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Quail Production Systems, Prospects and Constraints in Ghana

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Abstract— This study was undertaken to assess the production systems, prospects and challenges of quail farming in three (3) ecological zones (Rainforest, Transitional and Guinea Savannah) in Ghana. Sixty (60) quail farmers were purposefully sampled for the study using the snowball sampling technique. Data were gathered through interviews with the aid of structured questionnaire and analyzed using SPSS 22.0. The results showed that more males (86.7%) than females (13.3%) were involved in quail farming in Ghana with majority (73.3%) of farmers having less than five years of experience in the business. About 50% of quail farmers had their flock sizes ranging from 501 to 2000 birds. Three (3) major breeds of quails (Japanese, American and Jumbo Giant quails) are reared in Ghana, but the most common breed is the Japanese quail due to its prolificacy and ability to tolerate the intensive colony battery cage management system for commercial egg production. Quail production was more prevalent in the ecological zones in Southern Ghana than in the Northern Guinea Savannah zone.

Keywords— **quail production prospects, ecology zones, production constraints, quail products.**

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INTRODUCTION

Ghana's economy is based primarily on agriculture, which contributes about 54 % to the Gross Domestic Product (GDP) and provides over 90 % of the food needs of the country (MOFA, 2001). According to a survey conducted by the Ministry of Food and Agriculture / Department for International Development (MOFA/DFID, 2002), about 60% of the Ghanaian labour force is engaged in agriculture (crop and livestock/poultry production) and the livestock/poultry subsector offers a 'safety net' to the country; especially the rural folks as it provides a major source of ready cash during periods of emergency needs. Although poultry and livestock populations have been persistently low over the past three decades, contributing only 7% to the agricultural Gross Domestic Products (GDP) (FASDEP, 2002; FOA, 2006).

The relatively low productive performance of poultry especially the indigenous chicken could be attributed to high losses due mainly to prevalence of diseases and predators. The exotic pure breeds of chicken on the other hand have not performed satisfactorily in the scavenging systems in the country due to their higher nutritional demand and lower disease tolerance (Blackie, 2014). In order to boost up the poultry industry and alleviate poverty and animal protein deficiency, peri-urban and rural communities need additional species of birds with a short generation interval, easy to rear with minimum capital and offer better income within a very short period.

Quail farming is said to be a short generation industry with the potentials of meeting the economic and nutritional needs of developing countries (Ojo *et al.,* 2014). There are many quail breeds under domestication but the most common one according to Priti and Satish (2014) is the Japanese quail (*Coturnix japonica*). Japanese quails are small avian species belonging to the same family (Pheasant family) as the chicken. The birds are said to be smaller than the pigeon and much smaller than the chicken (Wilkinson, 1999).

Quail production has been practiced in several nations, including Australia (since 1970) and many Asian countries like Japan and India. Quails are commonly reared for meat production in Europe and for egg production in the Far East and Asian countries (Karapetyan, 2003). Some African countries that have introduced quail farming in their poultry industry include Kenya, Uganda, Zimbabwe, Nigeria as well as Ghana. Although, quail is a novel poultry species with low awareness in Ghana compared to the traditional species such as chicken, guinea fowl or duck, limited information revealed that the climatic and environmental conditions of Ghana was very favourable for commercial production of quails (Aikins *et al*., 2019).

However, information regarding the distribution, production prospects and constraints as well as the perceived

nutritional and health values of quail products in Ghana is limited. Hence, there is the need to assess the production systems of quail farming and to evaluate perceived nutritional and medicinal values of quail products and how that influenced quail farming in Ghana.

MATERIALS AND METHODS

A. Study area

The study was conducted in three (3) agroecological zones of Ghana, namely: the Guinea Savannah, the High Rainforest and the Transitional Zones. Eight (8) regions comprising at least two from each agro-ecological zone and a total of 26 districts/municipalities/metropolises were purposefully selected for this study.

B. Sampling and Data Collection

Three (3) ecological zones, 8 administrative regions and 26 districts/municipalities/metropolises were purposefully sampled for the study. The Snowball Sampling Technique was employed in order to successfully locate respondents from each district/municipality/metropolis. Sixty (60) respondents (quail farmers/breeders) were sampled for the study which include small, medium or large-scale farmers. Data were collected from January to July 2020 with the aid of questionnaires.

