A STUDY OF MORTALITY IN LAYER CHICKENS AND ITS EFFECT ON FAMERS' INCOME IN JOS SOUTH LOCAL GOVERNMENT AREA, PLATEAU STATE

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Abstract
This study examined mortality in layer chickens and its effect on famers' income in Jos South Local Government Area, Plateau State. Simple random sampling was employed to select 60 poultry famers and data were collected through questionnaires. The data were analyzed using descriptive statistics, correlation and regression analysis. The results show that majority (98.33%) of the poultry farmers adopted deep litter management system, keeping brown and few black type layer chickens. Most (36.67%) of the famers sourced their layers stock from Zartech farm while 30% of them did so from unknown source(s). Mean mortality rate due to various abnormalities was 14.48%. Mortality was higher during growing stage than laying and brooding stages. Diseases especially coccidiosis and Newcastle caused higher mortality, other factors such as weather; management problem, hatchery problem, cannibalism and stampede were also recorded. Mortality positively and significantly ($P<0.01$) correlated (0.345) with age, and it occurred mostly at the growing stage of the layer chickens. The result also shows that mortality negatively and significantly ($P<0.05$) influenced revenue of the poultry famers. Good management practices/sanitation, use of anticoccidiosis and proper attention to the chickens at growing stage was recommended
Key words: mortality rate, disease, management systems, production, income

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Introduction

Poultry production is an important and diverse component of agriculture. Poultry are kept in most areas of the world and provide an acceptable form of protein to most people in the world. Many developed countries have adopted intensive poultry production system in order to meet demand for protein in humans. Poultry are able to adapt to most areas of the world at relatively low price, they reproduce rapidly and have a high rate of productivity. Layer chicken hens are efficient egg producers; breeds used for egg production are mostly based on leghorn and Rhode Island Red but selection and cross breeding have resulted in high productive laying hens (FAO, 1999).

Layers production is perhaps the most significant source of income and quality protein as compared with other livestock production activities. It has generated millions of employment around the world (Tablante *et al.,* 1994). Smaller capital investment and rapid returns over the invested capital are the salient features of layers production as a layer hen starts laying eggs between the ages of 16 and 20 weeks (Petek 1999). In most parts of the world, especially Nigeria, consumers' preference and acceptability for layer eggs is very high; hence there is ready market for the product (Ojo, 2003). Not all eggs produced are however, directly consumed by humans; some are used for production of vaccines and antibodies (EPA, 2011).

According to IEC (2007), majority of commercial layers in the world are kept in confined housing systems, either in battery cage or deep litter. In any of these systems concern has been raised over layer hens mortality and it vary substantially between hen flocks (Appleby *et al.,* 2004).

Mortality is inherent to any particular system of management; it has been recognized to cause a lot of challenges ranging from economic loss, poor egg production and increases cost of production in an effort to prevent it (Farooq *et al.,* 2002). Famers suffer various degree of loses on their farms resulting to shortage of egg and protein supply in the society. These and many more necessitate the study with the objectives to:

i. examine the management systems practiced by the famers,
ii. determine the mortality rate of layer chickens in the study area,
iii. identify causes of mortality,
iv. determine the relationship between age of layer chicken and mortality, and
V. determine the effect of mortality on famers' income.

Methodology

The study was conducted in Jos South Local Government Area, Plateau State, Nigeria, located

between latitudes 9° 30' to 10° N and longitude 8° 30 E with mean temperature of 18^0c (Michael, 2012). Two villages (Kangang and Rantya) were purposively (because of high concentration of poultry farmers) selected for the study. Simple random method was employed to select 60 poultry famers and data were collected through questionnaire. The data were analyzed using descriptive statistics, correlation and regression analysis, as described by Iheanacho and Iheanacho (2012).

Results and Discussion

Management system

The result (Table 1) of the study shows that majority (98.33%) of the respondents used deep litter system in raising their poultry of small scale at backyard. Those that used battery cage system constituted 1.67% of the respondents. According to Appleby *et al.,* (2004) differences in management can contribute to mortality, thus mortality can be high or low depending on the management system (Rao *et al,* 1997 and Qu *et al,* 1997). An important prerequisite to good poultry management is the attitude of the farmer. Scientists have noted that attitude of those in charge of management and husbandry practices are likely to be a major determinant of animal welfare (Appleby *et al.,* 2004).

