Survivability of Pure and Cross Bred Chickens at Early and Late Growth Phase in Nigeria Humid tropics

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ABSTRACT
Survival is a general measure of an animal's fitness. In commercial poultry production, mortality can result from a range of conditions (disease, physiological stress, environmental condition and aggressive behaviour. The aim of this work is to evaluate Yoruba Ecotype Chicken (YEC), Sussex (SS), Goliath (GG), Marshall (MM) and crossbred with YEC for survivability in the Nigeria humid tropical climate. A total of 529 chicks were raised from day- old to 8 weeks (early growth phase) and 9 weeks to 20 weeks of age (Late growth phase). Data obtained was compiled and analysed using SPSS (2012) version 21 by using the methods of Kapler mier survivability test. The findings of the study revealed that at early growth phase, pure bred YEC x YEC had highest survivability of 91.20% while crossbred YEC x GG had the least survivalbility rate of 75.00%. The overall survivability of 86.40% was recorded at this stage. Late growth phase recorded highest survivalbility (100.00%) for cross bred YEC x GG while cross bred YEC x MM had the least survivability of 87.50% and overall was 94.10%.This study concluded that YEC are hardy while cross breeding improve the performance of YEC x GG at the late growth phase and also that probability of survival was not equal among all the examined breeds. The study recommends that YEC should be used as terminal sire in crosses involving exotic breeds for proper adaptability and performance in the Nigeria humid tropics.
(**Key words: *Cross bred, Survivability, Early growth phase, late growth phase,* Kapler mier**)

INTRODUCTION
Survivability refers to the rate at which an animal survive and reproduce within a define environment (Barker, 2009), the rate of survival of chicken could be dependent on conditions like feeding, disease condition, physiological stress and response to other environmental conditions. Bird's survival recorded as a binary traits i.e either dead or alive at a given time is a potential indicator for many underlying health traits that could be improved simultaneously. Flock *et al.,* (2005) and Havensten *et al*., (2007) stated that selection for general survival has been applied largely in chickens and turkey but with little success.

MATERIALS AND METHODS
Location of the study
A poultry facility located at Oyan (Osun state, South-West Nigeria) was used. The coordinates of the experimental site is latitude 8.05 and longitude 4.77 and an elevation of 422 meters above sea level.

Experimental animals and Management
A total of 529 chicks which belong to four purebred (Yoruba ecotype, Sussex, Goliath and Marshall) and six crossbred strains (Table 1) obtained from hatchability experiments were used for the evaluation of early growth performance of the 10 chicken strains. Also, a total of 457 eight-weeks old chickens were used to evaluate weekly bodyweight performance of grower chicken. Birds were raised in deep litter floored. All birds were given unrestricted access to

water, and were fed the same diet *ad-libitum.* The time (days) for individuals within each strain to die (mortality) was recorded and plotted against the cumulative probability of survival.

Statistical Analysis

Data for survivability was obtained for all the strain from day-old to 8 weeks of age (early growth phase) and 9 weeks to 20 week (late growth phase). The incidence of death (mortality) was recorded per bird per day while mortality was scored 1 throughout the experimental period. Data was compiled and analysed using SPSS (2012) version 21 by using the methods of Kapler mier survivability test. The cumulative probability percentage of survivability was calculated for each breed and the survival function was obtained from the record of mortality and plotted against the cumulative probability of survival. Also, the log rank test was used to test the probability of equality in survival among all the breeds.

RESULTS

Survivability in Early Growth Phase

Figure 1, shows the Kapler-Meier survival distribution of early growth phase in pure and cross bred chickens. The birds were monitored for the period of 8weeks (early growth phase) It was noted that about 9% of YEC, 13 % of GG, 11% of SS, 11% of MM, 25 % of YEC x GG, 15% of YEC x SS, 20% of YEC x MM, 17% of GG x YEC, 14 % of SS x YEC and 20% of MM x YEC reached the event (mortality) at different days during the early growth phase.

The Log rank test of equality of survival distribution (Table 1) for different breeds was significant (x^2 = 12.08, d.f = 9, $p<0.05$). Pure bred YEC had the highest percentage survival (91.2%) while cross bred YEC x GG recorded the lowest percentage survival (75.0 %). Other breeds had percentage survival values that were intermediate between these two values at the same growth phase.

