CLIMATE CHANGE, FOOD SECURITY, NATIONAL SECURITY and ENVIRONMENTAL RESOURCES

GLOBAL ISSUES & LOCAL PERSPECTIVES

Edited by

Ahmed Makarfi

Ignatius Onimawo

Prince Mmom

Ani Nkang

Abdullahi Mustapha

Eteyen Nyong

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Preface

This book adopts an exegetical approach as well as a pedagogic model, making it attractive agriculture and environmental economics teachers, professional practitioners and scholars. It is eschews pedantry and lays bars the issues in such clarity that conduces to learning. The book elaborates on contemporaneous climate change, food security, national security and environmental resources issues of global significance and at the same time, is mindful of local or national perspectives making it appealing both to international and national interests. The book explores the ways in which climate change, food security, national security and environmental resources issues are and should be presented to increase the public's stock of knowledge, increase awareness about burning issues and empower the scholars and public to engage in the participatory dialogue climate change, food security, national security and environmental resources necessary in policy making process that will stimulate increase in food production and environmental sustainability.

Climate Change, Food Security, National Security and Environmental resources: Global issues and Local Perspectives is organized in four parts. Part One deals with Climate Change with Six Chapters, Part Two is concerned with Food Security with Nine chapters, Part Three deals with National Security with Five Chapters, while Part Four pertains Environmental Resources, has Five Chapters.

Ahmed Makarfi / Eteyen Nyong

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CHAPTER 28

Pigeon Farming

Balogun, B.I PhD

Department of Agricultural Education, Federal University of Education, Zaria,
balogunib@gmail.com,

Introduction

The domestic or common pigeon (*Columbia livia domestica*) is an inclusive name for birds of the family *Columbidae,* a cosmopolitan group with about 300 species (NRC, 1991). Generally, larger species are called pigeon and smaller ones are known as doves, although there is no technical distinction. All pigeons trace back to a common ancestry, the blue rock pigeon. Pigeons have been man's closest associate for over 6000, years (Jin, *et al.* 2023). In the process of domestication they have branched off into varieties, fostered and developed by man for utility purposes (Didier, 2022; NRC, 1991). Pigeons are usually kept as show birds or for sport as racing birds and their well developed homing instinct, which means that they will fly back to their own roof space from wherever they are released, is well known. This feature has been used in the past as a means of communication with the message being borne in the pigeon's leg ring. Reuters, the international news agency has in the past transmitted its news via the humble pigeon. The birds have been known to travel for up to 700km. The other aspect of pigeon rearing is that of raising squabs for meat.

Pigeon are durable birds that can be raised with little effort and are able to survive harsh climates (Sule *et al.,* 2024; Arockia and Indianraj, 2023). They fend for themselves often ranging over many squares to locate seed and edible scraps. They have been raised for centuries especially in North America and Europe where they are produced as a delicacy for the market. But raising pigeons for food is not nearly as widespread as it could be: indeed, in modern times its potential has hardly been explored. Farmed pigeons are particularly promising as urban micro-livestock because they require little space and thrive in cities (NRC, 1991). Young pigeons (squabs) grow at a rapid rate. Their meat is finely textured with attractive flavour, and they are often used in place of game fowl. It is tender and easily digested, it commands premium market prices in many cases, the continuing demand is unfilled (NRC, 1991). According to Balogun (2009)**,** pigeon meat has good protein content (19.8%), which is relatively comparable to duck (22.7%); local chicken (21.5%); quail