C. Statistical Analysis

The data gathered from the questionnaires were organised, coded and entered in Microsoft Excel (2013) worksheet and processed. They were further summarised using descriptive statistics and then analysed with chi-squared in Statistical Package for the Social Sciences (SPSS 22.0, IBM). The results were then presented in percentages using charts and tables.

RESULTS AND DISCUSSION

Socio- Demographic Characteristics of Quail farmers

Sex and Age distribution of Respondents

Results from the survey revealed that commercial quail farming in Ghana is a male-dominant vocation as only a few women were engaged in quail rearing in the study area (Table 1). These results differ from findings obtained in Uganda (Nasaka *et al.*, 2017) and in Zimbabwe (Majoni *et al.*, 2018) where women were found to have more stakes in quail rearing than men but similar to findings obtained in selected areas of Bangladesh (Rahman *et al*, 2016) and Benin (Ekpo *et al*, 2020) where majority of quail farmers were males. The prevailing poor female participation in quail farming in Ghana could be attributed to the fact that males may have more propensity to want to venture into supplementary sources of income for livelihood and economic sustenance of their families. The demand and stress related to quail production could also be some contributory factors that may deter women from venturing into quail farming.

Although various age groups of individuals were involved in quail production in Ghana, the findings clearly indicates that majority of the farmers were either young or middle-aged adults in their economically vibrant age. This could be because young and middle-age adults are more eager likely to adventure into a novel and quicker means of income generation venture such as quail farming. Also, this group of individuals are energetic and are more likely to cope with the physical stress related to quail production. Similar findings were reported in Kenya (Muthoni, 2014) and in Benin (Ekpo *et al*., 2020).

Table 1. Sex and age of respondents

Characteristics	Frequency	Percentage (%)
Sex of respondents		
Male	8	13.3
Female	52	86.7
Total	60	100
Age in years		
21-30	6	10.0
31-40	34	56.7
41-50	11	18.3
≥ 51	9	15.0
Total	60	100

Level of education and marital status of quail farmers

All the respondents had some level of formal education, majority (85%) of whom had acquired tertiary education (Table 2). This finding was similar to data obtained by Aliyu (2016) and Muhammad-Lawal *et al*. (2017) but varied from results obtained in the Kaduna State of Nigeria (Okusaga, 2016) which indicated that 59% of small holder quail farmers had no formal education. The situation in Ghana is a positive indication as one's level of education is necessary in the adoption of new innovations, adventures and effective management of some challenges that may arise from quail production and marketing.

Table 2. Educational level, marital status, and year of establishment of quail farm.

Characteristics	Frequency	Percentage (%)
Educational status		
Basic	3	5.0
Senior High	6	10.0
Tertiary	51	85.0
Total	60	100

Flock sizes and regional distribution of quails in Ghana

The result from the study revealed that commercial quail farming in Ghana commenced in 2012 with most of the farmers having less than five years of experience in the quail business compared to Nigeria (in 1992) and other African countries (NVRI, 1994). This confirms earlier findings that quail farming is a novelty in the African continent (Moreki

and Seabo, 2012; Moreki and Radikara, 2013). However, there was an increasing trend in the number of farmers engaged in quail production, attaining the highest in 2017 but subsequently begun to decline (Table 3). Decline in the adoption rate of quail farming in Ghana could be ascribed to little awareness by most Ghanaians about quail and quail products as suggested by previous researchers (Ayim, 2019). As a result, most of the quail farmers (66.7%) are small-scale producers with a flock size of less than or equal to 1000 birds. This finding was in consonance with results obtained by Olorunfemi *et al*. (2016) who reported that majority of quail farmers were small-scale and medium-scale producers.

The result further indicated that Greater Accra region (in Southern Ghana) had the highest population of quails, representing 40% of all the quails produced in the surveyed regions (Fig. 1). With this distribution, up to 15% of respondents in the region kept a flock size of above 2000 birds per farm. Further analysis revealed that Greater Accra and Ashanti regions (both in Southern ecological zones) had quail farmers with the largest flock sizes and cutting across all the categories (ranging from less than 200 birds to above 2000 birds, Fig. 2). Even though Aikins *et al*. (2019) established that the climatic and environmental factors in the Northern Region (guinea savanna ecological zone) of Ghana are very conducive for quail farming, this research however suggests that commercial quail production is predominant in the ecological zones in Southern Ghana (High Rainforest and Transitional zones) than those in Northern Ghana. This could suggest that the southern ecological zones of Ghana are more conducive for commercial quail production. It could also be attributed to the fact that Greater Accra and Ashanti regions are cosmopolitan in nature and hence citizens may be increasingly venturing into quail production every year as a survival or coping mechanism to the high cost of living in those cities.