The result on source of day old chicks shows that 36.67% of the farmers obtained their day old chicks from Zartech farm and 30% of them obtained their chicks from unknown source(s), those that do so from Amobyn, CHI and Ota farm constituted 23.33%, 8.33% and 1.67%, respectively. Again, 78.33%, of the famers kept brown colour layers, 1.67% and 20% kept black and both brown and black colour layer chickens, respectively. Similar to this report is that of Ebraheem *et al.,* (2012) who asserted that brown layer chickens were reared mostly by commercial poultry egg farmers than the black layers because brown layers are good converters of feeds, consumed less than black layers and yet produced more eggs than the black strain.

Mortality rate in layer chickens

The mortality rate in Rantya village was higher (19.07%) than in Kangang (9.89%). The mean mortality rate in the study area however, was 14.48% (Table 2a). This figure is slightly higher than the mean mortality in layer chickens reported by Amin *et al.,* (1995), Singh *et al, (*1995) and Petek (1999), of 12%, 12% and 14.2%, respectively, but lower than the result of Ghodasara *et al.,* (1992) who reported a mean mortality rate of 33.33%.

The result further revealed that 35% of mortality in layer chickens in the study area was recorded at the brooding stage (1-5 weeks), and at the growing (6-17 weeks) and laying (18 weeks and above) stages were 40% and 25% respectively (Table 2b). These results are slightly different from the figures reported by Ghodasara *et al.,* (1992), Prathapkumar *et al, (*1995), Amin *et al., (*1995), and Petek, (1999). The higher rate of mortality at the brooding stage may be due to stress, chick immunity (low) and vulnerability to hash weather. This opinion has also been reported by Appleby *et al.,* (2004) who said that immune strength of animals increases with age and have inverse relationship with mortality.

Causes of mortality in poultry layer chickens

Diseases (Fowl typhoid 6.17%, Newcastle 14.81%, Coccidiosis 27.16%, Gumboro 3.70%, Pullorum 2.47%, Cholera 2.47%, E-coli 4.94% and respiratory disease 2.47%) caused 64.19% of the mortality in poultry layers production, weather (Cold weather 6.17% and Hot weather 1.23%) and management (Hatchery, 6.17%, Stampede 11.11% and Canibalism, 1.23%) problems accounted for 7.4% and 18.51%, respectively (Table 3). Mortality in poultry production was reported (Farooq, 2002) to be caused by several factors ranging from diseases, management problems, poor quality chicks and cannibalism.

Probhakaran *et al.,* (1997), Bell and Weaver (2002), and Farooq *et al*., (2002) have indicated that coccidiosis cause higher mortality in layer birds. However, North (1984) has indicated 12-58% loss in layer chickens due to Newcastle disease. According to Soresene (2001) and Ovwigbo *et al,* (2009), management practice, low or high temperature, poor quality chicks causes mortality from 0.8% to 13% in layer chickens. Philip and Moiter (1993) and Lambert and Kabar (1994) said overcrowding and poor hygiene causes mortality. Morgan and Kelly (1990) and Ortiz *et al.,* (2006) had reported high temperature with relatively high humidity, and cannibalism to cause mortality in layer birds. However Ajum, (1990) attributed a higher incidence of mortality in layer chickens to weather extremes.

Relationship between age of layer chickens and mortality

Age of layer chickens at different stages of development significantly ($p<0.01$) correlated with mortality. The age of the birds at brooding, growing

and laying stage had positive correlation values of 0.422, 0.736 and 0.557, respectively (Table 4). The growing stage had higher correlation with mortality followed by the laying stage. This means that mortality is higher at the growing stage than the laying and brooding stages. This result is deviant with the finding of Ghodasara *et al*., (1992) who reported 26.23%, 24.56% and 49.2% mortality in layer birds which occurs at brooding, growing, and laying stages, respectively.

