egg and meat products have grown by more than 34% and 79%, respectively (Table 2.57). This increase may be attributed to an increase in the human population and hence a corresponding demand for chicken products as shown by the more than 100% increase in egg and meat production from commercial layers and broilers.

Table 2.57. Indigenous chicken populations, egg and meat production trends

Year	Population (million)		Eggs (million)		Meat (tons)	
	Indigenous	Hybrids	Indigenous	Hybrids	Indigenous	Hybrids
1984	11.56	3.80	406.58	341.42	6,011.20	3,637.00
1994	17.49	5.10	459.06	521.80	9,094.00	4,553.00
2004	20.77	8.50	545.20	709.47	10,800.20	9,984.30

There is an average of 15 IC per household in over 96% of households in western Kenya and the coastal region where they are important economically, nutritionally, social-culturally and spiritually in both rural and urban areas.

Economic roles

Despite a lack of defined or measurable indicators for its contribution to the gross domestic product (GDP), the IC sub-sector in Kenya has been recognised as an important economic tool for rural poverty alleviation and households' food and nutrition security. It is estimated that the meat produced by poultry in Kenya is 18,600 tons valued at KES 3.52 billion. Out of this, IC produced about 11,400 tons (61%) while broilers produced about 6,300 tons (34%) and culls from hybrid layers about 900 tons (5%). While egg production is estimated at 1.22 billion, valued at KES 9.70 billion with IC producing about 570 million (47%) while exotic layers produced 650 million eggs (53%). The poultry subsector contributes an average of 8% of livestock gross marketed production.

Food security roles

A household is food secure when it has access to food needed for a healthy life for all its members (adequate in terms of quality, quantity, safety and cultural acceptability). Apart from generating income, chicken meat and eggs are cheap and readily available sources of food for the household. Available feedstuffs not consumed by humans are utilised by these birds to produce high-quality and cheap animal protein. Generally, over 18% of the eggs laid and 30% of the household flock are consumed at the household. It has been shown that with only three mature hens, a household is nutritionally secure within one year. In times of droughts and related calamities, chicken eggs become a critical source of animal protein.

Indigenous chicken production systems can be classified according to production objectives into either commercial or subsistence. Based on husbandry practices and levels of inputs and outputs, IC production systems in Kenya have been identified and categorised into free range systems (FRS), semi intensive systems (SIS) and intensive systems (IS). Comparing the profitability of the three production systems, it was found that raising IC under FRS is more profitable than in SIS and IS. However, utilisation of IS should be considered because land availability for practicing FRS is reducing due to the ever increasing human population, and therefore the production systems may shift to IS.

Free range system

In this system, chickens are reared extensively for various reasons including provision of eggs and meat for household consumption, occasional source of income and various socio-cultural obligations. This system is more common in low human population density rural areas and is based entirely on low input-low output management. Small flocks of less than 30 adult birds per household are kept with minimal care and no supplementation. Free-range feed resources usually include grass, insects, earthworms and various seeds. During cropping seasons, birds are sometimes confined and supplemented with maize, kitchen leftovers and any other available feed resource.

Semi-intensive system

In this system, chickens are kept in small flocks of between five and 50 birds mainly for consumption and sale. Levels of inputs range from low to medium depending on the commercial value attached to the flock. The birds are left to free range around the homestead or in fenced runs feeding on grass, insects, kitchen wastes, and any other available feed resource. They are provided with some form of housing ranging from simple shelters to proper chicken houses. Health care depends on the commercial value attached to the enterprise. However, water and supplementary feeds are provided. Because input levels are low, production is lower than in IS.

Intensive system

In this system, flocks ranging between 5 and 500 adult birds, depending on the objectives, are fully confined in constructed shelters or runs and provided with commercial or home-made feed rations and health care. The enclosed system protects the birds from thieves and predators. Deep litter and slatted floors are the most common housing systems used. Usually the birds are reared for household consumption, but are mostly for sale. Production of eggs and growth rates are higher while mortalities are low. However, due to high costs of inputs and high levels of management required, this system is rare in rural areas and common in urban and peri-urban areas where households own very limited or no land but are able to provide the required.

Ecotypes and strains

Indigenous chicken worldwide are reported to be small and multi-coloured birds of no particular breed. In most areas of Kenya, especially those that were covered by the Cockerel Exchange Programme, local chickens are not strictly indigenous as they were crossed with exotic breeds. In those areas, most IC are non-descript crosses of both meat and egg types. However, the effects of the introduction of foreign genes are expected to be low due to natural selection in the harsh free-ranging environment against the non-adapted exotic genotypes. Therefore, use of the term ‘indigenous’ in this context is still valid. The available IC in Kenya has not been conclusively described. Nevertheless, a few attempts made have reported several distinct morphological variants; some common and others primarily found in certain parts of the country. The major phenotypes include the normal feathered, naked-neck, frizzle-feathered, dwarf, crested-head, feathered shanks and rump-less among others.

