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Poultry Production in Africa: Present Status, Challenges, Opportunities, and Prospects

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Abstract

AFRICA'S DEMAND for meat products is rising due to the increasing human population and consumer preferences. The human population of Africa was estimated to be 1.52 billion in 2024, representing about 18% of the world's population. This paper describes the status of the African poultry subsector and highlights the industry's challenges, opportunities, and prospects. Unlike in other regions, Africa's commercial poultry production is still evolving. The contribution of Africa's poultry subsector to global production is estimated to be about 5%. Egypt and South Africa are the leading chicken meat producers, while Nigeria and Egypt are the leading egg producers. The *per capita* consumption of chicken meat and eggs in Africa is 3.8 kg and 44 eggs per person annually. African poultry farmers face many challenges, including climate change, lack of extension support, lack of access to finance, lack of market access, high feed costs, and inadequate infrastructure. The continent's dependence on imports of hybrid birds, which are less heat tolerant. Also, raw materials (e.g., wheat, maize, soybean, etc) contribute to the unsustainability of the industry. Large quantities of raw materials, subjected to customs duties and taxes, are imported at high expense, resulting in high feed costs. Therefore, there is a need to intensify farmer education, adopt strategies to alleviate heat stress, expand breeding operations and hatcheries, produce raw materials required in feed formulation, and promote further processing of poultry products. We conclude that poultry production can significantly contribute toward achieving Sustainable Development Goals, especially 1 (No poverty) and 2 (Zero hunger).

Keywords: Africa, Heat stress, Poultry products, Sustainable Development Goals.

Introduction

Africa's human population is projected to reach 2.5 billion people in 2050. Over 80% of the increase will occur in cities, with about 1.5 billion Africans living in urban areas. By 2050, about 70% of total meat and milk consumption will likely come from cities, with people living in urban areas demanding 28 and 47 additional million metric tonnes of meat and milk, respectively [1]. The proportion of people living on less than USD 1.25 per day ranges from less than 5% in North Africa to over 80% in some sub-Saharan Africa (SSA), indicating that poverty is high in Africa. About 75% of the extremely poor (destitute) live in rural areas, especially in SSA [2]. Due to its ease of keeping at minimal costs and short generation intervals, poultry is important in the livelihood of the resource-poor rural populations. Poultry is an important source of protein (eggs and meat), income, and employment.

In Africa, the poultry populations comprise mainly traditional or indigenous chickens that produce meat with a unique taste and texture [3]. About 80% of the poultry populations in Africa are found in scavenging systems. This indicates the importance of this production system to rural populations [4]. The poultry sub-sector efficiently

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utilises natural resources to provide protein (eggs and meat) to supply the increasing global demand. Poultry rearing is particularly important for smallholders and poor rural and urban populations. Poultry is produced in large-scale and intensive farms, making it one of the fastest-growing agricultural sub-sectors [5].

Poultry is important in food and nutrition security as a source of energy, protein, and essential micronutrients humans require [6]. Poultry has short generation intervals and can convert agricultural by-products and wastes into meat and eggs for human consumption. It also contributes to poverty alleviation. Poultry can be sold to meet immediate family needs, thus acting as household insurance [5]. This paper describes the present status of the poultry sub-sector in Africa and highlights the industry's challenges, opportunities, and prospects.

Global Poultry Production

The poultry sub-sector is the most important component of the livestock industry. It comprises different production levels such as feed manufacturing plants, hatcheries, breeding farms, rearing farms, processing plants (including rendering plants), and distribution channels. The poultry industry is the fastest-growing agricultural sub-sector, particularly in developing countries [7]. Chickens account for 94% of the poultry population, indicating they are the main poultry species bred globally [8]. Other species include quail and ducks in Asia, turkey in North America, and guinea fowl in Africa. Worldwide, poultry products (i.e., meat and eggs) are the main animal sources of protein in human diets [9]. The rise in human population, increased incomes, urbanisation and the growing health-conscious market influence the growth of the poultry sub-sector [7]. The global chicken population is given in Table 1 [10]. FAO [8] estimated the world's chicken population in 2020 to be 33 billion, and 25.8 billion in 2021 [11] and 26.56 billion in 2022 [12].

The global poultry market was projected to rise by 4.1% between 2021 and 2025, producing 100.9 million metric tonnes. Exports are anticipated to reach 13.4 million tonnes, with Brazil, the US, and China leading the way [13]. At a compound annual growth rate (CAGR) of 10.1%, the world's poultry industry was projected to increase from USD 318.58 billion in 2021 to USD 350.87 billion in 2022. The market is estimated to expand at a CAGR of 8.9% to reach USD 493.21 billion in 2026 [13].

Poultry meat production

The global share of meat types has changed significantly in the past 50 years. In 1961, poultry meat accounted for only 12% of global meat production and 35% in 2013. The world's poultry meat production increased more than 13-fold from 1961 to 2014 [14]. Global poultry meat is expected to account for 41% of all the protein from meat sources in 2030 [15], making it the most consumed animal meat type. Beef, pig meat, and sheep meat account for 20%, 34% and 5% of the global share of meat production, respectively. This advantage indicates a shift in meat consumption towards poultry because it is cheap and safe compared to other meat types. In lower-income developing countries, this shift shows that poultry meat is lower in price than other meats, while in high-income countries, this indicates an increased preference for white meats, which are more convenient to prepare and present a healthier food choice [15].