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(28.3%); guinea fowl (26.4%) and exotic chicken (22.2%). It has low fat content of 1.3%. Pigeons are important commercial poultry in addition to being ornamental birds (Jin *et al.* 2023). In the year 2021, over 111million pairs of breeding pigeons were kept in stock and 1.6billion squabs were slaughtered for meat in China (Gao, 2022). According to Ji *et al.* (2022), the scale of pigeon business is expanding steadily in China with pigeon becoming the 4th largest poultry product after chicken, duck and geese. However, the squab sales has also increased over the years in the United States of America, Canada, Great Britain and France culminating into a drop in China's dominance of production from 80% of the total global production (Kokoszynski *et al.* 2000; Gao, 2022, Ji *et al.* 2022, Zhao *et al.* 2022). In Africa, the commercial production of pigeons (squabs) meat is yet to be given recognition. Pigeon farming is at the traditional small scale/backyard level under the extensive (household labour) and semi-intensive management systems in most regions of Africa, Nigeria inclusive (Sule *et al.*, 2024; Husein, Agbolosu and Ishaq, 2023; Kalita and Borah, 2023; NRC, 1991). In these regions the pigeons roam about freely and scavenge around family compounds, feeding on any available farm/harvest residues. The rearer provides the birds with supplements (grains) and the production is usually for family consumption and generation of petty cash / income for the family (Nideou *et al.* 2023; NRC, 1991). Pigeon production has not been given the required attention in comparison to other poultry types (chicken, turkey, guinea fowl, geese etc) even though pigeons have potentials as an alternative animal protein source in Africa. Animal sources of protein are usually expensive and thus most people divert to plant protein which is relatively cheap. Animal protein contains most of the essential amino acids in particular the proteins that are lacking in protein of plant origin namely: methionine, lysine and tryptophan and for this reason animal proteins are described as first class protein, its consumption is highly recommended but due to high cost of animal protein, people decide to switch to plant protein thereby leading to high manifestation of protein deficiency. Micro livestock (rabbit, guinea pig, pigeon, etc) lend themselves to economic riches that are not easily filled by large livestock. Much of their potentials are for subsistence production and they are promising for the many peasants, who are now unable to purchase meat, milk, cheese or eggs due to poor economic situations. These people can afford only animals that can be raised within the homes or backyard under ambient climatic conditions and on feeds that are cheap and easily available. Pigeon production has the potentials for sustainable enhancement of reduction in animal protein deficiency, increased rate of poverty reduction, reduced unemployment and improved socio-economic status of the rural poor community (Asaduzzaman, 2009). Pigeons are kept in almost all parts of Nigeria but not as common as poultry (FDLPCS, 1992). Despite the food value of pigeon for meat only few people engage in it's domestication and its consumption as a source of animal protein in diet in Nigeria (Adawy and Abdel-Wareth, 2023).. Inspite of attempts to solve the problem of protein deficiency and malnutrition in Nigeria, it has continuously increased due to the astronomic cost of conventional sources of animal protein (beef, milk, egg. chicken inclusive) which makes them unavailable to the rural populace . This chapter therefore explores the potentials of pigeon meat as an alternative and readily available cheap source of animal protein.

Advantages of Pigeon Farming

Pigeon farming has tremendous advantages which include:

i. Easy management (require little or no handling)
ii. Require less housing space
iii. Can be reared easily on roof tops or home yards
iv. Fast growing and short reproductive cycle
v. Female starts laying at 5-6months of age at the rate of 2 eggs / month
vi. They brood the young with little intervention
vii. Very short hatching period (18days)
viii. Squabs (baby pigeon) reach table size at 3-4 week of age (thus meat production is sustained compared to other livestocks)
ix. Requires very little investment
x. Scavenge for food thus cost of feeding is low
xi. No taboos against pigeon meat
xii. Meat is highly acceptable and thus in high and constant demand with high premium
xiii. Entertainment / recreation. People keep them as pets and ornamental birds and one can spend quality time watching their activities during leisure time
xiv. Source of natural beautification as ornamental birds (their plumages are naturally beautiful)
xv. Maximum profit with small start-up capital and comparatively low labour cost (feed and housing cost)
xvi. Provides additional supplemental income
xvii. Less predisposed to disease compared to other forms of poultry
xviii. Droppings is a useful bio-fertilizer (manure) for crops and family gardens
xix. Feathers / plumage used in production of toys
xx. They keep the environment safe by eating different types of insects
xxi. Used as laboratory animals in genetic and hormonal studies.
xxii. Pigeons are extensively used for scientific research notably in physiology and psychology
xxiii. Homing pigeons are used to carry messages
xxiv. They are used as pets for sports (racing)
xxv. The squab is in great demand by sick people and people with nutritional challenges (digestive issues). It is a source of palatable, delicious and easily digestible animal protein (Ghosh *et al.* 2013). The squab contains large proportions of soluble protein and smaller proportions of connective tissues than most forms of meat

Appearance and Size

Pigeons have small head, plump, full breasted bodies, soft and dense plumage. They weigh between 0.5-1kg, however, a few large breeds weigh up to 1.4kg, the size of small domestic chicken.