In western and coastal regions of the country, characterised by warm and humid climatic conditions, as well as in eastern and northern parts, characterised by hot and dry climate, the naked-neck, frizzle, dwarf and rump-less genotypes are found kept together with the normal feathered genotypes more than in other areas. This would be expected, as these genotypes are

known to be tolerant to high ambient temperatures and other environmental stresses associated with such areas. In addition, IC in most areas of the regions have major socio-cultural and spiritual roles. Furthermore, along the coast and especially the Lamu islands, a game chicken locally known as Kuchi is common. On the other hand, around Mt. Kenya and the highlands East and West of Rift Valley, characterised by cool and wet climatic conditions, normal feathered, crested, feathered shank and bearded genotypes are kept.

A few IC characterisation attempts, based on morphology and feather colours, indicate wide variations in these features. These phenotypes are an indicator of genetic variability within the chicken population.

Production performance

Some studies have reported production and reproduction performance of IC under backyard, semi-intensive and intensive production systems (Table 4). The various performance parameters are low and highly variable. In the backyard and semi-intensive production systems, age at first egg ranges from 180 to 240 days. However, this has been shown to reduce to 166 days under intensive management.

Males grow faster and are heavier than females, with an average mature body weight of 2.2 and 1.6 kg respectively. The growth rate of IC is similar to that of commercial eggtype hybrids. Hens lay about 45 eggs per year with a range of between 30 and 75 eggs under free range and semi-free range systems. However, some lay up to 120 eggs when supplemented with concentrates. The mean egg weight in all production systems was estimated at 47.4 g with a range of between 36 and 52 g. About three clutches are laid per year with an average of 15 eggs per clutch before incubation. In all the production systems, chicks are produced by natural incubation using broody hens. Fertility and hatchability is usually above 70% but hatching weights are often low, ranging between 25 and 43 g.

Age at first egg (days)	166.0	203	224
No. of clutches/year	4.0	3.0	2.5
No. of eggs/clutch	30	21.2	11.1
Egg weight (g)	42.7	-	-
Fertility (%)	61.8	-	-
Hatchability (%)	74.2	77.0	84
Annual egg production	120	75	40
Chick weight at hatch (g)	32.7	-	-
Chick weight at 8 weeks (g)	438.9	-	-
Body weight at first egg (g)	1630.0	-	-
Mature body weight (g)*	2210^{m} 1660^{f}	-	1770^{m} 1320^{f}

*m= male; f= female

Diseases and parasites

Observations have shown that diseases and parasites commonly affect IC in Kenya. The most common diseases are Newcastle Disease (NCD), Chronic Respiratory Disease (CRD), fowl pox, coccidiosis, fowl typhoid, salmonellosis, infectious coryza and pullorum. Of these, NCD is the most devastating causing severe losses. This disease has also been reported to be the

most important in other developing countries. NCD, CRD and infectious coryza occur mostly during dry seasons between November and March. This is attributed to the dry conditions favouring the spread of the disease-causing microbes and high chicken mobility. Fowl pox, coccidiosis, fowl typhoid and salmonellosis occur mostly during wet seasons. During these wet seasons, chicks are mostly affected by coccidiosis leading to heavy losses. Reports on other important avian diseases that mostly affect commercial hybrids (e.g. Marek, Gumboro, etc) are scarce for Kenya.

Both internal and external parasites are common. External parasites include lice, fleas, ticks and mites, while helminths and coccidia constitute the most important internal parasites. A recent study in Kenya showed that 93.3% of adult IC in semi-arid Kenya were infested with at least one type of helminth. In high rainfall areas helminths infestation of 70.6%, 95.3% and 93.5% for chicks, growers and adult chickens has been reported respectively. It has been observed that coccidian and Ascaridia galli are the most common endo-parasites in the three ecological zones. Although information concerning the prevalence of common external parasites is scarce, lice, fleas, mites and ticks have been reported as the most common, not only in Kenya but also in other developing countries.

Herbs are sometimes used to treat sick birds, with the most commonly used herbs being Aloe vera, croton, milkweed and hot pepper. Information on the efficacy and effectiveness of these herbs in the control and treatment of the various diseases is scarce.

