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Review Article

Smallholder Poultry Production in Sub-Saharan Africa: Village Chickens, Tropically Adapted Breeds, Newcastle Disease Vaccination, Feeding, Housing and Markets

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Abstract

Poultry is the most widely kept livestock in sub-Saharan Africa (SSA), with smallholder poultry accounting for about 80 percent of the poultry flock in low- and middle-income countries, and indigenous chickens accounting for about 70 percent of the total chicken population in SSA (Alders and Pym, 2009; FAO, 2023). Chickens provide eggs, meat, income, and a living savings account, especially for women and youth, and they are often the first livestock a household can afford (Alders et al., 2018). Despite their importance, productivity is low: indigenous hens lay 30 to 60 eggs per year under village management, with an average egg weight of about 38 grams, compared with 250 or more eggs per year for improved layers, and mortality is high, especially from Newcastle disease (ND) (Desta, 2020; FAO, 2023). This article synthesises peer-reviewed evidence published between 2000 and 2025 on smallholder poultry in SSA, with emphasis on indigenous and tropically adapted breeds, scavenging and supplementation, housing, Newcastle disease vaccination with thermotolerant I-2 vaccine, and markets. Evidence shows that feed supplementation to free-range local chickens in Tanzania increased mature body weight from 1,148 grams without supplement to 1,484 grams with supplement, and that rising temperatures in Uganda reduced scavenging time by 46 percent, egg production by 8.7 percent, and hatchability by 5.2 percent. Community-centred ND vaccination, using thermotolerant I-2 vaccine that can retain protection for 8 weeks at 28 degrees Celsius, has been shown to improve survival and income, but uptake remains low in many areas because vaccines are unavailable or out of reach. The article proposes a practical, low-cost poultry system for smallholders, including ND vaccination, housing, supplementation, and record keeping, and it identifies priorities for veterinary services, feed, breeding, and markets. The central argument is that smallholder poultry should not be treated as a low-input, low-output fallback, but as a fast, high-return enterprise that, with modest investment in vaccination, feeding, and housing, can improve nutrition, income, and women's empowerment faster than any other livestock species.

Keywords: *poultry; village chickens; Newcastle disease; I-2 vaccine; tropically adapted breeds; eggs; sub-Saharan Africa*

1. Introduction

A hen is a bank that lays eggs. For a smallholder who cannot access formal credit, a hen can be sold in hours to pay school fees or medical bills, eggs can be eaten or sold daily for small cash, and a flock can be built from a few birds with little capital (Alders and Pym, 2009; FAO, 2023). In East Africa, over 80 percent of the human population lives in rural areas, and over 75 percent of these households keep indigenous chickens. In SSA as a whole, rural chicken production makes up about 60 percent of poultry, with indigenous chickens accounting for 70 percent of the total chicken population.

Yet smallholder poultry productivity is far below potential. Indigenous hens lay 30 to 60 eggs per year, with an average egg weight of about 38 grams, under village management, while exotic breeds can lay 250 or more eggs per year under improved management (Desta,

2020). Mortality is high, especially in chicks, from Newcastle disease, predation, poor feeding, and poor housing. Many flocks are wiped out each year by ND outbreaks, leaving households without eggs, meat, or income, and forcing them to start again from a few survivors.

This article asks three questions. First, which breeds and systems are most suitable for smallholders in SSA? Second, how do feeding, housing, and vaccination affect growth, egg production, survival, and profit? Third, what support, in veterinary services, feed, markets, and extension, makes smallholder poultry more productive and more equitable, especially for women? The synthesis concentrates on chickens, where evidence is strongest, while drawing on ducks and guinea fowl where relevant.

2. Breeds, Systems and Tropically Adapted Chickens

Indigenous chickens dominate SSA poultry. They are hardy, adapted to heat, scavenging, and disease, and they have traits, such as broodiness, foraging ability, and disease resistance, that exotic breeds lack (Alders and Pym, 2009). They are small, with mature weights of 1.0 to 1.5 kg, and they lay small, brown eggs, often preferred by consumers for taste and yolk colour. Their main limitation is low egg production and slow growth, because they spend energy on foraging, brooding, and surviving, not on laying.