Effect of mortality on poultry famers' income

The effect of mortality in layer chickens on famers' income was examined using regression analysis. The result (Table 5) shows that mortality significantly influenced income of the famers at $P<0.05$. It had a coefficient of -0.041. The R^2 and F-ratio were 0.653 and 63.973(significant at $P<0.05$), respectively. The negative coefficient signifies inverse relationship between mortality in layer chickens and income of the famers. Bell and Weaver (2002) had reported a coefficient of -0.172 and -0.287 between mortality and revenue of famers keeping layers under free and deep litter systems, respectively. Ebraheem *et al.,* (2012) reported that 1% increase in mortality rate resulted to decrease in egg profit with a coefficient of -0.347. Higher mortality rates are associated with lower profitability of laying hen enterprise (Ebraheem *et al.,* 2012). The result of this study also shows a negative coefficient between mortality and quantity of eggs produced, however it was not significant. Farooq *et al.,* (2002) reported that mortality reduces the population of birds, egg production and income of famers. Furthermore, in an attempt to reduce mortality the farmers incur higher cost of production resulting in low income.

Conclusion and Recommendations

Conclusion

The study indicated that mortality was recorded mostly at the growing stage of the layer chickens; coccidiosis (disease) was the major cause and affected the level of egg production and income of the poultry famers in the study area.

Recommendations

i. Based on the findings, poultry famers should use coccidiostat, anticoccidial drugs and other important poultry drugs appropriately based on veterinary prescription to prevent diseases.

ii. Farmers should pay more attention at the growing stage when raising layer chickens

iii. Poultry famers should provide good ventilation, reduced flock size and stocking density to minimize diseases risk. Providing adequate space and regular removal of litter material in the poultry houses is therefore important.

iv. There should be regular awareness from extension organization to poultry famers for better hygiene practices and disease eradication programs.

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Table 1: Management practices, source of day old chick, and type of birds reared by the poultry farmers (N=60)

Parameter	Frequency	Percentage
Management system		
Deep litter	59	98.33
Battery cage	1	1.67
Type/colour of chickens		
Brown	47	78.33
Black	1	1.67
Both	12	20
Source of day old chicks		
Amobyn farm	14	23.33
Zartech farm	22	36.67
CHI farm	5	8.33
Ota farm	1	1.67
Unknown source	18	30.00

Source: Field survey, 2014

Table 2a: Mortality rate of layer chickens in the villages

Village	Start	End	Mortality	Mortality Rate (%)
Rantya	53434	44081	10189	19.07
Kangang	24379	22450	2221	9.89
Total	75884	68460	12410	28.96
			Mean	14.48

Source: Field survey, 2014

Table 2b: Stages/age at mortality in layer chickens in the study area

Stage/age of mortality	Frequency	Percentage
Brooding stage (1-5 weeks)	21	35
Growing stage (6-17 weeks)	24	40
Laying stage (≥18 wks)	15	25

Source: Field survey, 2014

Table 3: Causes of mortality in layer chickens in the study area

Causes	Frequency	Percentage
Disease		
Fowl typhoid	5	6.17
Newcastle	12	14.81
Coccidiosis	22	27.16
Gumboro	3	3.70
Pullorum	2	2.47
Cholera	2	2.47
E.coli	4	4.94
Chronic respiratory disease	2	2.47
Weather		
Cold weather	5	6.17
Hot weather	1	1.23
Management problem		
Hatchery problem	5	6.17
Stampede	9	11.11
Cannibalism	1	1.23

Source: Field survey, 2014

Table 4: Correlation matrix of the relationship between age and mortality in layer chickens in the study area

Mortality/Age (WKs)	*Mortality*	*L.S (≥18)*	*G.S(6-17)*	*B.S(1-5)*
Mortality	1.000			
L.S (≥18)	.557*	1.000		
G.S (6-17	.736*	.643*	1.000	
B.S (1-5)	.422*	.607*	.767*	1.000

L.S =Laying stage, G.S =Growing stage, B.S =Brooding stage. * = Correlation is Significant at P< 0.05

Source: SPSS version 16.0

Predictor	β	*SE*	*T-value*	*P*
Constant	-122.398	97.335	1.257	0.108
Number of crate of eggs	-5.676	2.896	1.960^{NS}	0.058
Mortality	-0.041	0.05	8.469***	0.000
R^2	0.689			
F. Ratio	36.581***			

Table 5: Effect of mortality on famer's income
*** Significant at P<0.001
Source: SPSS version 16.0