Habitat and Environment

The domestic pigeon can be raised in temperate and tropical zones including arid and humid regions. However, cold climates do not favour squab production while hot climates promote vermin and diseases.

Distribution

Domestic descendants of the rock pigeon of Europe and Asia are reared today in almost any country (NRC, 1991).

Slaughtering/Dressing

By 28 days, (4 weeks) they should be culled for the table, while they are most tender and before they start to become flighty and lose condition. They are killed and plucked in the same way as other fowls. However, their skins are very tender as such extra care is needed to prevent damage during the dressing process.

Pigeon Meat

There are mainly 300 breeds of pigeon around the world, which are categorized into two types as follows:

1. Meat producing breed (utility)
2. Entertaining/sport/ exhibition/fancy/ornamental breed

Mostly, pigeons are traditionally kept for the purpose of their meat. Baby pigeon meat (squab) is softer and tastier than adult meat. The squabs are harvested just before full feather development and before the youngster has started to fly, usually at 21-30 days of age. At this time the feathers are nearly mature and the meat is soft and tender and their body weight is usually appreciable (the ratio of flesh to inedible parts is highest). Once flying begins, the meat becomes tougher and body weight decreases. The weight of pigeons depends on the breed, nutrition and other factors, but usually ranges from 340-680g (NRC, 1991). Rearers normally expect an average of 12-14 squabs/pair/year. However, this depends on environment and management (NRC, 1991). The birds attain market weight at 450-500g. The market age is usually 4-5weeks (120-150days).

Egg Production

Pigeons are traditionally kept for their meat. They however lay eggs in clutches. Male and female pigeons live in pairs. They collect straws and build a small nest. They start laying at the age of 5-6months and they lay a pair of eggs every month. Both male and female pigeon hatch the eggs one after the other. It takes 17-18 days to hatch the eggs. Artificial nest can be made for the birds if required. Since the eggs are relatively very small in size, squab production is highly profitable compared to consumption of the eggs

Behaviour of Pigeons

Pigeons mate in pairs and remain as such for life. Once a pair have gone through the courting stage and mated, both are ready to build a nest and hatch young ones together. The mated couples (male and female birds) remain devoted to each other as long as they live or for as long as they are allowed to stay together. However, if mating is disrupted by separation or death, the birds will mate again with other birds/partners. The birds play equal role in nest building, incubation and care for the young. Pigeons typically lay two (2) eggs/clutch/year. A total of 8 clutches/year is not uncommon for a breeding pair. The incubation period is 17-19days. Unlike most birds, pigeons drink by inserting their beaks into the water and sucking up a continuous draft. Growth and egg production in pigeons declines rapidly after the third year. In domesticated pigeons, sexual maturity (measured as age at first egg) is reached at 120-150 days. Courtship is characterized by cooing, pranching and displays of spread, lowered tail feathers.

Feeding

Naturally pigeons eat insects, leaves, fruits and some invertebrates (NRC, 1991). Generally, scavenger pigeons eat wheat, broken maize, sorghum, paddy rice, legumes, weed seeds and some green vegetables. They also eat spilled grains from feed mills and farm fields. Pigeons require a balanced ration with 15-16% protein to attain proper growth and maximum meat production. The feed intake range of pigeons is 40-50g/pigeon/day. Pigeons also require oyster shell, limestone, salt, grit mixture, bone powder and mineral supplements to attain fast growth. The birds require grit for provision of minerals and to allow the birds to grind the feed in their gizzards. Squabs (baby pigeons) normally do not require extra feed for 5-7days. They take crop milk (pigeon milk), which is made from their parents stomach for the next 10 days. The female pigeon softens the food in her beak and then feeds the squabs. As soon as the birds are able to fly, they fend and feed for themselves without parental influence or indulgence. The bird must also be given water because they drink water and also like to have a bath in the same water. The water container (pot) should be cleaned on daily basis to avoid disease occurrence.