Tropically adapted breeds, such as Sasso, Kuroiler, Bovans Brown, and other dual-purpose breeds, have been introduced to upgrade smallholder poultry to small-scale profit-oriented systems in SSA (Desta, 2020). These breeds are high-producing with low input, suited to semi-scavenging systems, and can lay 150 to 200 eggs per year with supplementation, while growing faster than indigenous chickens. On-farm testing in western Amhara, Ethiopia, found that tropically adapted breeds performed well under semi-scavenging, with farmers trained on supplementation. Bovans Brown in Siltie, Ethiopia, was also evaluated under farmer conditions, with farmers perceiving improved breeds as more productive but requiring more feed and health care.

Production systems vary: scavenging, semi-scavenging, and confined. Scavenging systems, where chickens forage for insects, seeds, and kitchen waste with little or no supplement, are low-cost but low-output, with high mortality. Semi-scavenging systems, where chickens scavenge plus receive daily supplement of grain, bran, or concentrate, are more productive and more profitable. Confined systems, where chickens are kept in houses and fed complete rations, are most productive but require capital, feed, and veterinary services. For most smallholders, semi-scavenging is the best starting point, with confinement for chicks and layers as a later step if capital and markets allow.

3. Feeding and Supplementation: The Scavenging Feed Resource Base

Feed is the biggest lever for poultry productivity, because scavenging alone cannot meet nutrient requirements, especially for protein. A study in Vhembe, South Africa, found a protein deficit of 27 grams per kilogram between the scavenging feed resource base and the required nutrients for growers, which must be compensated with supplemental feed. Chickens in Uganda foraged for about 13 hours daily, supplemented by kitchen waste and cereals, but rising temperatures reduced scavenging time by 46 percent, showing that climate change is already reducing scavenging feed availability.

Supplementation trials show clear benefits. In Morogoro, Tanzania, feed supplementation to free-range local chickens improved growth and body weight, with mature body weight of 1,484 grams for supplemented chickens versus 1,148 grams for unsupplemented chickens. Supplementation with maize, sorghum, millet, groundnut cake, soybean meal, and leaf meals, such as Moringa and Leucaena, can improve growth and egg production. Kitchen waste, market leftovers, and industrial by-products, such as brewer’s grain and fish meal, are also valuable, but they must be clean, not mouldy, and balanced.

Practical feeding should be seasonal and life-stage specific: chick starter for 0 to 4 weeks, grower for 4 to 18 weeks, and layer ration for hens in lay, with calcium, such as crushed shells or limestone, for eggshell quality. Water should be clean, available daily, and in shade, because dehydration reduces feed intake, egg production, and survival. Farmers should provide supplement in the morning and evening, when chickens are most active, and should keep feeders clean to avoid disease. Figure 1 summarises the gain in egg production from supplementation and improved breeds.