Table 3. Year of establishment of quail farm

When farm was established	Frequency	Percentage (%)
2012	5	8.3
2013	2	3.3
2014	4	6.7
2015	5	8.3
2016	8	13.3
2017	17	28.3
2018	10	16.7
2019	8	13.3
2020	1	1.8
Total	60	100

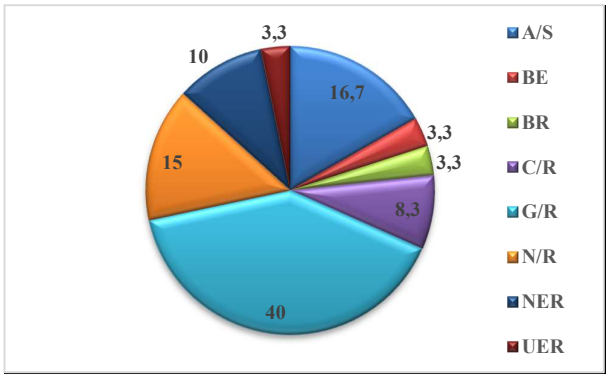

Fig.1. Regional distributions (%) of quails. Note: A/S= Ashanti region; BE= Bono East; BR= Bono region; C/R= Central region; G?R= Greater Accra region; N/R= Northern region; NER= North East region and UER= Upper East region.

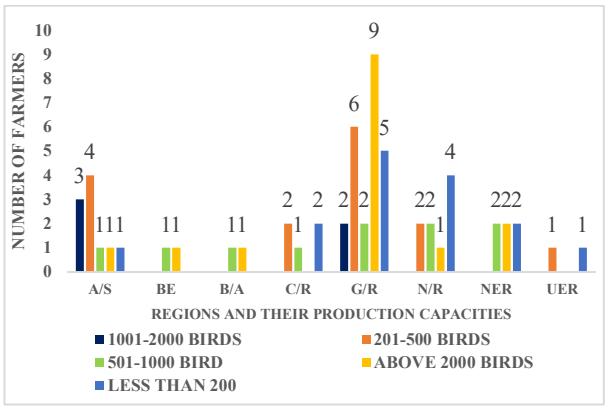

Fig.2. Regional distribution by flock size

Training and other support for quail farmers

The research further revealed that a large number of respondents never had any form of capacity building or financial support before and after adoption of the quail farming. It was for this reason that the capacity needs assessment of the respondents revealed that many of them were lacking skills related to the quail production systems and management practices. Since quail production like any other poultry business is capital intensive and only a few (1.7%) of quail farmers had some financial assistance, this might contribute negatively to the number of farmers that can start and remain in the quail production business in the country.

Production systems and management practices of quail farming

Quail housing systems

The survey confirmed that quail farming in Ghana is purely intensive with majority (88.3%) of the quail farmers using the battery cage system of housing where quails were

kept in colony cages whilst a few (6.7%) others were using the deep litter system for intensive production of quails (Table 4). The quail farmers preferred to use the battery cage housing over the deep litter system because under the cage system, management of quails is easier, dust and ammonia gas accumulation is minimal, collection of eggs is easier, feed wastage is reduced and feed utilisation efficiency is increased (Tauson, 1998; Rajendran and Mohanty, 2003).

Table 4**.** Type of quail housing and facilities

Type of housing system	Frequency	Percentage (%)
Battery cage only	53	88.3
Deep litter only	4	6.7
Battery cage and Deep litter	3	5.0
Total	60	100

Feeding and watering of quails

The result indicates that majority of quail farmers (P<0.001) in Ghana used commercial chicken feed ration (Table 5) for feeding their quails from the chick to adult stage. A few of them however used the standard commercial quail feed ration whilst the rest used homemade (home formulated) broiler/layer mash for the commercial production of quails. This finding however differs from reports obtained in other countries that seem to project homemade feed formulation and mixing as an important cost-saving mechanism among poultry farmers (Kasule *et al*., 2014). The results further revealed that a few farmers (26.7%) used the appropriate commercial quail feed (Supplied by Akropong Feeds and Stationery Limited in Kumasi) for feeding their birds. Most of the farmers used commercial chicken feed for feeding quails due to the unavailability of appropriate commercial quail feeds although some quail farmers had the notion that quails require no special diet, hence the unavailability of commercial feed was not a problem. The use of chicken rations in feeding quails by most farmers may however hamper optimum productivity of the quail since the bird requires slightly higher crude protein (CP) levels (20%) for optimum egg production compared to that required by chicken (17.43%) (Table 6) (Leeson and Summers, 2005; Cambel, 1994).

