EVALUATION OF HYGIENE AND GRADE CHARACTERISTICS OF EGGS PRODUCED FROM COMMERCIAL POULTRY FARMS WITHIN AND AROUND BIRNIN KEBBI METROPOLIS

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ABSTRACT
The study was conducted to investigated the physical hygiene and grade characteristics of eggs produced from commercial poultry farms within and around Brinin Kebbi metropolis. All viable commercial poultry farms covering 50 kilometers radius in and around Birnin kebbi metropolis were surveyed in a preliminary survey, and five (5) farms were identified to be operating in a relatively consistent commercial quantities. Three crates of fresh eggs (containing 30 eggs per each crate) were purchased from each farm. Therefore, a total of 450 eggs were used for the study. The physical characteristics determined include egg size, cracks, stains, dirt, texture, ridges, colour and shape of eggs while the eggs from various farms were graded using the USDA standard grading characteristics based on size classification of the eggs. Results on physical characteristics indicated that there was significant differences ($P<0.05$) on egg weight and number of dirty eggs among farms. However, there was no significant differences ($P>0.05$) between the farms on egg cracks, egg stains, egg textures and ridges on eggs. Farm B had higher egg weight (66.1g) while Farm E had the least (2.67) dirty eggs. Generally, egg size classification across the farms studied conforms to the USDA standards of jumbo, Extra-large and Large eggs. No medium eggs, small eggs and pwewee eggs were recorded among the farms studied. The study concluded that most of the eggs produced from selected farms are of good size and weight but have stains, dirts and cracks which could raise safety concerns. All eggs from the farms studied favorably conform to the USDA standards based on the size of the eggs.

Keywords: Hygiene, Grade Characteristics, Eggs, Poultry Farms

INTRODUCTION
Eggs are very important for feeding people as they have high nutritive value and are suitable for Processing and 50g of the edible part of a hen egg contains 72.5-75.0 g of water, 12.5-13.3 g of protein,10.7-11.6 g of fat, 0.7 g of carbohydrates and 1.0-1.1 g of mineral substance. The human body also makes good use of the nutritive value of eggs: proteins are utilized at 97%, fats 95%, carbohydrates 98% and minerals 76%. The content of essential amino acids in eggs is also very important, especially leucine, isoleucine, lysine, arginine, valine and phenylalanine. Eggs are also rich in vitamins - especially A, K and B complex - and also in different micro- and macro-minerals (USDA, 2015). According to Dudusola (2010) and Pasquoal *et al.*, (2012), eggs are highly versatile food containing many essential nutrients. Eggs of most species of birds may have similarities in nutritional composition and potential food usage, however, information on egg quality characteristics and utilization of egg for food and other purposes have been limited mostly to chicken eggs. Egg quality is composed of those characteristics of an egg that affects its acceptability to consumers such as cleanliness, freshness, egg weight, shell quality; yolk index, albumen index, Haugh unit and chemical composition (Mahdabi *et al.*, 2012, Song et al., 2000).

Grading refers to the process of grouping eggs according to similar characteristics, such as quality and weight. Egg grading is dependent upon examination of internal quality factors (e.g., condition of the egg white and yolk, air cell size). According to Abanikannda and Leigh (2012), egg grading generally involves the sorting of products according to quality, size, weight and other factors that determine the relative value of the product (USDA, 2005). It entails the grouping of eggs into lots, having similar quality and weight. The grade of an egg is determined by factors like its quality, soundness and weight, but the factor with the lowest grade determines the overall grade of the egg (Jacob *et al.*, 2002). Chukwuka *et al.*, 2011) reported that under the European Union of egg marketing regulations enforced in all European Union countries, eggs are classified as either class A or B eggs (CEU 2006) and eggs graded as A can be sold for direct human consumption or retailed (CEU, 2006). Similarly, the United States Department of Agriculture (USDA) has developed three grades of eggs based on the

interior quality of the egg, appearance and condition of the egg shell. The USDA grade AA and US grade

According to Abisogun *et al.* (2012), the major challenges of marketing livestock products are appropriate pricing, preservation and storage. The usual practice of small holder poultry farms is to sell eggs unsorted which results in loss of income, decreased marketability and increased wastages. Sorting and grading of eggs in to fairly homogenous sizes by small holder commercial egg producers could lead to an increase in the consumer's preference which will consequently result in increased marketability and revenue. Hence, this research will attempt to study the practice of egg grading in kebbi state by obtaining first-hand information on the knowledge attitude and practice of egg grading from the commercial egg producers and also to determine the quality of the eggs produced if they conform to the international standards. Therefore**,** this study seek to evaluate physical hygiene grade characteristics and determination of the conformity of egg from commercial poultry farms around Birnin Kebbi metropolis to USDA standards.

MATERIALS AND METHODS

Study Area

The study was conducted at the Animal Science Laboratory of Kebbi State University of Science and Technology, Aliero, Kebbi State. The study evaluated some hygiene and grade characteristics of eggs produced from selected commercial poultry farms around Birnin kebbi metropolis.

Sampling and Sample Size

All viable commercial poultry farms covering 50 kilometers radius in and around Birnin kebbi metropolis were surveyed in a preliminary survey, and five (5) farms were identified to be operating in a relatively consistent commercial quantities. Three crates of fresh eggs (containing 30 eggs per each crate) was purchased from each farm as per the arrangement of the eggs by the farms. Therefore, a total of 450 eggs were used for the study.

