



RESEARCH ARTICLE

The Effects of Climate Variability on Poultry Production in Ose Local Government Area of Ondo State, Nigeria: Socio-Economic Characteristics and Perceptions of Farmers

UN Uzokwe and EA Bakare

Department of Agricultural Economics and Extension, Delta State University, Asaba Campus, Asaba, Delta State, Nigeria

ARTICLE INFO

Received: January 01, 2013
Revised: February 22, 2013
Accepted: February 28, 2013

Key words:

Climate variability
Farmers' perception
Global warming climate change
Greenhouse gas
Poultry production

ABSTRACT

This study was conducted in Ose Local Government Area (LGA) of Ondo State to ascertain socio-economic characteristics and perceptions of farmers as related to the effect of climate variability on poultry production. A multi-stage sampling technique was employed in choosing the required sample of 100 farmers. Only 90 copies of the questionnaire could be retrieved. Males dominate poultry farming in the area. Majority (66.4%) of the poultry farmers were between the ages of 21-50 years. Most of them were married and had one form of formal education or the other with good number of years of experience in poultry keeping. Most of them perceived unpredicted rainfall, high relative humidity, excessive wind occurrences, increase in sun-intensity, unpredictable day-length pattern and increase in temperature. They observed increased heat stress, increased disease outbreak, reduced egg production, slow growth rate, reduced feed intake, reduced egg size, reduced egg weight, poor egg shell quality, yolkless egg, decreased water intake, dehydration, reduced feed conversion efficiency, increased mortality, difficult breathing, increased pest invasion and reduced poultry carcass. Perceived climate variability significantly affected egg production, growth rate, poultry carcass and caused disease outbreak. Climate variability was discovered to have affected poultry production in the study area. It is therefore recommended that the government should assist the farmers in purchasing of improved poultry breeds by subsidy because majority of farmers were discovered not to adapt to climate variability and/or climate by purchasing improved varieties, the government should establish formidable climate recording centres in Ose local government, and awareness should be heightened and policies formulated should restrict or reduce the emission/accumulation of green house gases.

*Corresponding Address:

UN Uzokwe
uheadauzokwe@yahoo.com

Cite This Article as: Uzokwe UN and EA Bakare, 2013. The Effects of climate variability on poultry production in Ose Local Government Area of Ondo State, Nigeria: Socio-economic characteristics and perceptions of farmers. *Inter J Agri Biosci*, 2(1): 39-44. www.ijagbio.com

INTRODUCTION

Climate is a very important factor in agricultural production. It determines the success or failure of crops. Good climatic conditions enhance crop production. With the change in climatic conditions, the world over, agricultural production is also affected. Several researches carried out on the relationship between climate change and livestock production has shown that there is an impact. This threatens poultry production. Despite technological advancements such as improved varieties and genetically modified livestock organism, climate is still a key factor in agricultural productivity. According to

Obayelu and Adeniyi (2006), climate variables (temperature, rainfall, wind-speed and relative humidity) in Ilorin contributes about 81%, 96% and 43% to the variance in poultry egg production, feed intake and outbreak of disease of poultry production respectively.

The term climate change is sometimes used to refer specifically to change in weather caused by human activities. By this, climate change is attributed directly or indirectly to human activities that alter the composition of the global atmosphere and this is in addition to natural climate variability observed over comparable period. Climate variability influences weather elements such as temperature, relative humidity, wind speed and direction,

daylight, sun intensity and rainfall, which all have impact on agriculture.

Food production increase at the rate 2.5%, while demand increases at the rate of more than 3.5% due to high population. Inadequate protein in the diet of a large proportion of the Nigerians is a big challenge. Poultry production seems to be a panacea for protein deficiency with high prolific rate, simple management, reduced cost of production and high profitability. Poultry plays an important role in the diet and economy of Nigeria. It is the primary supplier of egg and meat and serves as a source of income and employment to people compared to other domestic animals (Avila, 1985). One poultry egg weighing 55g/day meets the 50% protein requirement of a child up to 5 years of age (Ponapa, 1982).