Table 2 shows that the Americas is the largest producer of poultry meat, followed by Asia, Europe, and Africa. However, Africa accounts for only 5% of global poultry meat production. The United States (US) is the world's largest producer of poultry meat, followed by China and Brazil. Africa's average *per capita* meat consumption was 9.6 kg/person/year between 2021 and 2023 [10]. Figure 1 shows that the lowest meat consumption *per capita* was observed in Africa compared to other regions. Consumers are more attracted to poultry meat than other meats because of its lower price, product consistency and adaptability, and higher protein/lower fat content [15]. In 2024, the *per capita* consumption of chicken meat in Africa was 3.8 kg yearly [10]. This shows that chicken meat consumption in Africa is low compared to other regions and falls below the world's average meat consumption value of 28.1 kg/person for 2021-2023.

Egg production

In 2022, world hen egg production was 86 million tonnes, a decline of about one percent compared with 2020. Asia was the main egg-producing region, accounting for 62.5% of the global production, followed by the Americas, Europe, Africa, and Oceania with 20.4%, 12.2%, 4.6% and 0.4%, respectively [16]. Egg production from China accounted for 35% of the total eggs produced globally, making it a leader in hen eggs. The other main egg producers include the US, India, Indonesia, Brazil, Mexico, Japan, and the Russian Federation [16]. From 2018 to 2019, global egg production increased by approximately 2%. [21] attributed the low performance of Africa's poultry industry to the inefficient scavenging system predominant in rural areas. Family poultry accounts for about 60% of the total poultry in SSA, with indigenous chickens comprising about 70% of the total chicken population [22].

Poultry Production in Africa

Livestock is a source of livelihood and nutrition for millions of smallholders in Africa [23]. In most parts of Africa, poultry production is practised at the household level, with no or minimal costs [24].

According to Statista [25], chickens led the livestock populations in Africa with about 2.1 billion heads in 2020. These are followed by goats, sheep, and cattle with about 490 million, 420 million, and 370 million heads, respectively [25].

Generally, two main poultry production systems exist. These are family poultry and commercial production. The family poultry system in Africa holds more chickens than the commercial system. This makes family poultry the most important production system, especially for the rural populace who depend on family poultry for the supply of high-quality proteins (meat and eggs) and as a source of income. However, Gelli *et al*. [26] argued that the traditional poultry production systems present health and nutrition risks, as poultry that scavenges for feed in the household compounds may increase children's exposure to livestock-related pathogens. About 80% of poultry meat and egg production in Africa is realised in 10 countries, with leaders being Egypt and Nigeria, respectively. According to Vermooij *et al*. [27], Africa accounts for 5% of global poultry meat and 5% of the world's egg production.

Chicken meat and egg production

In descending order, Africa's leading chicken meat-producing countries include Egypt, South Africa, Morocco, Nigeria, Algeria, Tunisia, Burkina Faso, Malawi, Mozambique, and Senegal [16]. As mentioned earlier, Africa produces about 5% of the world's poultry meat [16, 28. Figure 2 shows that Egypt produced about 2.523 million tonnes of poultry meat in 2022, thus making it Africa's largest producer. It is followed by South Africa, Morocco, Nigeria, and Algeria with 1.951 million tonnes, 525 000 tonnes, 355 000 tonnes, and 275 000 tonnes, respectively.

As with poultry meat, Africa accounts for about 5% of global egg production. Africa's small contribution to global egg production could be because most of the eggs in SSA are produced in backyard farms with no biosecurity and limited market viability. It is projected that production will be more intensive in the next 20 years, resulting in about a 15% expansion in production. The five largest producers of eggs in SSA in descending order are Nigeria, Egypt, South Africa, Morocco, and Algeria [16, 29].

Poultry Production Systems

Poultry production systems are categorised into three systems: village or backyard (also referred to as family poultry), commercial, and industrial. Table 4 presents these three production systems [30]. The classification by FAO is mainly based on the biosecurity levels, confinement of the birds, types of sheds (conventional *vs.* environment-controlled houses), and location of the farms. Each system varies according to inputs employed, outputs, gender dimensions, poultry health and welfare, and environmental impacts [31]. In this review, the poultry production system is broadly categorised into family poultry and commercial systems, with family poultry being the most predominant across Africa. Family poultry is defined as small-scale poultry keeping by households using family labour and, wherever possible, locally available feed resources [32].

a). Family poultry

Family poultry accounts for 80% of the poultry stocks in many African countries [33, 34]. Family poultry generates about 19-50% of rural family income and accounts for about 98% of poultry products consumed in the rural areas of developing countries [33]. According to Guéye [35], over 85% of rural families in SSA keep one or more other poultry species. Family poultry is kept by families in the backyards and is cared for by family members, particularly women and children. Family poultry is reared using family labour, and children and women (who often own and care for the family flocks) are the major beneficiaries. Moreki *et al*. [36] reported that 98% of family chicken rearers in the North East district of Botswana were women.

Family poultry is seldom provided shelter, resulting in birds being exposed to inclement weather, predation, and theft [37]. They roam the village surrounds searching for feed, indicating that they derive their nutrition from scavenging with limited supplementation. Talaki *et al.* [37] reported that the major constituents of feed were cereals, particularly maize (95.09%), millet (43.71%), leftovers (35.32%) and sorghum (34.49%). The use of modern medicine in this production system is low, resulting in the wide use of traditional remedies against diseases and parasites [37]. The mortality rate is high due to a lack of housing, inadequate feeding, and a lack of health management.

