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Effects of Various Storage Temperature on the Hatchability of Quail Eggs in Hot Humid Environment of Lafia, Nasarawa State, Nigeria.

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Abstract
Four hundred and fifty (450) eggs laid by Japanese quailswere subjected to various storage media in hot humid environment of Lafia, NasarawaState, namelyroom temperature (26.7^{o}C),cool clay pot temperature (20.5^{o}C) and refrigerator temperature(12.7^{o}C), for seven (7) days simultaneously and the temperatures monitored and recorded. The results obtained show that, the eggs stored at the refrigerated temperature had the highest percentage (%) hatchability of(68%), followed by the cool clay pot temperature with (30%), while the percentage (%) hatchability of thosestored at ordinary room temperature was (7.3%). This result indicated that, lower temperature is required for storingquail eggs and also to enhance better hatchability performance.Cool clay pot if modified could be an alternative to save cost accruing from the purchase of refrigerator andcould be very ideal for the rural setting where power supply is lacking.

Key words: *Quail eggs, storage temperatures, hatchability, embryo mortality*.

Introduction

Poultry is a term connoting all domesticated birds raisedfor eggs, meat used as food and for research purposes.The term is sometimes restricted in application todomesticated galliformes birds such as chickens,turkeys, geese, quails and other birds bred for purposeof domestic economy (North, 1978).Poultry production is an important industry in Nigeria. Ithas also been found that Nigeria leads all other AfricanCountries in poultry production (FOA, 1980), hencepoultry consumption is growing at a faster rate than thatof other kinds of livestock which led to the introduction ofquail into Nigeria (Ikpi *et al*., 1977).The quails (*Coturnix conturnix*), are small, robust birdswith high reproductive ability. They come in various sizes and colour varieties with wild species found in Asia,:Europe and certain parts of North Africa. They have been domesticated in Asia and Europe for decades and have a been found to be easy to keep, requiring little space and simple equipment. They are also resistant to some of the common poultry disease (Haruna, 1995; Lombin, 1990; Lukefahr, 1991; Wilson and Shingari, 1991). It wasreported that, many of the domesticated strains haveoriginated from China and the migrating Chinese carried them throughout Asia. Today millions of domestic quails are reared all over the world (Anonymous, 1971; Haruna, 1995; Wilson and Shingari, 1991). Even though, quails do very well in temperate climate,they are known to be adaptive to different

environments including the hot climates such as the one found in Nigeria and other parts of the tropics. The quails were firstintroduced into the country by the National Veterinary Research Institute (N.V.R.I.) Vom, through a farm inBenin Republic with commercial production as in thechickens industry with specialized units involvinghatcheries and processing units for eggs and meat,when it was noticed that, the poultry industry in Nigeria cannot meet the ever increasing demand for animalprotein and other purposes. Petek *et al*. (2003) and Mani*et al*. (2008) have tried to look at temperature effect atdifferent perspective on quail in tropics and Nigeria.

In addition, temperature during storage is directly related to albumen quality changes, which are related to time and temperature dependent effects (Brake *et al*., 1993). Goodrum *et al*. (1989) reported that albumen pH increased rapidly when eggs were stored at high temperatures. The most important effect of albumen quality appears to be on early embryonic mortality (Brake *et al*., 1993). Van Schalkwyk *et al*. (1999) showed that storage temperature was a key factor in determining embryonic viability. In Nigeria a number of farmers are trying to keep the birds like other poultry, but the lack of infrastructure like the hatchery, electricity which is lacking in most part of the country, and even where there is electricity its relaibility is not there, due to incessent power outrage, making it difficult for owners of hatchery to operate and effective production. In this study, efforts were made to finding subtitude solution to hatching quail eggs particularly to the rural poor who donot have access to some basic infrastructurefor incubating quail eggs in hot humid environment so as to enhance better performance

Materials and Methods

Four hundred and fifty (450) quail eggs were collected and divided into three (3) storage media with distinct temperatures .The first set of 150 eggs marked (A) were stored in a cool clay pot kept on wet sand which was wateredtwice daily for the period of storage to create cool surrounding for the pot containing the eggs kept at mean average temperature of 20.5^0C.The second set of 150 eggs marked (B) werestored at the mean average room temperature of 26.7^0 C andThird set of 150 eggs marked (C) were stored in the refrigerator maintained at 12.7^0 C which was thecontrol.The eggs were stored for the periodof seven (7) daysduring this period, temperature were taken andrecorded twice daily using thermometers. At the end of storage period,the external parameter of each egg set was taken and the eggs were simultaneouslyincubated at 40^0 C using table incubators separately for each set of 150 eggs and are manually turned for a period of seventeen (17) days with an additional 24 hours to allow for drying of the hatched quail chicks. After the hatched chicks were removed and counted ,all the unhatched eggs were removed and broken for identification of fertile or embryonic mortality as described by (Abdel azeem, 2009). All embryo mortalities were classified as early (1-10) embryo

development and late (11-17) embryo the result was analysed using simple hatchability percentage for instance

Hatchability %=Number of hatched chick x 100
Number of set eggs

Results and Discussion

Table 1 presents the effect of storage type on egg weight parameters of the quail eggs the final weight of those eggs stored in clay pot and refrigerator were not significantly affected (P>0.05) only those stored at room temperarure had weight variation This is similar to findings of Silva *et al.*(2008) who reported that internal and external egg quality of breeder eggs are not affected by collection time or storage medium. The variation observed might have to do with the weather and other environmental factors sorrounding the storage medium.