Studies have shown that the level of performance of poultry does not only depend on inherited capacity but also largely upon the environment (Campbell and Lasley, 1975). The environmental conditions affecting the performance and health productivity of a chicken includes temperature, relative humidity, sunshine prevailing at a given time, light, housing system and ventilation. Therefore, variability in climate will ultimately have effect on poultry production. High temperature and humidity has some negative effect such as an increase in poultry body temperature, a decrease on feed consumption and feed efficiency (Cowan & Michie, 1978; Barua & Howlider, 1990). High temperature also results to a reduction in poultry live weight (Mowbray and Skyes, 1971), growth speed and high mortality (Arjona, Dendrow & Weaver, 1988) in addition to a decrease in production and quality of eggs (Ozbey and Ozuelik, 2004).

In spite of the large number of poultry farmers in Nigeria, there is still insufficient supply of protein products such as eggs and poultry meat to meet the protein consumption need of the nation. It is suspected that changes in climatic factors are partly responsible.

Climate variability is experienced in many regions and countries of the world. The perceived threats and weaknesses of poultry production due to climate variability includes more heat stress in both housed and outdoor flocks, reduced egg production and growth rate at higher temperatures, higher mortality rates in outdoor flocks result from extreme weather events, more expensive housing to withstand storms and temperature fluctuations, more effective ventilation and cooling systems to counteract higher temperatures, higher energy cost in operating ventilation system more frequency, increased persistence of some endo-parasite and ecto-parasite with associated increase in medication are big challenges to consider.

Climate variability effect has not received much attention in Ondo state and especially in Ose Local Government Area in particular. Most research work produced on climate change and its effects on agriculture, livestock or poultry production are related to temperate regions with only few researched works carried out in the tropical regions. Molua and Lambi (2007), agreed that works done on climate variability were focused on highly developed nations like the United states, Canada, Europe and Australia with little or nothing done in the third world countries. There is therefore, lack of sufficient

information available to farmers, policy makers and other agricultural stakeholders in this region.

It is against this background that the study will address the following research questions:

- (i) What is the background of the farmers to appreciate that there is climate change in Ose LGA affecting poultry production?
- (ii) Has there really been change climate variability in the study area?

Objectives of the Study

The broad objective of this study is to determine the effect of climate variability on poultry production in Ose Local Government Area of Ondo State.

The specific objectives are to:

- (i) determine the socio-economic characteristics of farmers in the study area;
- (ii) Identify the poultry farmers' perception on climate variability as affecting their farming enterprise.

Hypothesis

The poultry farmers' perceived climate variability has no significant effect on their farming enterprise

METHODOLOGY

The study area is Ose Local Government Area, in Ondo State, SW Nigeria. It is bounded by Owo in the West, Akoko-south in the North, Edo state in the East and Ose River in the South-eastern part. It has a land mass of 1,465km² and a population of 144,901 as at the last census in 2006.

The climate is characterised by both wet and dry season, each covering eight and four months respectively. The wet season lasts from March to October having a total annual rainfall of 1600mm-2300mm. While the dry season runs between November and February with associated periods of *harmattan*-dry season. The vegetation provides reasonable quantity and quality for livestock animals especially in the rainy season. Temperature ranges in the wet season is between 23°C-30°C in the dry season. However, the weather is generally stable and warm for most part of the year.

The area supports a wide range of grass like elephant grass, spear grass and goat weeds. Farming is the major occupation of the people. The crops cultivated are mainly yam, cassava, maize, tomatoes, cocoa, rubber, oil-palm, cashew. Livestock such as poultry, goats, buffalo and sheep are kept. Chicken species available in the area are domestic exotic fowl all of which are reared in farms and the indigenous chicken found in household stead. Ose Local Government Area is reputed as the food basket of Ondo state.