Multiple roles of family poultry

Family poultry and their eggs are sold to generate income, indicating that they play important socio-economic roles in the livelihood of rural families. In addition, chicken meat and eggs provide high-quality protein, vitamins, and minerals [38]. Chickens are often considered a source of petty cash for families, as they can be sold to solve immediate family needs such as buying medicines, educational materials, school uniforms, and groceries. In addition, chickens are used for barter [31] and in traditional ceremonies or healing rituals. The multiple roles played by family chickens are summarised in Table 5.

b). Commercial poultry production

The commercial production system uses high-yielding birds, high-quality compound feeds, and housing is provided to confine the birds permanently. High levels of biosecurity are employed. Based on

the commitment of high levels of inputs, it is referred to as a high-input-high-output system. Intensive poultry production generates greenhouse gases (GHGs), contributing to global warming. According to Dunkley [43], GHGs of concern are carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons, and sulphur hexafluoride, with N2O and CH4 being GHGs of primary concern in agriculture. The breakdown of organic compounds under anaerobic conditions in the soil leads to the emission of CH4. These anaerobic conditions occur in the soil, in stored manure, during enteric fermentation (particularly in ruminants), or in incomplete combustion of organic matter. Much of the CO_2 equivalent (CO_2e) that the poultry industry generates results primarily from the farms' use of fossil fuels. In animal agriculture, feed consumption results in carbon being divided into animal biomass (meat and eggs), CO_2 respired by animals, and faecal deposition of carbon in manure [43].

For chicken meat, feed production contributes 78% of GHG emissions, followed by direct on-farm energy use (8%), post-farm processing and transportation of meat (7%), and manure storage and/or processing (6%). In egg production, feed production, direct on-farm energy, post-farm processing and transport of meat, and manure storage and processing contribute 69%, 4%, 4%, and 20% of emissions, respectively.

As shown in Figure 3, the transmission and evolution of diseases through several mechanisms can be directly influenced by the level of intensification. Intensification refers to the various processes by which livestock production and trade systems can improve the overall outputs (*i.e.*, the amount of meat and eggs produced) per unit of input [44]. Usually, intensification entails increased stocking densities, using specialised breeds/strains and high-quality feeds to increase conversion ratios, rapid production cycles, and synchronous all-in/all-out production.

Higher stocking densities contribute to higher contact rates between individual birds, leading to the rapid spread of diseases. Stefanetti *et al.* [45] observed that the rearing systems affect the animals' immune response and welfare. Compared to more extensive systems, the all-in/all-out rearing system deleteriously affects natural resistance genes in host populations. This led Gilbert *et al.* [46] to conclude that the de-industrialisation of most intensive production systems in high-income countries and sustainable intensifications in low-income countries may lead to the nutritional and livelihood benefits of livestock production being less affected by its negative impacts on human health and the ecosystem.

Marketing of poultry and poultry products

The demand for meat products in Africa is rising due to expanding populations, consumer power [47], and the growth of the health-conscious market. Recently, egg and chicken meat consumption has significantly expanded across the continent [48]. It has been observed that food security analyses frequently assume that food scarcity emanates from a lack of production or supply [49]. Nevertheless, individuals consume what is readily available, reasonably priced, and with which they are comfortable. Nkukwana [9] stated that food costs in low-income households influence the individuals' purchasing decisions, suggesting that choosing a steak menu or buying red meat makes them uncomfortable about using up a lot of their limited funds.

Across Africa, the consumption of poultry products is high during festivals, celebrations, and religious ceremonies [50]. According to Afolabi [51], the slaughter of domestic chickens occurs during celebrations in the rural areas of Niger. Similarly, Kulla *et al.* [52] observed that demand for poultry meat and eggs increases during funerals and religious events. In Senegal, most farmers sell mainly birds to family members and close neighbours [53]. In Senegal and Burkina Faso, chickens are employed as sacrifices, with roosters frequently used in Ghana [54]. According to Traore [53], eggs produced in rural areas are used mainly for procreation rather than human consumption. Birhanu *et al.* [55] in Nigeria observed that the live chicken market was more popular among smallholder producers than the eggs. This may be due to low egg output, resulting in smallholder farmers prioritising the production of chicks from local breeds over egg consumption. On average, Nigerian smallholder farmers who kept superior breeds sold higher numbers of live chickens than those who reared low-quality local breeds [55]. Asante-Addo and Weible [56] observed that most African customers favour regional and home-grown poultry breeds over hybrids.

Poultry products are a significant source of income [54]. Atuahene *et al.* [57] and Ragasa *et al.* [58] stated that food safety, nutrition, and health influence the demand for the chicken meat market. Asante-Addo and Weible [56] reported that customers believe local chicken meat is fresh, hormone and antibiotic-free compared to hybrids. A study by Atuahene *et al.* [57] on the food-buyer demand and readiness in Accra (Ghana) reported that consumers were willing to spend more money on chicken meat approved by a food safety management system. Previous studies reported that consumers preferred chicken meat that had received hazard analysis critical control points (HACCP) certification and was free of antibiotic residue [57, 59]. The study by Mtolo *et al.* [60] concluded that the safety of chicken meat can affect customers' purchasing

behaviour. In another study, Ragasa *et al*. [61] found that about 50% of chicken meat buyers cared about health and safety and were prepared to pay a 15% premium for chicken meat products.