Table 5. Kinds of feed used by quail farmers in Ghana

Characteristics	Frequency	Percentage (%)	Chi-Square	P-Value
Kinds of feed			37.3	<0.001
Commercial chicken feed*	41	68.3		
Commercial quail feed*	16	26.7		
Homemade feed	3	5.0		
Total	60	100		

*Composition shown in Table 6

Table 6. Comparison of nutrient composition of commercial quail and chicken feeds used by farmers in Ghana.

Nutrient	**Starter mash (25kg)**		**Layer mash (25kg)**	
	Quail*	**Chicken****	**Quail***	**Chicken****
Protein	24.0	23.05	20.0	17.43
Phosphorus	0.45	0.43	0.46	0.5
Calcium	1.17	1.75	2.79	3.50
Lysine	1.12	0.25	1.16	0.83
Methionine	0.46	0.30	0.45	0.3
Sodium	0.25	0.25	0.25	0.25
M. E. (kcal) kg	2880	2802	2700	2700

Source: Field Survey (formulated by *Akropong Feeds and Stationery Limited, Kumasi and **Agricare Limited, Tamale).

The study further confirmed the use of non-conventional feed resources (NCFR) by some farmers for feeding quails. The use of cheap and locally available non-conventional feed resources mainly of plant origin as potential cost reduction strategies and sources of energy, protein and essential vitamins in poultry including quail production has been well established in other countries (Kasule et al., 2014; Chakrabarti *et al*., 2014; Swain *et al*., 2014). It was for these reasons that most (48.3%) of the quail farmers (compared with 37.2% obtained in Kenya; Muthoni, 2014) affirmed the use of non-conventional feed resources (NCFR) of plant origin for feeding quails. These resources were either used as feed supplements or for prevention and treatment of various quail diseases and parasites. They include bitter leaf, orange peels, mango bark, cabbage, watermelon fruits, dandelion leaves, Moringa leaves and cocoyam leaves.

The study also confirmed the use of various types of feeding and watering troughs in quail production. The types of feeding troughs used by the quail farmers include metallic

(25%), plastic (51.7%), wooden (3.3%) and others (20%) while a distribution of farmers according to the type of watering troughs used include, metallic (11.7%) and plastic (88.3%) (Plates 1 and 2.). The farmers' choices of the type and design of feeding and watering troughs were based on their availability, easiness to clean or wash and growth stage of the birds.

Fig.3. Plate 1: Metallic (extreme left) and plastic feeding troughs

Fig.4. Plate 2: Quail watering systems (troughs) of different designs

Species and breeds

This study identified three major breeds of quails reared in Ghana (Fig. 3) but the most prevalent breed reared was the Japanese quail ($P < 0.001$; $X^2 = 76.90$). The other breeds under production include the American quail and the Jumbo giant quail. Three categories of quails were reared by the farmers, namely layers, broilers and breeders. The research further revealed that majority of the farmers reared layer quails only for the main purpose of egg production whilst a few others either reared broiler quails only or breeder quails only (Table 7). Farmers preferred the Japanese quail to the other breeds because it is said to be the most appropriate and tolerable quail breed for commercial egg and meat production under the intensive system of management (Rahman *et al*., 2016). Besides, the Japanese quail is a highly prolific breed that starts laying eggs at a very early age of 6-7 weeks and can lay up to 250-300 eggs per annum while the other quails start egg laying when they are 8-10 weeks old, producing only 150-200 eggs per annum (Bakoji *et al*., 2013). It was therefore not surprising that many of the quail farmers were found keeping the Japanese quail significantly for the main objective of egg production (Table 7).