The study area is currently divided into three area made up of sixteen (16) geo-political wards. They are:

Areas	Ward
Ose-North	Afo, Idoani I, Idoani II, Idegun, Imeri
Ose-Central	Ifon I, Ifon II, Ikaro, Elegbeke, Oriafafe, Oriolumi
Ose-South	Ijegba, Imoru, Arimogija, Ute, Okeluse

A multi-stage sampling technique was employed in choosing the required sample. In the first stage, purposive sampling was used to select ten wards with the greatest concentration of poultry farmers from each area. The second stage involved the selection of 10 farmers from each of the ten wards selected through ballot sampling method, to get 100 respondents.

Data for the study were collected from primary sources. The primary data were drawn from the respondents using structured questionnaire distributed to the selected poultry farmers and interview schedule, as some of the farmers are not formally educated. Out of the one hundred (100) copies of structured questionnaires distributed only ninety (90) were retrieved.

Data for the study were subjected to statistical analysis using descriptive statistics such as frequency counts and percentages. The socio-economic characteristics (objective 1) were achieved using percentage and frequency. While for objective 2 data were analysed using mean that was derived from from a 5-point likerts' type scale of:

Strongly disagree	(SD)	=	5
Disagree	(D)	=	4
Undecided	(U)	=	3
Strongly agree	(SA)	=	2
Agree	(A)	=	1

The Cut off mean for objectives 2 and 3 were Objective 2: Cut off mean: 3.0 (≥ 3.0 = an observed effect; $< 3.0 \neq$ an observed effect). The hypothesis was tested with the use of Chi-square analysis.

RESULT AND DISCUSSION

Socio-economic characteristics of respondents

Table 1 showed that most (68.%) of the respondents were male while 31.5% were female. This agrees with Akhere (2011), showing that male dominated poultry production. It is in agreement with Oruru (2009) who asserted that in prevailing cultures men concentrate on and dominate livestock farming. Men dominate this agricultural sub-sector because it is labour intensive; the smell of the droppings; removal of the litter; handling of birds and all other husbandry processes scare most women.

The age range was almost evenly distributed amongst all age ranges of the respondents. Majority (66.4%) of the poultry farmers were between the age ranges of 21-50 years. More than half of the respondents (53.9%) were married. This implies responsibility and is expected to reflect on their devotion to their farming activities. Thus, changes in the income of their poultry farming will affect most families in the study area.

Most (71.9%) of the respondents have had one form of education or the other. According to Ewuola and Ajibefun (2006), technological change is achieved through formal education. This is therefore, expected to aid their knowledge and adaptability to climate variability.

Majority (87.6%) of the respondents have had 1-15 years of farming experience. This implies that majority of the respondents still has good knowledge of climate variability occurring within the area.

Table 1: Socio-economic characteristics of respondents: Biodata and Educational and farming experience

Variables	Frequency	Percent (%)	Cumulative percent
Gender			
Male	61	68.5	68.5
Female	29	31.5	100.0
Age			
Below 20	13	14.6	14.6
21-30	29	32.6	47.2
31-40	15	16.9	64.0
41-50	15	16.9	80.9
51-60	11	12.4	93.3
Above 60	6	6.7	100.0
Marital status			
Single	25	28.1	28.1
Married	48	53.9	82.0
Divorced	2	2.2	84.3
Widowed	11	12.4	96.6
Separated	3	3.4	100.0
Level of Education			
No formal education	25	28.1	28.1
Primary school education	25	28.1	56.2
Secondary school education	25	28.1	86.5
Tertiary education	27	30.3	100.0
Years of farming experience			
1-5	47	21.3	52.8
6-10	19	13.5	74.2
11-15	12	52.8	87.6
16-20	5	5.6	93.3
21-25	2	2.2	95.5
25 and above	4	4.5	100