Table 1 Effect of storage type on egg weight parameters (grams)

Storage medium	egg weight intitial	egg weight final	sign
Cold clay pot	10.01±0.02	10.00±0.01	ns
Room temperature	10.02±0.01	9.10±0.01	*
Refridgerator	10.12±0.01	10.01±0.02	ns

*= P<0.5

Table 2. presents the percentage (%) hatchability of eggsstored at clay pot, temperature (20.5^{o}C) was 45 (30%) , while those at room temperature (26.7^{o}C) was (7.3%) and those stored at refrigerator temperature (12.7^{o}C)was 102 (68%).At the end of the work, it was observedthat, most eggs stored at cool clay pot temperature had started developing however the embryo died before the end ofthe incubation on breaking their shells. The percentage
(%) hatchability obtained from the three (3) varied storage temperature; cool clay pot temperature, roomtemperature and refrigerator temperature were 30%,7.3% and 68% respectively.The variation in percentage hatchability clearly show the variation in the storage media uesd in the study. This showed that the eggsstored at refrigeration temperature of 12.7^{o}C recordedthe highest hatchability, this however fall short of theaverage percentage hatchability compared to those of the guinea fowls and chickens eggs under the same
storage condition, this may be attributed to irregular power supply. At this refrigerator temperature, the embryonic development was arrested and continuous metabolism that may lead to blastodermalsenenscense was avoided (Narahari, 1988; Streenivosaih and John, 1988; Wilson and Shingari, 1991). Accordingly, the low storage temperature of the eggs could have

Table2. Effect of storage media on hatchability parameters

Storage type	fertility %	hatchability%	chick wt	embryonic mortality(days)	
				(1-10)	(11-17)
Room temp	80.42	7.4	7.6	53	52
Clay pot	72.60	30	8.2	101	38
Refridgerator	85.2	68.2	7.9	15	33

The 30% hatchability recorded with the eggs stored in cool clay pot storage medium maintained at 26.7^{o}C wasprobably due to the porosity of the clay pot and damping environment provided by the water could be responsiblefor the microbial contamination of the eggs hence low percentage in hatchability. Though the cooling ability ofclay pot has been widely used as reliable alternative to the refrigerator in the rural setting, this has however not
been achieved in egg storage. Of the storage temperatures used in the present study, room temperature recorded the least %hatchability and this may be due to the reduction in moisture as this was conducted during the harshharmattan period (Streenivosaih and John, 1988; Wilson and Shingari, 1991). Even though in both the cool claypot and room temperatures, the eggs have starteddeveloping and formed chicks as seen during candling,most of the chicks died before the end of the incubationwhich may be due to lack of moisture during the storage in varioustemperatures.

Embryo mortality

One factor responsible for embryonic death is water loss Romanoff (1930); Tiwari and Maeda (2005), reported that insurfficient egg weight loss during incubation can reduce the gas exchange through the egg membrane promoting a decrease hatchability.

The effect of storage medium on embryonic mortality is outline in Table 2 with eggs stored at room temperature and clay pot having higher embryonic mortality 70 and 92% respectively. Similarly early embryonic mortality were notice in eggs of this two storage medium. This corroborates the submission of Brake *et al*.(1993) who opine that egg storage prior to incubation can have both detrimental and beneficial effect. The high mortalityand low hatchability resulting from the two pre storage medium (room temperature and clay pot) may result from egg weight loss as it is reported to have significant effect on rate of embryonic metabolism (Rahn *et al*., 1979; Meir *et al.,* 1984)

Chick weight at hatch

Body weight at hatch was significantly (P<0.05) affected by storage type with eggs store at clay pot recording higher weight than those stored at room temperature and refridgerator. The weight obtained in this study were within same range as reportd by Petek *et al.*(2003) and Farooq *et al.*(2001). Though the reported that major factors affecting chick weight at hatch include length of storage, hatching egg weight and water loss.

Conclusion

From the above, it can be concluded that, the refrigeration storage temperature offers the best percentage hatchability of quail eggs in hot humid environment but cannot be affordable to rural poor. The present study suggest that clay pot if properly handled and managed could be an option for egg pre storage handling and hatching particularly in rural communities where electricity is a major challenge,thus providing a sustainiable technology for increase quail production in the country.

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