Marketing actors

i). Live chicken aggregators or collectors

Birhanu *et al*. [55] in Nigeria reported that aggregators or collectors purchased live chickens and eggs from smallholder farmers at the farm gate price and resold them to merchants in major marketplaces. The aggregators travel to villages to buy eggs or chicks directly from smallholder farmers who keep family chickens. According to Bah and Gajigo [62], collectors facilitate the movement of goods from rural areas to urban markets.

ii) Live chicken wholesalers and retailers

Wholesalers and retailers are also significant players in the marketing of live chickens. Wholesalers act as middlemen in Zambia by buying live chickens from vendors and distributing them in large quantities to customers or other businesses, such as restaurants, processors, and individual consumers [63]. In Bangladesh, Rahman *et al*. [64] reported that retailers purchase live broiler chickens from producers or merchants, such as wholesalers or aggregators, and sell them directly to customers. Despite their interconnected or overlapping functions, each actor in the value chain serves a crucial role. According to Birhanu *et al.* [55], the number of chickens purchased is influenced by the type of chickens and suppliers.

The study by Onumah and Selorm [65] in Ghana reported that the main and second most significant challenges were a lack of access to greater marketing possibilities and lower market prices. The authors observed that markets for live chickens and eggs for most small-scale farmers were insufficient. This resulted in farmers offering their goods at lower prices because of limited market opportunities. Birhanu *et al*. [55] in Nigeria reported that most farmers believed the live chicken and egg prices in the neighbourhood markets were lower than farmers had expected. In Ghana, Kwadzo *et al.* [66] found that the cost of meat influences customers' preference to buy broiler meat. This result is consistent with Makanyeza and Du Toit [67] and Boimah and Weible [68] in Zimbabwe and Senegal, respectively, who reported that the price was a factor in consumers' decisions to buy imported poultry meat.

The existence of market-related issues emphasises the requirement for combining market interventions with production and productivity-enhancing actions [69]. A study by Nkgadima *et al.* [70] in South Africa that analysed the impact of import tariff adjustments on domestic poultry production reported that hiking import tariffs is not a proper intervention to solve poultry industry challenges. In another study, it was observed that if there is a more promising market for products, production, and gains in productivity could lead to favourable economic and social outcomes [66]. The authors opined that farmers' profits from keeping superior breeds would be realised if a market for the products existed because of greater investment and input costs associated with the enhanced breeds. Therefore, governments in developing countries should develop appropriate systems to ensure that the pricing of agricultural products is fair [71].

Imports and Exports of Poultry Products in Africa

Imports

The cheap chicken meat imports from the European Union (EU), the US and Brazil have received attention in public arguments regarding trade liberalisation, food security, and poverty [73]. Chicken meat imports have long been perceived to harm the domestic poultry industry and risk-averse smallholder farmers [74]. As a result, several African countries, including Nigeria and Senegal, have implemented trade safeguards by increasing import tariffs or imposing restrictions on chicken meat imports [68]. Under the Economic Partnership Agreements (EPA) signed by several countries in Africa and the EU, increasing import tariffs is not always permissible; nevertheless, in some countries, the EPA does not cover chicken tariffs. Import bans are not allowed and are against World Trade Organization (WTO) rules, though some exceptions may apply in certain circumstances. For example, in response to an avian influenza outbreak, Ghana temporarily banned imports of poultry products from the Netherlands, Germany, Russia, Denmark, and the United Kingdom [73]. Import restrictions on chicken products have gained popularity among policy-makers to safeguard local production, stop the spread of livestock diseases, and boost self-sufficiency [74].

Ghana is West Africa's largest importer of poultry meat. The country imported 261 million tonnes of poultry meat in 2019 [56]. With 185.5 thousand metric tonnes imported from the EU in 2019, Ghana was the major importer of poultry meat from the EU [75]. Although Ghana imposed the 35% Common External Tariff (CET) of the Economic Community of West African States (ECOWAS) on poultry meat imports in 2015, import levels remained high [76]. While Senegal and Nigeria prohibit the importation of poultry and their products, Senegal also imposes higher taxes on some food products [77, 78].

South Africa was the 15th largest world importer of poultry meat in 2020, importing poultry meat worth USD 304M. In descending order, the top five countries that export poultry meat to South Africa are Brazil (USD 119M), the United States (USD 60.3M), Ireland (USD 35M), Spain (USD 28.6M), and

Argentina (USD 20.7M. Between 2019 and 2020, the fastest-growing exporters of poultry meat to South Africa were Spain (USD 9.19M), The Netherlands (USD 6.82M), and Ireland (USD 3.78M) [79].

Following the 2017-2018 HPAI outbreak in the EU, South Africa banned poultry products from the UK [80]. However, in 2018 and 2019, the UK provided occasional and modest supplies of raw goods, including frozen bone-in pieces. In October and December 2020, the imports of raw poultry from the UK were 190 and 25 tonnes, respectively.

Angola was the 38th largest global poultry meat importer in 2020, and poultry meat was the fourth-most-imported good that year. During this period, poultry meat worth USD 162M was imported from Europe and America. The main exporters of poultry meat to Angola were the US (USD 81.7M), Brazil (USD 42M), the United Kingdom (USD 11.3M), Turkey (USD 5.34M), and Argentina (USD 3.94M) [79]. Between 2019 and 2020**,** Poland (USD 2.66M), Ukraine (USD 1.75M), and The Netherlands (USD434k) experienced the largest growth in poultry meat exports to Angola. According to OEC [79], the countries with the highest import taxes for poultry meat with the most favourable national duty rate treatment of 10% are Benin, Botswana, Burkina Faso, Burundi, and the Central African Republic.