Source: Author's field survey, 2011

Farmers' perception of climate variability indicators

Table 2 indicated that most farmers observed that there had been variability in climate of the area. It showed that 85.4% of the poultry farmers perceived unpredictable rainfall pattern as an indicator of climate variability, this confirms the statement in *climatevariability.com* that one evidence or effect that climate change is really happening is extreme amount of rainfall. Also, 62.9% of the respondents observed high relative humidity and for excessive wind each. This agrees with the findings of Akhere (2010) in which 66.6% and 68.33% out of 120 respondents agreed to observing high relative humidity and excessive wind respectively as indicators of climate change in Delta state. 89.9% of respondents observed increase in sun intensity, in her study Akhere (2010), also found out that there had been increased solar radiation in Delta state. 71.9% of respondents agreed to unpredictable day length pattern and this is known to have large effect of poultry chick and layer production. Most (91.0%) observed increase in temperature, this agrees with the findings of Anyokwu (2010) who stated that there had been gradual increase in temperature in Delta state. 50.6% of the respondents agreed on experiencing shorter/absence of harmattan occurrences. According to Izunobi (2002), these indicators of climate change as perceived the poultry farmers have significant effects on poultry birds as well as

on poultry production. Majority may not have indicated the changes because it may not highly be perceived as a threat to their poultry production.

According to Obayelu and Adeniyi (2006), rainfall affects the quality and quantity of livestock feed that can be available per time. According to climatevariability.com (2011), the warmer temperatures in different parts of the globe had led to intense rainfall events in numerous areas.

Observed changes in poultry production due to observed climate variability

Table 3 Showed observed changes in poultry production due the perceived climate variability factors in the area. These observed changes with the significant mean scores includes:

Table 2: Poultry farmers' perception of climate variability

Indicators	Frequency	Percent (%)
Unpredictable rainfall pattern	76	85.4
Incessant flooding occurrence	41	46.1
Drought	42	47.2
High relative humidity	56	62.9
Excessive wind occurrences	56	62.9
Increase in sun-intensity	80	89.1
Unpredictable day-length pattern	64	71.9
Increase in temperature	81	91.0
Shorter/absence of harmattan	45	50.6
More frequent Gully erosion	42	47.2

Source: Field survey, 2011

Table 3: Observed changes in poultry production due to climate variability

Observed impact	Score	Mean score (X)	Rank
Increased heat stress	411	4.62	1
Increased disease outbreak	363	4.08	3
Reduced egg production	336	3.78	7
Slow growth rate	335	3.76	8
Reduced feed intake	337	3.79	6
Reduced egg size	315	3.54	13
Reduced egg weight	318	3.57	12
Poor egg shell quality	305	3.43	14
Yolkless egg	289	3.24	16
Decreased water intake	300	3.37	15
Dehydration	321	3.60	11
Reduced feed conversion efficiency	339	3.80	5
Increased mortality	372	4.18	2
Difficult breathing	321	3.61	10
Increased pest invasion	346	3.89	4
Reduced poultry carcass	334	3.75	9

Cut off mean =3.0 (≥ 3.0 = an observed effect; $< 3.0 \neq$ an observed effect); Source: Field survey, 2011

Increased heat stress (X = 4.62) was most observed by majority of the respondents as a change in their poultry production due to climate variability. The optimum body temperature in birds is much closer to the point of heat death than cold death. He also stated that high environmental temperature just below body temperature increases body temperature which produces severe heat and this process rapidly lead to their death from hyperthermia. In addition, broilers are more prone to suffer heat stress than are laying birds bred for production of table eggs and they are more stressed if the relative humidity is above 70% (Wood-Gush, 1971).

Reduced egg production (X = 3.78) was a significantly observed impact of climate variability on poultry production. This could be due to change in day-length (Bishop, 1998). Gentle (1985), asserted that many research workers have found that at high ambient temperatures a reduction occurs in the number of eggs produced, he further stated that the main cause of loss of production is the reduction in energy intake which is caused by high ambient temperature.

Increased disease outbreak (X = 4.08) was shown to be highly observed by the respondents. This could be due to excessive wind occurrence that carries disease vectors and pathogen from one place to the other. In addition, increased moisture content and temperature makes the birds prone to disease infection. Poultry birds are known to be more vulnerable to disease when the temperature is at either extremes of hotness and coldness.