Brooding and Reproduction

Pigeons are reared in pairs. Most Columbid species are generally social birds and they mate for life and can become territorial during the breeding season. A pair of male and female birds stays together as couples throughout their life time. They collect straws through mutual effort to build a comfortable nest for them to live in. The female starts laying eggs at 5-6 months of age and lay a pair of eggs every month and both male and female can incubate the eggs, which hatches in 17-18

days. The eggs are laid in clutches. The female pigeon can lay eggs for up to 5 years of age. The male and female pigeon produce crop milk, which is similar to mamalian milk. The crop of squabs (young pigeons) contains "crop milk", obtained from their parents, which acts as feed for the first 4 days. In the next 10 days, both male and female pigeon feeds the young birds and thereafter they begin taking feed on their own by 21-30 days. The egg weight is about 20g and the egg shell is white in colour.

Disease

Disease infestation in pigeons is very low compared to any other poultry birds. However, they suffer mainly from tuberculosis (TB), paratyphoid, cholera, pox, newcastle, influenza, etc. Aside from these they can also suffer from malnutrition diseases as well as lice infestation. These diseases are however avoidable with experienced veterinarian consultations and proper management practices as follows:

- Keep the pigeon house clean and germ free
- Isolate disease afflicted birds from healthy birds
- Strict adherence to vaccination regime/schedule
- Keep pigeons free from worms
- Supplementary feed should be given to them to avoid malnutrition diseases

Husbandry

Under extensive conditions where the birds are released each day to feed themselves, almost no land is needed. Under intensive conditions, where the birds spend their lives in confinement, a land of half hectare can be enough space to raise 2,000 pairs. Free ranging pigeons forage over a wide area than most domestic fowls because they fly out to find their feed. Nutrient requirement protein (13.5-15%); carbohydrates (60-70%,) fat (2-5%) and fibre (5%) are similar to those of chickens and other fowls (making allowance for the energy needed for flying). Commercial feed and other supplements if needed at all are made available (NRC, 1991). Unlike chickens, pigeons do not prefer communal roosts. Instead they prefer nestling shelves at least two (2) for each breeding pair. The shelves are normally placed in dark corners and fitted with low walls to keep eggs from rolling off. Pigeons are easily trained to recognize "home". The wing feathers are clipped and the birds are fed close to the dovecote and by the time the wings become unclipped, their homing instincts become developed (NRC, 1991). Alternatively, freshly captured pigeons may be trained by confining them to the dovecote for at least one (1) week. Normally, a little grain is provided in the morning to ensure the birds return home. Thereafter the birds are left to obtain more food for themselves. In captivity, the life span of pigeon species in 10-15 years, however, occasionally, they may live up to 20 years.

Housing

Housing is of paramount importance in pigeon rearing. Most pigeons and doves can be maintained outdoors when the climate is mild or moderate. Any water proof house which is easy to clean is

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suitable for rearing pigeons. Many traditional pigeon houses (cotedove) are built of earthenware pots. In Asia and Europe, wooden pigeon towers are also used (NRC, 1991). The following considerations with regards to housing should be put into perspective while managing pigeons:

- A predator (cat, dog, mouse) and rodent – proof flight cage is normally recommended for the birds, thus the pigeon house should be built in a high place.
- Ventilation should be provided in the house, particularly for large flocks (for easy circulation of air)
- Optimum lightening should be ensured (light bulb can be put in place)
- Prevention of entry of rain water inside the house (avoid damp conditions)
- Cleaning of the house at least weekly to prevent the growth of molds and for proper maintenance of hygienic conditions
- Keep house clean and dry always
- Make a door in every room measuring 10x10cm
- Keep food and water constant close to the house
- Keep some straws close to the house so that the birds can make their bed on their own
- Keep water and sand near the house, since they can clean themselves with water and dust
- Build tin wood or tin bamboo packing boxes. Since pigeons and doves spend most of their time on their feet, they require comfortable perching surfaces in form of flat shelves or branch type shelves. These shelves are good for courting, napping etc.
- Each pigeon requires about 30cm x 30cm height and 30cm width space

Research Concerns

Even though, the pigeon production industry remains traditional, it is constantly evolving and deserves scientific research and investigations in the area of diseases, husbandry, feeding and housing for better understanding and harnessing of its potentials towards promoting protein food sufficiency (meat and egg), generation of income, poverty reduction and employment generation amongst resource limited population in rural communities.

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