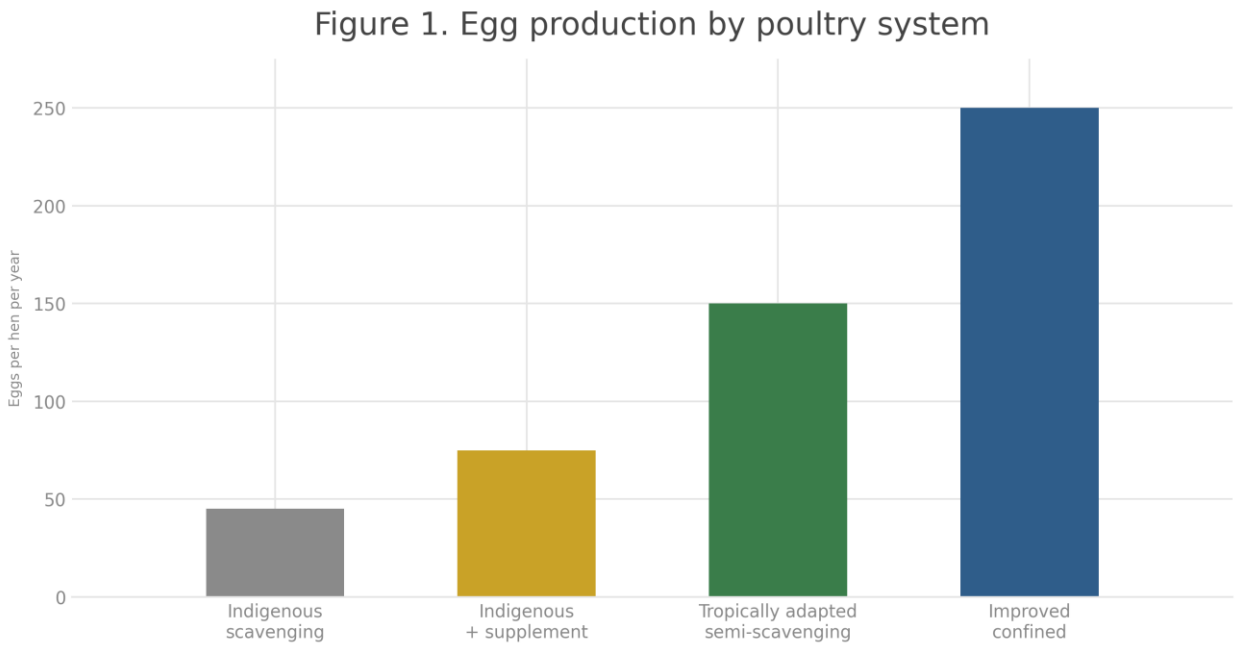


Figure 1. Egg production by poultry system. Indigenous scavenging hens lay few eggs, while supplementation and tropically adapted breeds substantially increase production. Values are based on the ranges reported in the text (30–60 eggs for indigenous scavenging hens; 150–200 eggs for tropically adapted breeds with supplementation; 250+ eggs for improved confined layers).

4. Newcastle Disease and Vaccination: The Single Most Important Intervention

Newcastle disease (ND) is the single most important constraint to smallholder poultry in SSA, causing huge economic losses to chicken farmers and wiping out flocks in days (Alders and Pym, 2009; FAO, 2023). ND is a viral disease that causes respiratory signs, nervous signs, diarrhoea, and sudden death, with mortality up to 100 percent in unvaccinated flocks. It is endemic in many SSA countries, and outbreaks often occur at the start of the rains, when chickens are stressed and in contact with wild birds.

Vaccination is the single most important intervention, and thermotolerant I-2 vaccine has transformed ND control for village chickens. I-2 was developed using a temperature-tolerant strain of ND virus that results in thermostability, and it can retain its protective ability for 8 weeks at 28 degrees Celsius when in freeze-dried form and stored in the dark (Alders and Pym, 2009). It is best administered via eye drop, and it can be produced in Africa through master seed egg amplification from disease-free flocks, as in Uganda where Brentec Ltd. produced over five million doses, and in Nigeria where DBellium Ltd. administered two million doses. Trials in Kenya showed that I-2 provided 62 percent protection against ND, and in Nigeria, I-2 coated on maize offal, sorghum, and brans produced antibody titres and protection, with highest titres for sorghum coated with gum Arabic.

Despite the availability of I-2, uptake remains low in many areas. A study in Tanzania found that ND vaccine adoption by chicken-owning households was low, despite I-2 being designed to overcome cold chain, because vaccines remained unavailable and out of reach for many smallholders. A community-centred ND vaccine delivery model in southeastern Kenya, using I-2 and LaSota strains, was tested under paid and free frameworks, and found that community vaccinators, timely delivery, and trust were critical for uptake. Farmers should vaccinate all chickens, including chicks, at 3 to 4 weeks, with booster every 3 to 4 months, and should report outbreaks promptly. Other vaccines, such as Gumboro (infectious bursal disease), fowl pox, and fowl cholera, should also be given where endemic, under veterinary guidance. Figure 2 and Table 1 summarise survival gains and health control.