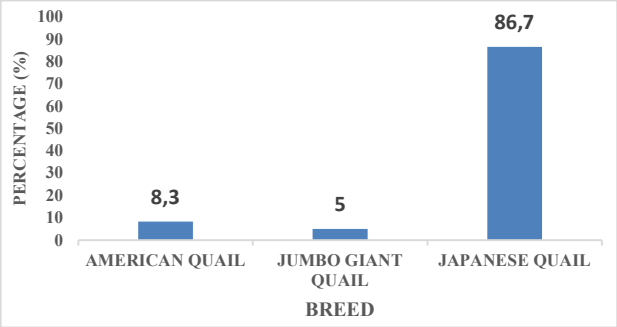

Fig.5. Quail breeds kept in Ghana

Table 7. Categories of quails kept by farmers

Category of quail	Frequency	Percentage (%)	Chi-Squared	P-Value
Layers only	37	61.7	41.17	<0.001
Broilers only	4	6.6		
Breeders only	9	15.0		
All the above	10	16.7		
Total	60	100		

Quail Egg Production

The survey revealed that a high proportion (70%) of the farmers kept male and female quails together in the same pen at an average male to female quail ratio of 1:3 for the purpose of producing fertilized eggs only, while 30% of them produced both fertilized and unfertilized eggs and none produced unfertilized eggs only (Table 8). Findings reported in Kenya expounded a percentage distribution of quail farmers for production as 91.5% fertilized eggs, 5.5% unfertilized eggs and 3.0% both fertilized and unfertilized eggs (Muthoni, 2014) contrary to findings in this study as none of the farms visited produced table (unfertilized) eggs only. The practice of housing both male and female quails together in the same colony cages by quail farmers seems to conform to recommended best practices worldwide as stocking ratios of male to female of 1:2 and up to 1:5 quails kept in cages are desirable for improving upon their genetic makeup (Narinc *et al*., 2013; Priti and Satish, 2014).

The findings further showed that most of the layer quail farms recorded lower hen-day production (Table 8) compared to findings in other parts of the world which suggest that the Japanese quail when given the right energy and protein levels can record hen-day production of up to 90% (Ratriyanto *et al*., 2018). Perhaps the lower hen-day production recorded in this study could be as a result of majority of farmers using the commercial chicken feed which had lower crude protein (CP) and energy levels than the standard quail diets (Table 6). The survey also indicated that a large proportion of egg laying was recorded in the evening or night hours from 15:00 hours till night (19:00 hours) during which egg collection was done and this agrees with findings by Fernandez *et al.* (2018). Furthermore, quail farmers collected and stored eggs in open egg trays and other vessels (Plate 3) before they were either set in incubators for hatching or packaged in trays (Plate 4) and sold to consumers or better still, processed into other finished industrial products.

Table 8. Egg type, percentage hen-day production and daily egg quantities in trays per farm

Characteristic	Frequency	Percentage (%)
Type of eggs		
Fertilised eggs only	42	70
Both fertilised and unfertilised eggs	18	30
Total	60	100
Percentage hen-day production		
> 90%	6	10.0
86-90%	3	5.0
81-85%	8	13.3
71-80%	15	25.0
61-70%	22	36.7
≤ 60%	6	10.0
Total	60	100

Fig.6. Plate 3: Quail eggs stored in trays (left) and wire mesh (right) awaiting sales or incubation

Fig.7. Plate 4: Different designs of quail egg trays used by farmers

Source of Breeding Stock

Majority of the quail farmers acquired their breeding stock by hatching the chicks by themselves using incubators. A few others however purchased either day-old chicks or 2 weeks old chicks (Table 9). This finding is in sharp contrast with results obtained in a similar study by Muthoni (2014) that suggested that 73.8% of farmers in Kenya acquired their breeding stocks by purchasing 2 weeks old chicks and 24.4% of them obtained their stock by using incubators. is in conformity with earlier research reports which suggested that the domestic quail has lost its brooding instinct and therefore the only way to produce quail chicks on a commercial basis is to rely on the artificial incubator (Mohammed and Ejiofor, 2015; Arya *et al*., 2018). Apart from this reason, quail farmers from this study may have adopted the use of incubators in hatching their own eggs due to the high cost of day-old quail chicks and 2 weeks old chicks (Table 9). This confirms why the farmers indicated the necessity of incubators in quail production as a challenge especially for beginner farmers due to high purchasing and running costs of such machines.