In their desire to develop poultry industries, Botswana, Namibia, and Zambia have adopted policies to protect and support their industries. The protection limits competition, resulting in possibly higher costs to consumers in the short term [81]. In Botswana, egg and poultry meat imports are regulated under Statutory Instrument No. 29 of 1984 [82]. Statutory Instrument No. 29 states that "no person shall import eggs or poultry meat except under a written permit issued by the Minister of Agriculture or by a person authorised by him on their behalf". Statutory Instrument further states that a person may, without a permit, import for consumption by himself or his immediate family, not more than 36 eggs and 5 kg of poultry meat at any one time. The importation of pullets, day-old chicks and hatching eggs is also restricted. In addition, Botswana has a trade restriction on feed importation as producers must purchase at least 70% of their feed locally and import the remaining 30% [82]. Similarly, the African Competition Forum [81] reported that importers of poultry products, day-old chicks, fertile eggs and feed are required to apply for an import permit in Zambia. In addition, farmers are protected as there is a floor price for the maize.

The Namibian government has employed the Import and Export Control Act No. 30 of 1994 to impose restrictions through a quota system to control the imports of poultry meat products monthly. This is meant to protect its infant industry against cheap imports. In addition, a temporary quantitative chicken meat import restriction was implemented on 1st May 2013. This restriction is per Article 8 of the Southern African Customs Union (SACU) Agreement on Infant Industry Protection, which allows for the protection of an infant industry for 8 years [81].

Angola became the 187th largest world importer of eggs in 2020 after allowing eggs worth USD 34.2k to enter the country. Namibia (USD 29.2k), France (USD 4.83k), South Africa (USD 62k), Brazil (USD 48k), and Portugal (USD 27k) were the main exporters of eggs to Angola. During 2019 and 2020, France's exports of eggs (USD 4.83k) to Angola were the fastest-growing [79].

In 2020, South Africa was the 133rd largest importer of eggs worldwide, with eggs worth USD 626k imported [79]. The major exporters of eggs to South Africa were the US (USD 608k), China (USD 14k), Germany (USD 3.7k), Brazil (USD 522k), and Chinese Taipei (USD 44k). Between 2019 and 2020, the fastest-growing import markets for eggs into the South African market were the US (USD 583k), China (USD 9.22k), and Germany (USD 3.7k).

As the 154th largest egg importer in the world in 2020, Ghana imported eggs worth USD 327k. Eggs were imported from The Netherlands (USD 250k), Belgium (USD 45.6k), Turkey (USD 19.6k), Hungary (USD 9.29k), and India (USD 2.65k). Between 2019 and 2020, The Netherlands (USD 116k), Turkey (USD 13.6k), and Hungary (USD 9.29k) had the fastest-growing egg import markets for Ghana [79].

Exports

In 2020, South Africa was the 30th largest world exporter of poultry meat with exports of USD 72.1M. The top poultry meat export destinations for South African poultry meat were Lesotho (USD 28.8M), Mozambique (USD 23.4M), Namibia (USD 9.92M), Botswana (USD 3.25M), and the United Arab Emirates (USD 1.76M). Between 2019 and 2020, Namibia (USD 2,69M), Lesotho (USD 1.16M), and Comoros (USD 253K) were South Africa's fastest-growing export destinations for poultry meat [79]. During the same period, the exports of broiler chickens were 50 099 tonnes. However, 48 997 tonnes were exported in 2021, a decrease of 56 tonnes (11.7%) from 2020 levels. Lesotho received most of these exports (57.0%) estimated at 27 936 tonnes. In 2021, Namibia took 18.9%, Mozambique (8%), Botswana (7.3%), and Eswatini (5.1%) of South African broiler exports. Angola's poultry meat trade balance in 2020 exports accounted for USD 253k, imports USD162M translating to USD 162M net trade. The main exporting competitors for Angola in 2020 were Brazil (USD 5.59B), the US (USD 3.93B), and Poland (USD 2.61B) [79].

South Africa was also the 32nd largest global egg exporter with USD20.5M in 2020. The major importers of eggs from South Africa were Mozambique (USD13.5M), Eswatini (USD 5.02M), Botswana (USD 904k), Nigeria (USD 895k), and Namibia (USD 64.7k). Between 2019 and 2020, Nigeria (USD 264k), Botswana (USD 62.4k), and Malawi (USD 28.3k) had the fastest growth rates for South African egg exports [79]. Ghana exported USD 18.4 million in eggs in 2020, ranking as the world's 110th largest exporter of eggs. The top three export destinations for eggs from Ghana are Togo (USD 17.8k), Switzerland (USD 552k), and the United Arab Emirates (USD 38k) [[79].

In descending order, SSA's major wheat producing countries are Ethiopia, South Africa, Sudan, Kenya, Tanzania, Nigeria, Zimbabwe and Zambia. Ethiopia has the largest production area of 1.7 Mha followed by South Africa with 0.5 Mha [83]. The primary input cost for the poultry industry is feed, which is manufactured using processed maize, soya, and supplements [84]. In Africa, the poultry feed market is classified according to bird type (layer, broiler, turkey, and others), type of raw materials (e.g., cereals, soybean, oilseed meal, molasses, and fish meal, carcass meal, blood meal, etc.), and geography (Egypt, South Africa, Algeria, Nigeria, Ethiopia, Morocco, and the rest of Africa). In the next four years, the African poultry feed market is projected to grow by 4% annually [85]. Even though Southern Africa can increase production of the main inputs, this region remains a net importer of poultry and key inputs such as oilcakes required to produce poultry feed [84]. According to the international trade database, Zambia's exports of oilcakes and solid residues to Malawi were worth USD 291.94k in 2021 [86].