Marketing systems

Marketing of live IC and their products is entirely a private sector business. The marketing chain generally involves the producers, itinerant traders, processors and finally the consumers. The marketing process begins with a purchase of an egg or a live bird by a primary collector, direct from the household, or from small locally held weekly markets and ends with a consumer purchasing the products either in their raw form (raw egg or live bird or a piece of raw meat) or processed (cooked egg or a piece of cooked meat). The producer's decision to sell is entirely based on the economics of profits and availability of stocks. Due to lack of formal IC marketing organisations in Kenya, the commercially oriented producers usually have regular primary collectors. Although prices occasionally fluctuate due to market volatility, this marketing system is well developed and stable.

For the subsistence-oriented producers, egg and live chicken marketing is often erratic and unpredictable. The producer's decision to sell is dictated by the household need for cash, that is often critical during times (seasons) of human food scarcity, disease outbreaks and the need to de-stock whenever the population exceeds the household carrying capacity. During food scarcity and disease outbreak circumstances, which occur commonly in a locality, the supply of products, especially live birds, exceed demand by the primary collectors thus leading to depressed prices. For the same demand and supply reasons, the prices are usually stable during normal times and highest during festive seasons. Nevertheless, prices of eggs rarely fluctuate. When buying or selling live birds, prices are also determined by the weight or size and health of the bird. Although IC eggs are smaller and lighter, they fetch higher prices than eggs from commercial exotic birds. However, very small eggs have low market value as they are not preferred by consumers.

The growing consumer preferences and consequent demand for IC products has led to an increase in small and medium scale processing facilities in various parts of the country. In this marketing system, live birds collected via the chain of itinerant traders are slaughtered in private or local authorities slaughter premises, packaged whole or in pieces and sold either directly to consumers or to supermarkets. Birds are manually slaughtered, defeathered, eviscerated, washed, inspected and packaged in plastic bags/containers. Eggs are graded and wrapped in units of two or more using plastic packaging.

Further reading

Barua, A., Howlider, M.A.R. and Yoshimura, Y. (1998). Indigenous Naked Neck fowl of Bangladesh. World's Poultry Science Journal 54: 279-286.

Horst, P. (1988). Native fowl as reservoir for genomes and major genes with direct and indirect effects on productive adaptability. Proceedings of the 18th World's Poultry Congress, Nagoya, Japan, pp. 99-105.

Juma, N. and Ondwasy, H.O. (2002). Improved management of indigenous chicken: sustainable technologies contributing to the socio-economic welfare of rural households. Proceedings of the 8th Kenya Agricultural Research Institute Biennial Scientific Conference, Nairobi, Kenya, pp. 359-364.

Kaingu, F.B., Kibor, A.C., Shivairo, R., Kutima, H., Gitonga, L.M., Wihenya, R. and Kahi, A.K. (2010b). Activity of Aloe secundiflora crude extracts on Ascaridia galli in vitro. Proceedings of the Animal Production Society of Kenya annual symposium, 20-22 April 2010, Garissa, Kenya.

Kaudia, T.J. and Kitalyi, A.J. (2002). Commercializing rearing of village chicken in Kenya, in: Guéye, E.F. (ed) The Second INFPD/FAO Electronic Conference on The Bangladesh Model and Other Experiences in Family Poultry Development: http://www.fao.org/ag/AGAinfo/themes/en/infpd/documents/econf_bang/ add_ paper12.html [Accessed 26 Apr. 2005].

Kitalyi, A.J. (1998). Village chicken production systems in rural Africa: Household food security and gender issues. Animal Production and Health Paper No. 142, Food and Agricultural Organization of the United Nations, Rome, Italy.

Kitoi, L.O. (2000). Improvement of poultry production in western Kenya. Proceedings of the end of Agricultural Research Project Phase II Conference, Nairobi, Kenya. pp 227-236.

Magothe, T.M., Muhuyi, W.B. and Kahi, A.K. (2006a). Genetic parameters for egg and juvenile body weights of indigenous chicken genetic resources in Kenya. Proceedings of the 8th World Congress on Genetics Applied to Livestock Production, 13-18 August 2006, Belo Horizonte, Brazil, CD-ROM.

Magothe, T.M., Muhuyi, W.B. and Kahi, A.K. (2006b). Some external egg characteristics of local chickens in Kenya. Proceedings of the 32nd Tanzania Society of Animal Production Scientific Conference, 24-26 October 2006, Moshi, Tanzania.

Mwamachi, D.M., Muinga, R.W., Bimbuzi, S. and Mwambanga, J.N. (2000). Experiences in participatory research on improving productivity of indigenous chickens in Kwale district. Proceedings of the 7th Kenya Agricultural Research Institute Biennial Scientific Conference, Nairobi, Kenya, pp. 229-235.

Ndegwa, J.M. and Kimani, C.W. (1996). Rural poultry production in Kenya: Research and development strategies. Proceedings of the 5th Kenya Agricultural Research Institute Biennial Scientific Conference, Nairobi, Kenya, pp. 511-516.