Survivability in Late Growth Phase

The Kapler meier survival plot for late growth phase is shown in Fig 2. Most of the birds in each strain survived better at this phase. Approximately 5% of YEC, 6 % of GG, 4% of SS, 17% of MM ,0% of YEC x GG, 8% of YEC x SS , 12.5% of YEC x MM, 7% of GG x YEC, 3% of SS x YEC and 4% of MM x YEC reached the event (mortality) in this growth phase. The log rank test of equality of survival distribution (Table1) for different strains was significant at this stage (x^2 =25.41, d.f= 9, $p<0.05$). This explained inequality in probability of survival among all the breeds in this growth phase with cross bred YEC x GG recording the highest (100%) while cross bred YEC x MM had the lowest (87.5 %).

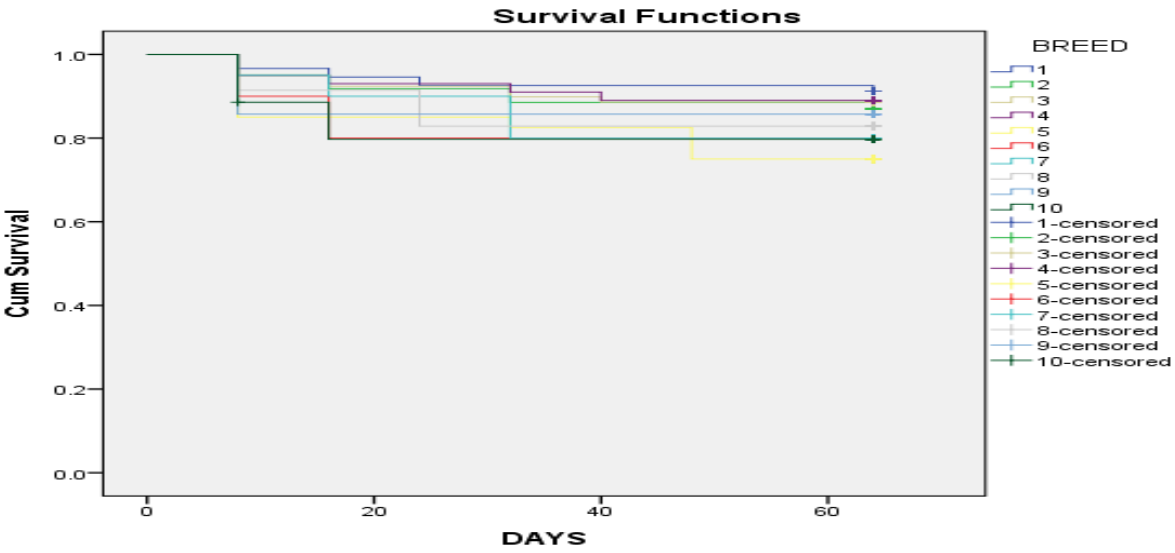

Figure 1: Survival function for early growth phase

Breed 1= YEC, 2= GG, 3 = SS, 4 = MM, 5= YEC x GG, 6 = YEC x SS, 7 = YEC x MM, 8= GG x YEC, 9 = SS x YEC and 10 = MM x YEC.