Table 9. Sources of breeding stock

Characteristics	Frequency	Percentage (%)
Source of breeding stock		
Purchase of 2 weeks old chicks	5	8.3
Purchase of day-old chicks	10	16.7
Using incubator	45	75.0
Total	60	100
Cost of day-old chicks (GH¢)		
< 2.00	5	8.3
2.00-3.00	43	71.7
4.00-5.00	11	18.3
> 5.00	1	1.7
Total	60	100
Cost of 1-2 weeks old chicks (GH¢)		
< 3.00	14	23.3
3.00-4.00	41	68.3
> 5.00	5	8.4
Total	60	100

Sex identification of quails

The study also showed farmers used various identification features to distinguish between male and female quails especially when the birds were 3 weeks old. Prominent identification features used by the farmers to identify males from females were plumage color of chest and the size of cloacae (Plates 5, 6 and 7). Other features farmers used to distinguish male quails from their female counterparts have been tabulated below (Table 10). These sex determination procedures agree with features established by earlier research researchers (Vali, 2008; Singh *et al*., 2011; Shit *et al*., 2010).

Table 110. Sex identification features between male and female quails.

S/N	Male quail	Female quail
1	Absence of brown spots on chest and neck plumage.	Presence of brown spots on the chest and neck plumage.
2	Enlarged or bulging cloaca indicating presence of male sex organ.	Cloaca is not enlarged or bulging.
3	Discharge of white-foamy semen from cloaca when squeezed.	Absence of semen when cloaca is squeezed.
4	Males quail makes crowing sound.	Female quails do not crow.

5	Presence of crown on the head.	Absence of crown on the head.
6	Absence of bare backs.	Presence of bare backs among layers.

Source: Field survey, 2020

Fig.8. Plate 5: Vent sexing, bulging vent of male quail with white discharge

. Fig.9. Plate 6: Vent of female quail, less bulging

Fig.10. Plate 7: Sexing of Japanese quail by plumage color of chest (Left –male; Right –female)

Farm labour and records keeping

The findings showed that quail farmers relied on family members as their major (71.7%) source of farm labour while permanent hired labour represented 5.0%. The use of family labour in quail management in Ghana confirms the suggestions that quail farming is considered a backyard/family poultry business in many countries (Sonaiya and Swan, 2004). Besides, since quail is a small bird and can easily be housed in a small space under multitier colony cages (Monika *et al*., 2018), and the fact that more than half of the respondents were small-holder quail farmers (<1000 birds) suggest that most of the farmers wanted to reduce labour cost by engaging paid family members instead of hired labour who were non-relatives.

The research further pointed out that 66.7% of farmers kept records of various farm activities such as mortality, purchasing, sales, egg production, incubation and hatchery, incidence of diseases and medications, and feeding. There was a significant association between some specific socio-economic characteristics (age and education) and record keeping ($X^2 = 68.67$) as farmers below age 40 kept more records than those above age 40. These findings corroborate reports by Muhammad-Lawal *et al*. (2017) who posited that age and level of education were essential socio-economic characteristics as they determine the availability, effectiveness and efficiency of human resource for daily farm activities such as record keeping. The inability of respondents over 40 years to keep farm records could be attributed to extra family and social responsibilities which they may have and therefore might affect their time available for full routine farm activities such as record keeping. There was also significantly a direct relationship between record keeping and educational level of respondents ($P < 0.001$).

Diseases and parasites

The study confirmed assertions made by Cambel (1994) and Chakrabarti *et al*. (2014) that quails are more resistant and therefore less susceptible to most poultry diseases and parasites. The most prevalent diseases identified by farmers however were Coccidiosis and Infectious Coryza (Plate 8) with a mortality rate of less than 10% especially at the chick stage (Table 11). This result is similar to findings reported by Muthoni (2014) but varies from findings by Rahman *et al*. (2016) that identified Diarrhoea as the most prevalent diseases followed by Pneumonia, Infectious Coryza and Newcastle disease among others. According to El-Demerdash *et al*. (2013), high mortality among day-old quail chicks may be attributed to respiratory disorders in their first week from hatching, but this challenge may be overcome after the first week with proper management practices.

The findings further revealed that majority (41.7%) of farmers used drugs for treatment of quail diseases and others observed biosecurity protocols (21.6%) whilst a few others adopted proper feeding regimes (11.7%) as control measures for diseases and parasites. However, since there are currently no approved medications and vaccines in the market for quails (Dozier *et al.,* 2010), treatment of specific quail diseases in Ghana by farmers had been on experimental basis as they had no other options than to rely on drugs meant for chicken and other poultry species. Good management practices such as regular cleaning and disinfection as well as proper feeding, which some farmers had adopted, were therefore essential in the control and prevention of quail diseases and parasites. This practice seemed to be very useful since a large number of the farmers had recorded very low mortality rates.