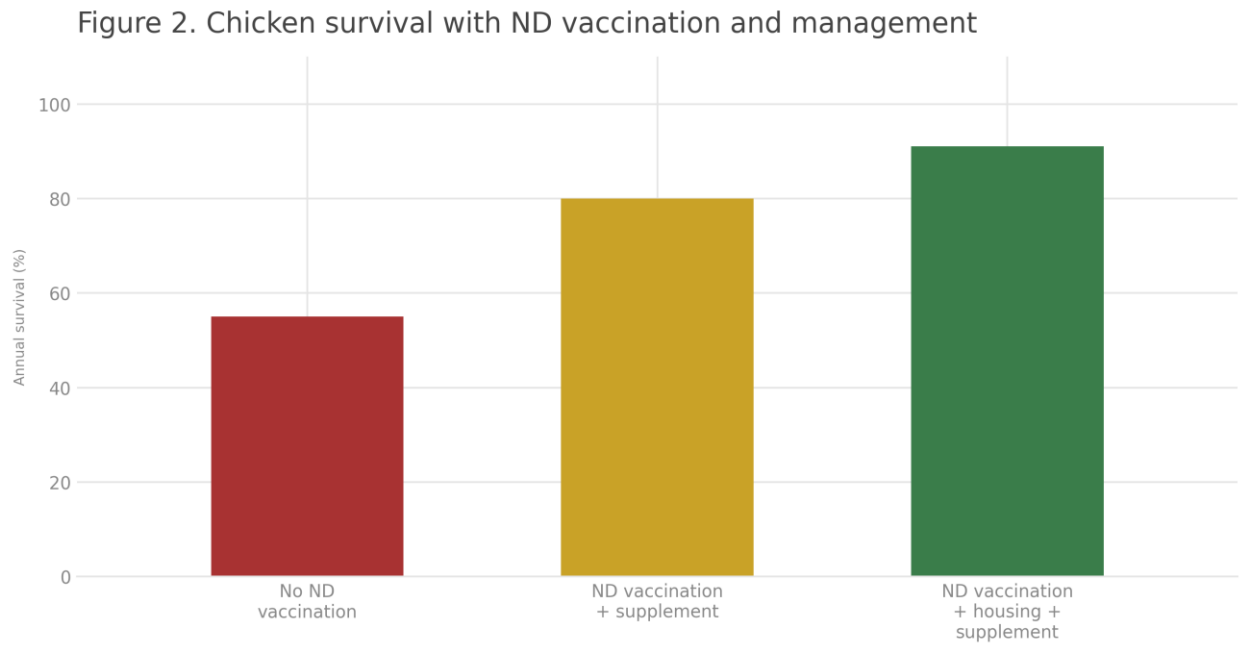


Figure 2. Chicken survival with ND vaccination and management. Vaccination alone improves survival, and vaccination plus housing and supplementation improves it further. Values summarise the effects described in Section 4.

Table 1. Major smallholder poultry health problems and their control.

Disease / problem	Signs	Prevention / control
Newcastle disease	Sudden death, respiratory, nervous	Vaccinate I-2, eye drop, every 3–4 months
Gumboro (IBD)	Diarrhoea, mortality in chicks	Vaccinate, hygiene
Fowl pox	Skin / mouth lesions	Vaccinate where endemic
Coccidiosis	Bloody diarrhoea, weight loss	Hygiene, coccidiostat, dry litter
Parasites (worms, lice)	Weight loss, poor feathers	Deworm, dust, hygiene
Predation	Loss to dogs, hawks, snakes	Housing, fencing, guard

5. Housing, Brooding and Management

Housing is often neglected, yet it is critical for survival. In western Kenya, 65 percent of farmers did not house their birds, leaving them exposed to predators, rain, cold, and theft. A simple house, made from local materials, with ventilation, perches, nest boxes, and a dry floor, can reduce mortality, improve egg production, and allow better feeding and vaccination. Housing should be predator-proof, with wire mesh, a solid roof, and a door that can be closed at night. Chicks should be brooded for 3 to 4 weeks, with warmth, clean water, and starter feed, and should be separated from adult birds to reduce disease transmission.