Slow growth rate (X = 3.76) and reduced feed intake (X = 3.79) were also observed by respondents to cause change in poultry production. According to Fisher and Boorman (1986), the energy intake mechanisms are certainly sensitive to environmental temperature because daily food intake by birds have been shown to decline as environmental temperature is increased and this is consequent on slow growth rate observed which could be due to increased temperature. Agricultural Training Board-ATB (1983) stated at higher ambient temperatures broilers grow more slowly than lower ones, also, at 32°C increasing the humidity from 30-70% have been shown to slow the growth rate of broilers.

It was also found that **reduced egg size (X = 3.54), reduced egg weight (X= 3.57), poor egg shell quality (X = 3.43)** are significant changes caused by climate variability on poultry production, this confirms the findings of ATB (1983), that changes in ambient temperature affects egg weights, shell thickness and the sizes of eggs. Bird kept at high ambient temperatures produce eggs of lighter weights than similar birds kept at lower ambient temperatures and this affects yolk weight and yolk production.

Decreased water intake (X = 3.37) was another observed change. This has a severe effect on the poultry birds as asserted by Gentle (1985), that decreased water intake decreases food intake and cause a reduction in the rate of egg production.

Dehydration of birds (X = 3.60) was found to also be a significant change in poultry production due to climate variability. This may be due to increased temperature, which causes evaporative loss of water from the birds and induces more water intake.

Reduced feed conversion efficiency (X = 3.80) was also observed. This could be due to increased heat production caused by increased temperature which according to Gentle (1985), has implication as far as efficiency of food use is concerned.

Difficulty in breathing (X = 3.61) was observed, Wood-Gush (1971), stated that if birds are heat stressed their respiration rate will rise rapidly from 40 to as many as 170 respirations per minute and their body temperature will rise rapidly, leading to death from hyperthermia.

Reduced poultry carcass (X = 3.75) was significantly observed by respondents as a change in poultry production due to climate variability. This could be due to the findings of ATB (1983), that at higher temperatures broilers grow more slowly than at lower ones which follows that at a given age the total meat production (kg/bird) is reduced, it was also found that carcass moisture decline with increasing ambient temperature and evidences suggest that in males there is a linear reduction in the amount of breast meat produced by males as the ambient temperature at which they are kept is increased.

Hypothesis

The results of the test of hypothesis (Table 4) show that perceived climate variability significantly affected egg production, growth rate, poultry carcass and caused disease outbreak. These show that climate variability adversely exert pressure on the affected poultry production indicators.

Table 4: Chi-square analysis of perceived effect of climate variability on poultry production

	χ^2 Cal	P-value	Remark
Reduced egg production	9.90	0.051	Significant
Increased disease outbreak	8.27	0.091	Significant
Reduced growth rate	5.81	0.002	Significant
Reduced poultry carcass	6.54	0.071	Significant

Conclusion and Recommendations

The statistical analysis of the perception of farmers on climate variability shows that there has been observed climate variability in the study area in most of the factors presented. Though, factors such as more gully erosion, frequency in drought occurrence and incessant flooding pattern were described by majority of the farmers not to have been much observed. Climate variability was discovered to have affected poultry production in the study area.

It is therefore recommended that:

1. The government should assist farmers in purchasing of improved poultry breeds by subsidy because majority of farmers were discovered not to adapt to climate variability and/or climate by purchasing improved varieties.

2. Trend analysis of climatic factors was not analyzed on this work due to unavailability of climate and weather information. The government should establish formidable climate recording centers in Ose local government and across all the local government centers of the state. A seasonal report on changes in the weather and climate of the area involving farmers, extension agents, researchers and other stakeholders should be carried.

Awareness should be heightened and policies formulated should restrict or reduce the emission/accumulation of green house gases which is a major cause of global warming resulting in climate variability, focus

on alternative energy source such as solar energy, planting of trees, reduced felling of trees and reduction in forest destruction should be emphasised.

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