Data Collection

Hygiene grade characteristics of eggs

The physical characteristics determined, include egg size, cracks, stains, dirt, texture, ridges, colour and shape of eggs. Egg size was determined by measuring the weight of each individual egg using a sensitive digital weighing balance. Cracks were determined by counting the number of eggs that have any visible crack on the shell surface. Stains were determined by counting the number of eggs that have any prominent, moderate and localized stains on the surfaces of egg shells. Dirty eggs were determined by counting the number of eggs that had adhering dirt or foreign materials on the shell. Texture of the eggs was determined by counting the number of eggs that have extremely rough surfaces and large calcium deposits. Ridges on eggs were determined by observing the eggs that have pronounced ridges on the shells.

USDA Grade characteristics of eggs

The eggs from various farms was graded using the standard grading characteristics based on size on the size of eggs. Eggs were measured by weight using digital weighing balance and classified as follows: Jumbo (>71g), Extra Large (61 – 70g), Large (51 – 60g), Medium (40 – 50g), Small (30 – 40g) and Pwewee (< 30g).

Data Analysis

Analysis of Variance (ANOVA) was used to compare the Physical characteristics and to determine the conformity between eggs produced from selected commercial poultry farms.

RESULTS AND DISCUSSION

Evaluation of Hygiene and Grade Characteristics of Egg Produced From Commercial Poultry Farms Within and around Birnin Kebbi Metropolis.

The results on the Table 1 indicate that there was significant differences (P<0.05) on egg weight and number of dirty eggs among farms. However, there was no significant differences (P>0.05) between the farms on egg cracks, egg stains, egg textures and ridges on eggs.

Table 1: physical Hygiene characteristics of egg produced from commercial poultry farms within and around Birnin Kebbi Metropolis.

FARM	PARAMETERS					
	Weight (G)	Cracks	Stains	Dirty Egg	Texture	Ridges
A	59.5^{bc}	2.00	25.00	16.00^{b}	12.7	5.32
B	66.1^{a}	1.00	24.33	15.33^{b}	3.67	4.99
C	60.3^{b}	0.00	21.67	11.33^{ab}	2.00	8.66
D	55.9^{bc}	1.00	20.33	8.67^{ab}	0.33	6.99
E	55.1^{c}	1.67	19.67	2.67^{a}	0.00	7.66
SEM	**1.04**	**0.650**	**2.211**	**2.271**	**0.856**	**1.342**

Means with difference superscript along the same column with a subset differ significantly (P<0.05)

Egg Weight in farm B had higher weight (66.1g) than other farms. This might be as a result of weight, breed and age of the laying birds from which the eggs were obtained. It has been demonstrated that there is correlation between body size and egg size within the breed, and also, age may have tendency to influence producing heavy weight eggs (Blanco *et al.*, 2014; Aygun and Yetisir, 2010; Begli *et al.*, 2010; Alkan *et al.*,2010). Majority of the farms studied had recorded cracks eggs. This could probably be as a result of poor handling during egg collection.

Determination of Conformity of Eggs Produced From Commercial Poultry Farms around Birnin Kebbi Metropolis to USDA grade standards

Results on the Table 2 shows that there was significant differences (P< 0.05) on egg size across the farms studied for jumbo, extra-large and large eggs. However, there was no significant differences (P>0.05) among the farms on Medium, small and peewee eggs.

Table 2: USDA standard grade characterization of eggs produced from commercial poultry farms within and around Birnin Kebbi Metropolis .

FARM	PARAMETERS					
	Jumbo	Ex-Large	Large	Medium	Small	Pwewee
A	1.33^{b}	18.33^{a}	24.33^{a}	3.33	0.000	0.000
B	6.33^{a}	12.33^{ab}	22.00^{a}	3.00	0.000	0.000
C	1.00^{b}	10.33^{ab}	15.33^{a}	2.00	0.000	0.000
D	0.00^{b}	4.67^{b}	15.00^{a}	1.00	0.000	0.000
E	0.00^{b}	2.00^{b}	5.00^{b}	0.00	0.000	0.000
S.E	**0.56**	**2.41**	**2.08**	**1.11**	**0.00**	**0.00**

Means with difference superscript along the same column with a subset differ significantly (P<0.05)

Based on Jumbo size eggs, farm B had higher (6.33) number of Jumbo eggs followed by farm A (1.33) and C (1.00). The high number may be due to breed or age of the laying birds. Based on Extra-large eggs, farm A had higher number of eggs (18.33), followed by farm B (12.33) and C (10.33). Farm E had lesser (2.00) number of eggs. Based on Large eggs, farm A had higher (24.33) number of eggs, followed by farm B (22.00) and C (15.33). Farm E had lesser (5.00) number of eggs. There was no small and pwewee eggs recorded among all the farms studied in the current study. This shows that,

most eggs produced by commercial farms within and around Birnin Kebbi metropolis fairly conform to the UDSA standard.

CONCLUSION

The study concluded that there is awareness of egg grading among poultry personnel but the system is not adequately practiced. Most of the eggs produced from selected farms are good size and weight but have stains, dirt's and cracks which could raise safety concerns. All eggs from the farms studied favourably conforms to the USDA standards based on the size of the eggs.

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