Table 11. Quail diseases and mortality

Characteristics	Frequency	Percentage (%)
Diseases incidence on quail farms		
Coccidiosis	27	45.0
Infectious Coryza	26	43.3
None	7	11,7
Total	60	100
Mortality rate		
< 10%	46	76.6
10-20%	7	11.7
None	7	11.7
Total	60	100
Growth phase at which mortality is common		
Chicks	32	53.3
Growers	2	3.3
Layers / broilers	19	31.7
All the phases	7	11.7
Total	60	100

Fig.11. Plate 8: Infectious Coryza disease of Japanese quails

Nutritive and medicinal benefits of quail eggs and meat

Although, there is no available scientific and industrial research findings in Ghana on the medicinal and nutritive value of quail products (eggs and meat), findings from this research established that the fundamental purpose for which many farmers went into quail production was to derive medicinal and nutritive benefits from the bird (Table 12). Majority of the respondents (Table 13) further testified that quail eggs in particular were very effective for the treatment of various diseases including stomach ulcers, asthma, kidney stones, diabetes, high and low blood pressures, anaemia among children and pregnant women, prostate cancer, sexual impotency and infertility in men and various skin conditions such as rashes, boils, eczema and pimples. These claims may be correct as earlier researchers (Tuleun *et al.*, 2011; Tunsaringkarn *et al*., 2013; Douglas, 2013; Tolik *et al*., 2014; Sathiya *et al*., 2017; Umera *et al*., 2018) established that quail meat and eggs have high quality protein of high biological importance, little fat content and less bad cholesterol and these qualities make quail eggs the most preferred choice of products for hypertensive patients, body and brain development among children, for treatment of asthma, tuberculosis and diabetes, and for prevention and removal of kidney, liver and gallbladder stones. It was for those reasons that a lot of the respondents confirmed they have been consuming some of the quail meat and eggs from their farms with their family members and friends in order to supplement their dietary needs.

Apart from the production of quails for their raw eggs and meat, a few farmers affirmed that they processed quail eggs into various industrial products among which include quail egg powder and capsules, quail egg oil, quail egg ointment and quail egg soap (Plates 9 and 10) whilst the meat is being processed into khebab, grilled, smoked, and frozen meat for management of various health conditions (Table 14).

Table 12. Purpose of rearing quails and consumption of quail products

Characteristics	Frequency	Percentage (%)	Chi-Squared	P-Value
Purpose of rearing quails			37.07	<0.001
Medicinal value	20	33.3		
Income generation	11	18.3		
Entertainment / hobby	7	11.7		
Nutritive value	4	6.7		
Others / multipurpose	18	30.0		
Total	60	100		
Do you eat quail products?				
Yes	59	98.3		
No	1	1.7		
Total	60	100		
Which product do you consume most?				
Eggs	54	90.0		
Meat	6	10.0		
Total	60	100		

Table 13. Nutritive and health benefits of eating quail eggs

Characteristics	Frequency	Percentage (%)
Farmers assertion about effectiveness of quail eggs in treatment of some diseases		
Yes	47	78.3
No	2	3.3
Not sure	11	18.4
Total	60	100
Quail products consumed		
Eggs	51	85.0
Meat	4	6.7
Egg + meat	5	8.3
Total	60	100

Table 14. Processing of quail eggs and meat into other products

Do you process quail eggs and meat?	Frequency	Percentage (%)
Yes	18	30
No	42	70
Total	60	100

Fig.12. Plate 9: Quail capsules produced and packaged by some farmers

Fig.13. Plate 10: Quail soap (left) & oil (right).

CONCLUSIONS

The research established that quail production is practiced in Ghana under the battery cage intensive system and that production is concentrated more in the ecological zones in Southern Ghana than in the Northern Guinea Savannah zone. The research further established that three (3) major breeds of quails are reared in Ghana but the most common breed is the Japanese quail because of its prolificacy and its ability to tolerate the intensive battery

cage system of management for commercial egg production. It can be concluded that quail farming in Ghana is done on a small-scale basis and most farmers did not use standard feed. Furthermore, the perceived nutritional and health values of quail eggs (main product) and meat are the main reasons quail production is practiced in Ghana.

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