Compound feed is not imported into South Africa, however, some feed ingredients are imported from other countries. South Africa is a minor player in the export market for soybean oilcakes [87]. Fishmeal has not been imported into South Africa for 10 years [88].

Challenges in Poultry Production

As shown in Table 6, the African poultry industry faces many challenges categorised broadly as extension, financial, market, and infrastructure-related. These challenges contribute to the industry becoming unsustainable. The industry's dependence on imports of hybrid birds and raw materials renders it unsustainable. Five African countries with a well-developed poultry industry include Nigeria, South Africa, Egypt, Morocco, and Tunisia. Most African countries do not have enough breeding stock to sustain egg and broiler industries; hence, they depend on imports from developed countries.

Large volumes of raw materials such as wheat, maize, and soybeans, subject to customs duties and taxes, are imported at high expense, resulting in high feed costs. Feed costs account for 75% of the production costs, making it the largest cost [9]. For the industry to be sustainable, increased investments in breeding operations are needed, and African governments must encourage local production of raw materials.

Lack of technical support to farmers by government extension services and non-governmental organisations contributes to high bird mortalities and low productivity levels. Tabler *et al.* [89] reported that poultry farmers across East Africa could not control poultry diseases because of the high cost of vaccines, lack of vaccines and knowledge of diseases and management. Previous studies reported a high rate of disease and pest attacks, which could be attributable to the inadequacy of extension services, especially to small-scale farmers [92, 94]. Compared to commercial poultry production, family poultry does not usually receive extension support. In South Africa, Nkukwana [9] reported a lack of collaboration between value chain actors and innovative ways to articulate concerns from producers and consumers to policymakers as barriers to technology adoption. Similarly, GIZ [108] reported that value chain actors in Cameroon were not organised, leading to low productivity.

Another challenge in poultry production is high veterinary costs owing to the poor sanitary environment and mistakes in breeding techniques. Highly Pathogenic Avian Influenza (HPAI) and Newcastle disease are a major threat to Africa's poultry industry. FAO [30] reported that the outbreak of HPAI in Egypt in 2006 resulted in the culling of over 40 million birds. Furthermore, the HPAI outbreak resulted in customers avoiding poultry and meat products, resulting in the government imposing regulations on family-run, small-scale poultry production facilities on balconies, rooftops, and backyards, and the closure of live bird marketplaces. This also resulted in movement restrictions being imposed, which affected the sale and distribution of poultry and poultry products. The Low Pathogenic Avian Influenza subtype H9N2 virus outbreaks in January 2016 in Morocco resulted in a 10% reduction in broiler production [98].

A lack of slaughter facilities poses a major challenge in broiler production in most African countries, implying that poultry meat is processed under unhygienic conditions, thus raising food safety concerns. Hassan *et al.* [98] in Morocco reported that over 85% of the national poultry meat production was processed outside the industrial facilities [98]. Similarly, Moreki [96] in Botswana reported a lack of slaughter facilities and refrigerated transport as major challenges in small-scale broiler operations. Other challenges included low prices offered by chain stores, high feed costs, high chick mortality, high utility costs, and lack of services.

The study by Kusi *et al*. [103] reported that managerial challenges limited poultry development in Ghana. These include difficulty in serving the target market, lack of employee training and development, lack of management experience, inadequate training in stock management and people management, lack of training in business skills and marketing, high employee staff turnover, and inability to attract and retain suitable employees. These challenges point mainly to the inadequacy of extension support (Table 6).

Opportunities

Various opportunities are available to poultry farmers in Africa, which include the following:

- The existence of a vast market within the continent should encourage investments in poultry production as per Commitment No. 5 (Boosting Intra-African Trade in Agricultural Commodities and Services) of the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods.
- Production of further processed poultry products, e.g., pre-cooked meat products, liquid and powdered eggs, and franchise products.
- The expansion of breeding and hatchery facilities to meet the continent's hatching egg and chick requirements for both broiler and layer chickens.
- Further diversification of the poultry sub-sector away from chickens to include guinea fowl, quail, ducks and turkey.

Prospects

The supply of raw materials, equipment, medication, and vaccines is inadequate, thus making the prospects of producing these on the African continent feasible. The market is vast across Africa; hence the need to expand the rearing, breeding and hatchery facilities.

Conclusion

Although commercial poultry production in Africa is growing faster than in other regions, family poultry production still predominates. This is because family poultry is produced cheaply using family labour and limited resources compared to commercial poultry, which requires high levels of inputs. Challenges that impede the development of the poultry industry in Africa include lack of disease control due to the high cost of vaccines, dependence on imports for hybrid birds, inadequate supply of raw materials required to formulate feeds, inadequate breeding stock, inadequate technical support to emerging farmers, lack of access to finance, lack of access to markets, and high cost of raw materials. For the industry to grow, African governments should consider promoting the production of raw materials locally, expanding breeding, hatching and rearing facilities, and intensifying the training of extension staff and farmers in poultry production.