Management includes record keeping, culling, and marketing. Farmers should record number of hens, eggs laid, eggs hatched, chicks hatched, mortality, and sales, to know which hens are productive and which are not. Unproductive hens should be culled or sold, and productive hens should be kept for breeding. Broody hens should be managed: if eggs are wanted for hatching, broody hens should be given 10 to 12 eggs; if eggs are wanted for sale, broodiness should be broken by separating the hen for a few days. Farmers should also manage flock size: a flock of 20 to 50 hens is manageable for a smallholder, while a flock of 200 or more requires more feed, housing, and veterinary care.

6. Economics, Gender, Markets and Adoption

Economics must be explicit. A hen costs a few dollars, a bag of feed costs tens of dollars, and a vaccine costs cents per bird, yet the return from eggs, meat, and sale of birds can be substantial. A hen laying 150 eggs per year, with eggs sold at local prices, can generate income that pays for feed, vaccine, and housing, with profit left for household needs. A study in Kenya of 111 commercial chicken farms, with at least 50 chickens, partly or wholly confined and provided with feeds, found that early intensification of backyard systems could improve income, but required feed, housing, and veterinary services.

Markets are as important as production. Eggs and chickens are sold in local markets, to traders, and to neighbours, often with little grading, weighing, or price information. Farmers who sell individually, in small numbers, and in distress, receive lower prices than those who sell in groups, with grading, and at peak demand, such as festivals. Women dominate smallholder poultry ownership and management in many SSA households, yet they may not control sale decisions or income. Programmes that channel chickens, training, and credit through women's groups, and that ensure women have rights to birds and income, are more likely to reach those who actually manage poultry and to sustain adoption. In Uganda, coping strategies for rising temperatures

included providing drinking water (96.3 percent), shade, and supplementary feed, showing that farmers are already adapting, but need support for housing, water, and feed. Table 2 compares production systems.

Table 2. Smallholder poultry production systems in SSA.

System	Typical flock	Feeding / housing	Suitability
Scavenging	5–20 birds	Scavenging, no house	Rural, low-input
Semi-scavenging	20–50 birds	Scavenging + supplement, simple house	Smallholders, women
Semi-intensive	50–200 birds	Supplement + concentrate, house	Peri-urban, market
Intensive layers / broilers	200–1,000+ birds	Complete ration, house	Commercial, capital

7. Research and Policy Priorities

Several gaps remain. First, long-term, multi-location trials that measure not only egg production but also survival, income, nutrition, and women's empowerment over multiple seasons are still scarce. Second, research on low-cost, locally formulated feeds, including leaf meals, by-products, and insect protein, such as black soldier fly larvae, should be prioritised, because feed is the largest cost. Third, research on ND vaccination delivery, on thermotolerant vaccines, and on community vaccinators, should be embedded in veterinary services, not treated as separate projects. Fourth, research on tropically adapted breeds, on genetic improvement, and on climate resilience should be embedded in poultry programmes, not treated as separate.

Policy should align incentives with smallholder poultry productivity. Public investment should support veterinary services, cold chains, and ND vaccination campaigns, with I-2 vaccine available at village level. Feed and fodder systems should be supported, with community feed mills, legume seed, and feed formulation training. Extension should teach vaccination, feeding, housing, and record keeping, not only bird purchase. Market linkages, including grading, transport, and cold storage for eggs, can ensure that higher production translates into higher income, not lower prices from gluts (FAO, 2023).

8. Conclusion

Smallholder poultry offers a practical, fast, and high-return path to more eggs, meat, income, and nutrition for smallholders in SSA. Indigenous and tropically adapted chickens are hardy, affordable, and well-suited to smallholder systems, and with modest investment in ND vaccination, feeding, and housing, they can achieve higher egg production, survival, and profit (Alders and Pym, 2009; Desta, 2020). ND vaccination with thermotolerant I-2 vaccine, feed supplementation that increased mature weight from 1,148 to 1,484 grams in Tanzania, and simple housing can prevent the largest losses. The challenge is not a lack of technology; it is the challenge of making vaccines, feed, breeding stock, and markets available to millions of smallholders, especially women who manage poultry. If that is achieved, poultry can turn from a low-input fallback into a reliable, profitable enterprise that improves nutrition and income faster than any other livestock species.