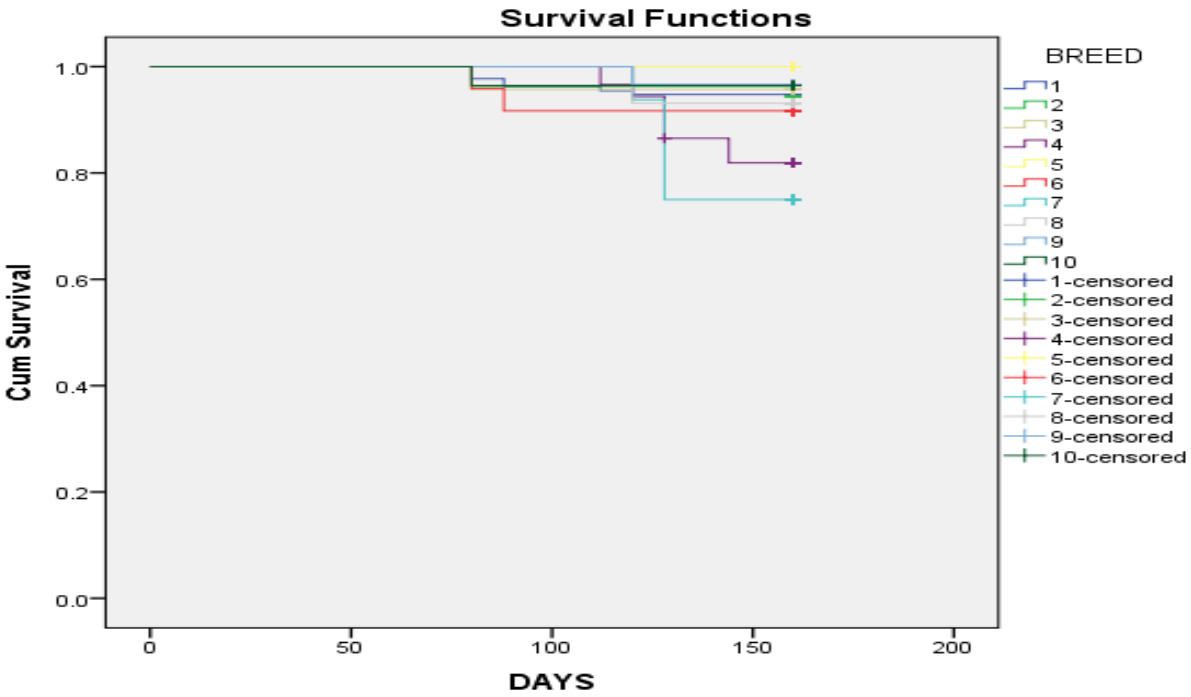

Figure2: Survival function for late growth phase

Breed 1= YEC, 2= GG, 3 = SS, 4 = MM, 5= YEC x GG, 6 = YEC x SS, 7 = YEC x MM, 8= GG x YEC, 9 = SS x YEC and 10 = MM x YEC.

Table 1: Survival Distribution of Early Growth Phase (Day Old - wk8) and Late Growth Phase (wk9 – wk20) in Pure and Crossbred Chickens

	EARLY GROWTH PHASE			LATE GROWTH PHASE		
Strain	**Number**	**Survival**	**Percentage Survival**	**Number**	**Survival**	**Percentage Survival**
YEC x YEC	148	135	91.2%	135	126	94.7%
GG x GG	61	54	86.9%	54	51	94.4%
SS x SS	79	70	88.6%	70	67	95.7%
MM x MM	46	41	89.0%	41	37	90.0%

YEC x GG	40	30	75.0%	30	30	100.0%
YEC x SS	30	24	80.0%	24	22	91.7%
YEC x MM	20	16	80.0%	16	14	87.5%
GG x YEC	35	29	82.9%	29	27	93.1%
SS x YEC	35	30	85.7%	30	29	96.7%
MMx YEC	35	28	80.0%	28	27	96.4%
Overall	529	457	86.4%	457	430	94.1%

LogRank (x^2 = 12.08 for early growth phase and 25.41 for late growth phase<0.05) YEC, GG, SS, MM represent: Yoruba Ecotype Chicken, Goliath, Sussex, and Marshall Broiler, respectively

DISCUSSION

The variation in probability of survival between early growth rates could be attributed to genetic makeup of the birds because pure bred YEC had been known for their hardiness in the tropics (Adebambo *et al*., 1999). The high survival rates in the introduced strains (i.e. SS and GG) gave an understanding that they adapt well in the tropics though this was more positive during the late growth phase while the cross bred also survived better at this growth phase. This implies that the probability of survival was not equal among all the examined breeds. It can be generally explained that survival can display variability depending on differential strain expression, environmental stressor, non-additive genetic factors and environmental factors. Merila and Sheldon (1999) and Ellen *et al*., (2008; 2010) opined that antagonistic relationship and social interactions can also be a reason for survivability in chickens. However, Quinton *et al*., (2011) reported that early survival and late survival were not genetically correlated which indicates that this traits are independent of each other.

CONCLUSION AND RECOMENDATION

The study concluded that YEC were hardy while cross breeding improve the performance of YEC x GG at the late growth phase and also that probability of survival was not equal among all the examined strains. The study therefore recommends that YEC should be used as terminal sire in crosses involving exotic breeds for proper adaptability and performance in the Nigeria humid tropics.

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