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Declaration of Conflict of Interest

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TABLE 1. Number of chickens in the world (1000 head)

Region	2018	2019
Asia	15,454,349 (60.81)	15,939,266 (63.24)
America	5,799,513 (22.82)	5,962,549 (23.67)
Africa	1,998,865 (7.87)	2,042,603 (8.11)
Europe	2,025,942 (7.97)	2,020,248 (8.02)
Oceania	137,766 (0.54)	150,658 (0.60)
World	**25,414,434**	**25,195,318**

Values in brackets are percentages
Source: [10]

TABLE 2. World's chicken meat production (thousand tonnes) from 2018 to 2022

Category	2018	2019	2020	2021	2022
Africa	5748	6207	6378	7251	7810
Americas	48 363	47 993	48 451	50 176	49 575
Asia	40 036	42 812	43 491	43 127	44 525
Europe	18 649	19 481	19 685	19 479	20 084
Oceania	1470	1524	1499	1555	1637
World	**114 267**	**118 017**	**119 505**	**121 588**	**123 631**

Source: [16-20]

TABLE 3. World's hen egg production (thousand tonnes) from 2018 to 2022

Category	2018	2019	2020	2021	2022
Africa	3 480.9	3 790.0	4 014.3	3 930.4	4 007.5(4.6)
Americas	16 853.4	17 256.3	17 638.5	17 741.4	17 540.2(20.2)
Asia	48 782.0	51 689.0	54 172.5	54 172.4	54 386.5(62.5)
Europe	10 925.5	10 987.9	10 985.0	10 912.3	10 756.8(12.4)
Oceania	344.1	343.9	332.1	360.3	308.6(0.4)
World	**80 385.9**	**84 067.1**	**87 142.4**	**87 116.8**	**86 999.6**

Source: [16]

TABLE 4. FAO classification of poultry production systems

Sectors	**Poultry production systems**			
FAO definition	**Industrial and Integrated**	**Commercial**		
		Biosecurity		
		High	**Low**	
	Sector 1	**Sector 2**	**Sector 3**	**Sector 4**
Biosecurity	High	Mod-High	Low	Low
Market outlets	Export and urban	Urban/rural	Live urban/rural	Rural/urban
Dependent on markets for inputs	High	High	High	Low
Dependent on good roads	High	High	High	Low
Location	Near capital and major cities	Near capital and major cities	Smaller towns and rural areas	Everywhere. Dominates in rural areas
Bird kept	Indoors	Indoors	Indoors/part-time outdoors	Outmost of the day
Shed	Closed	Closed	Closed/open	Open
Contact with other birds	None	None	Yes	Yes
Contact with ducks	None	None	Yes	Yes
Contact with other domestic birds	None	None	Yes	Yes
Contact with wildlife	None	None	Yes	Yes
Veterinary service	Own veterinarian	Pays for veterinary services	Pays for veterinary services	Irregular, depends on government veterinary service
Source of medicine and vaccine	Market	Market	Market	Government and market
Source of technical information	Company and associates	Sellers of inputs	Sellers of inputs	Government extension service
Source of finance	Banks and own	Banks and own	Banks and private	Private and banks
Breed of poultry	Commercial	Commercial	Commercial	Native
Food security of owner	High	Ok	Ok	From ok to bad

Sector 1: Industrial integrated system with a high level of biosecurity and birds/products marketed commercially (e.g., Farms that are part of an integrated broiler production enterprise with clearly defined and implemented standard operating procedures for biosecurity)
Sector 2: Commercial poultry production system with moderate to high biosecurity and birds/products usually marketed commercially (e.g., farms with birds kept indoors continuously; strictly preventing contact with other poultry or wildlife).
Sector 3: Commercial poultry production system with low to minimal biosecurity and birds/products entering live bird market (e.g., a caged layer farm with birds in open sheds; a farm with poultry spending time outside the shed; a farm producing chickens and waterfowl).
Sector 4: Village or backyard production with animal biosecurity and birds/products consumed locally.
Source: [27]

TABLE 5. Multiple roles played by family poultry

Product	Roles	Country	References
Eggs*	Hatching	Ethiopia, Botswana	[39, 40]
	Source of income	Ethiopia, Nigeria	[39, 41]
	Family consumption	Ethiopia, Botswana	[36,39,40,42]
Birds	Source of income	Ethiopia	[39, 41]
	Replacement stock	Ethiopia	[39]
	Family consumption	Ethiopia, Botswana	[31,41,42]
	Honour guests	Botswana	[31,40
	Traditional healing rituals	Nigeria	[41]
	Provide a sanitation service	Botswana	[31]

TABLE 6. A summary of challenges in the African poultry sub-sector

Challenges	References
Climate change, e.g., drought	[52,85,86]
High rate of disease and pest attacks	[9,30,90,91,93]
Lack of technical knowledge on the processing of poultry products	[91,95
High mortality rate	[91,96]
High cost of production, e.g., feed, chicks, pullets, medicines	[91,92,97,99, 104
High cost of equipment	[99]
Inadequate supply of one-day-old chicks	[92,100,104]
Inadequate supply of compound feeds	[[94,104]
Supply of poor-quality chicks/stock	[91, 101]
Supply of poor-quality feeds and breeding stock	[98]
Inadequate extension services and ineffective extension network	[91,102]
Inadequate access to veterinary services	[91,95,99,103,104]
Delayed allocation of land	[29,101,102]
High price of raw materials for feed production	[29,101,103]
Poor quality raw materials for the manufacture of feeds	[102]
Lack of slaughter facilities for small-scale broiler producers	[98,102]
Lack of close cooperation between industry actors, e.g., farmers, input sellers, etc.	[9,98]
Lack of access to credit;	[90,94,95,97,99]
Lack of market access	[104]
Weak marketing infrastructure.	[100, 104]
Poor local genetic breeds	[94]
Dependence on day-old chick imports	[94]
Imports of cheap poultry products from the USA, Europe and Brazil	[93,104
Insufficient financial resources	[103]
Lack of technical support from suppliers of hybrid chickens	[105]
Inadequate supply of locally produced feed ingredients to formulate low-cost feeds	[95]
Poor processing and marketing infrastructure	[95,106]
Inadequate supply of electrical power	[106]
Inadequate safety and security of poultry meat	[106]
Weak transportation infrastructure	[106]
Lack of effective packaging, branding, marketing, and certification of meat	[106]
Fluctuating prices of raw materials	[106]
Poor access to quality inputs	[106]
Low adoption of technology	[106]
Unskilled labour force	106]
Theft	[91,107]
Lack of cold chain	[104]
Laboratories for testing and quality control	[104
Heat stress	[29]
Inadequacy of breeding stock	[29,104]
Poor access to finance	[104]
High cost of utilities, e.g., water and electricity	[104]
Lack of enforcement of existing laws and regulations	[104]