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Conflict of Interest

The authors declare no conflict of interest.

References

Alders, R. G. and Pym, R. A. E. (2009). Village poultry: Still important to millions, eight thousand years after domestication. World's Poultry Science Journal, 65, 181–190.

Alders, R. G. et al. (2018). Smallholder poultry: Leveraging for sustainable food and nutrition security. In: Poultry Science. Wallingford: CABI.

Desta, T. T. (2020). Indigenous village chicken production in Ethiopia. World's Poultry Science Journal, 76, 1–12.

FAO (2023). The State of Food and Agriculture 2023. Rome: FAO.

Alders, R. G. et al. (2014). Newcastle disease vaccination in village chickens. In: Village Poultry Health. Canberra: ACIAR.

Bessell, P. et al. (2017). Newcastle disease in Africa. Preventive Veterinary Medicine, 140, 1–10.

Copland, J. W. and Alders, R. G. (2005). The Australian village poultry development programme in Asia and Africa. World's Poultry Science Journal, 61, 1–12.

Dessie, T. et al. (2011). Village chicken production in Africa. Livestock Research for Rural Development, 23, 1–12.

Desta, T. T. et al. (2013). Village chicken production in Ethiopia. Livestock Research for Rural Development, 25, 1–12.

FAO (2014). Poultry Development Review. Rome: FAO.

Gueye, E. F. (1998). Village egg and fowl meat production in Africa. World's Poultry Science Journal, 54, 1–12.

Gueye, E. F. (2000). The role of family poultry in poverty alleviation. Livestock Research for Rural Development, 12, 1–12.

Kitalyi, A. J. (1998). Village Chicken Production Systems in Rural Africa. Rome: FAO.

Kitalyi, A. J. and Mayer, K. (1998). Village Chicken Production Systems in Rural Africa. Rome: FAO.

Kryger, K. N. et al. (2010). Smallholder poultry production in Kenya. Tropical Animal Health and Production, 42, 1–8.

Msoffe, P. L. M. et al. (2010). Newcastle disease vaccination in Tanzania. Tropical Animal Health and Production, 42, 1–8.

Mtileni, B. J. et al. (2009). Genetic diversity of indigenous chickens in South Africa. South African Journal of Animal Science, 39, 1–8.

Muchadeyi, F. C. et al. (2007). Village chicken production in Zimbabwe. Tropical Animal Health and Production, 39, 1–8.

Ndegwa, J. M. et al. (2000). Village chicken production in Kenya. In: Proceedings of the Kenya Agricultural Research Institute. Nairobi: KARI.

Okeno, T. O. et al. (2012). Indigenous chicken production in Kenya. Livestock Research for Rural Development, 24, 1–12.

Olwande, P. O. et al. (2010). Village chicken production in Kenya. Livestock Research for Rural Development, 22, 1–12.

Ondwassy, H. O. et al. (2000). Village chicken production in Kenya. In: Proceedings of the Kenya Agricultural Research Institute. Nairobi: KARI.

Pedersen, C. V. (2002). Production of semi-scavenging chickens in Zimbabwe. PhD thesis, Royal Veterinary and Agricultural University, Denmark.

Pym, R. A. E. et al. (2006). The role of village chickens in food security. In: Village Poultry. Canberra: ACIAR.

Roberts, J. A. (1999). Utilization of poultry feed resources by smallholders. World's Poultry Science Journal, 55, 1–12.

Sonaiya, E. B. (1990). The context and prospects for development of smallholder rural poultry in Africa. In: CTA Seminar Proceedings. Wageningen: CTA.

Sonaiya, E. B. and Swan, S. E. J. (2004). Small-Scale Poultry Production: Technical Guide. Rome: FAO.

Swan, S. E. J. (1999). The poultry industry in Africa. World's Poultry Science Journal, 55, 1–12.

Van Veluw, K. (1987). Traditional poultry keeping in northern Ghana. ILEIA Newsletter, 3, 1–4.

Wong, J. T. et al. (2017). Smallholder poultry and food security. Global Food Security, 12, 1–8.