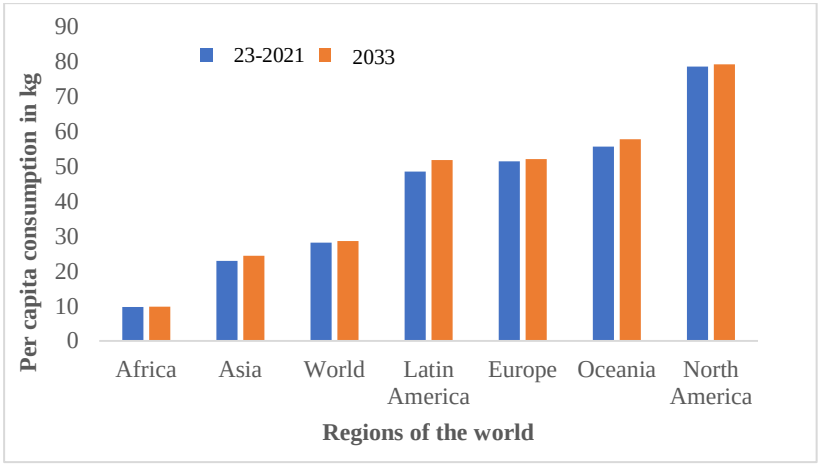

Fig. 1. ***Per capita*** **consumption of meat worldwide from 2018 to 2020, with a forecast for 2033, by region** [10]

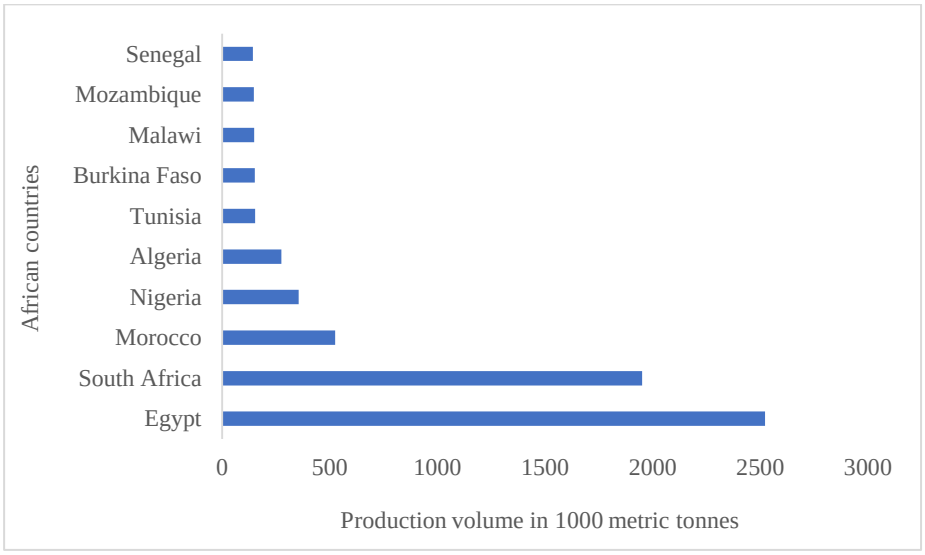

Fig. 2. Production volume of chicken meat in 10 countries [16]

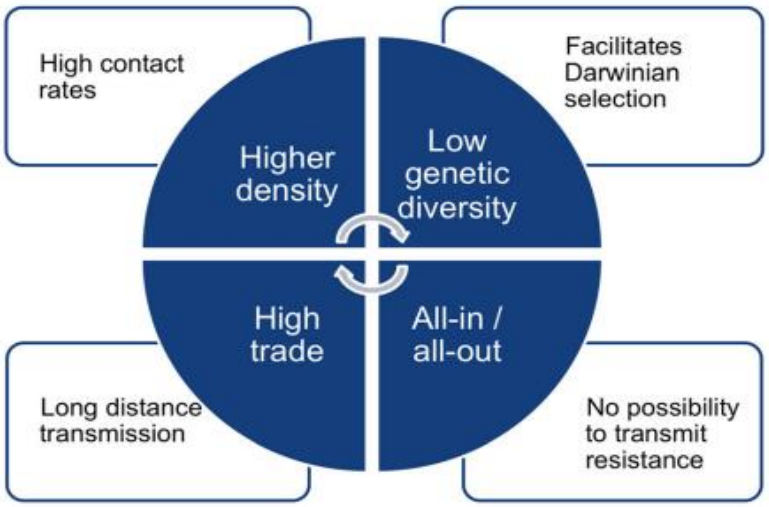

Fig. 3. Characteristics of intensifying livestock production systems and their consequences on the spread and evolution of emerging infectious diseases [46]

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