

EFFECT OF STORAGE DAYS AND TEMPERATURE ON THE SENSORY EVALUATION OF FERTILE AND NON-FERTILE CHICKEN EGGS IN JOS PLATEAU STATE

Sati N. M¹, Emennaa P. E¹, Mbuka J. J.¹, Ene P. N.², Adesope A.I³ & Oshibanjo D.O^{2*}

National Veterinary Research Institute, Vom Jos Plateau State Nigeria¹

Department of Animal Production, University of Jos, Jos Plateau State Nigeria^{2}*

Department of Animal Science, University of Ibadan, Ibadan Oyo State Nigeria³

oshibanjoo@unijos.edu.ng

+2348055438564

ABSTRACT

This study aims at identifying a suitable method that will significantly reduce the rate at which biological and physiochemical changes occur within the egg with respect to storage and temperature. A total of 600 fertile and non-fertile eggs of Lohmann brown hen were collected from Poultry Division of National Veterinary Research Institute, Plateau State (NVRI) in four successive weeks and used for this study. The eggs were stored at room temperature (ambient) and refrigeration at 10°C for 0, 5, 10, 15 and 20 days. Eggs were boiled, served to taste panelists of 20 trained persons in a 2 x 2 Factorial arrangement in a completely randomized design. Data obtained were analyzed using ANOVA at $\alpha_{0.05}$. The results reveal that there was no significant difference ($p>0.05$) existed among odour, aroma, taste, texture and overall acceptability for all the treatments. However, there was significant difference ($p<0.05$) between fertile and non-fertile eggs colour. The colour and texture was observed to be statistically significant ($p<0.05$) in all the storage days 0, 5, 10, 15 and 20 for both fertile and non-fertile eggs stored in room and refrigerator temperature. The colour of non-fertile eggs was recorded to be the highest at day 10 of refrigerator temperature. While the texture of fertile eggs was recorded to be the highest at day 10 and 15 of room temperature. There is no adverse effect of storage days and temperature on sensory evaluation of eggs from both the fertile and non-fertile.

Keywords: Sensory evaluation, storage days, storage temperature, fertile eggs and non-fertile eggs.

INTRODUCTION

Eggs are highly palatable and can be prepared or utilized in a number of ways. Eggs are perfectly balanced foods containing proteins, vitamins (except vitamin C) and minerals required for good health by both the young and old (NECC, 2014). Eggs could be fertile, non-fertile and unfertile. If the egg is infertile, the germinal disk contains the genetic material from the hen only. If the egg is fertile, it contains genetic material from both parents and is where embryonic development begins. The yolk material serves as a food source for embryonic development (Jacqueline *et al.*, 1998).

The main degradation factors for eggs are storage days (time), Bell (1996), temperature, humidity, air movement, and handling (Stadelman 1995; Samli *et al.*, 2005). Internal quality deterioration of eggs can be retarded significantly by maintaining storage temperature, because quality deterioration occurs faster at high temperatures than at refrigerated temperatures during storage (Zeidler, 20023). Therefore, the present study has been undertaken to determine the effects of storage days and temperature on sensory qualities of fertile and non-fertile eggs.

MATERIALS AND METHODS

Experimental site: The experiment was conducted at microbiology and biotechnology laboratory of the Pharmaceutical sciences, University of Jos, Jos-North Local Government Area (LGA) of Plateau State. It is situated at the extreme North of the State and located between latitude 9° E55' North of the Greenwich meridian and longitude 8° E54' East of the Equator (Haruna *et al.*, 2007).

Collection of experimental material

A total of 600 fertile and non-fertile eggs was collected from Poultry Division of National Veterinary Research Institute, Plateau State (NVRI) in four successive weeks were used for this study. Eggs were

obtained from Isa brown female chickens. The eggs were stored at room temperature (ambient) and refrigeration at 10°C for 0, 5, 10, 15 and 20 days and humidity was 55 to 60% for all treatments.

Sensory evaluation

A total of 20 trained individuals aged between 20 and 40 years were used to assess two replicate of the prepared eggs. The samples were evaluated using a 9-point hedonic scale for flavor, colour, juiciness, tenderness, and overall acceptability. The scale had a maximum score of 9 while the lowest score of 1 was assigned to the poorest condition (Mahendraker *et al.*, 1988).

Experimental design

2 x 2 Factorial arrangement in a completely randomized design.

Statistical analysis

Data collected were analyzed using General linear model of SAS (SAS 2010). Statistical variations were observed and means were separated using Duncan's multiple range test.

RESULTS AND DISCUSSIONS

The main effect of temperature difference on sensory evaluation of fertile and non-fertile eggs are shown in Table 1. There was no significant difference ($p>0.05$) that existed for odour, aroma, taste, texture and overall acceptability for all the treatments. However, there was significant difference ($p<0.05$) between fertile and non-fertile eggs colour. The highest colour was recorded non-fertile egg stored under room temperature which the least colour was observed on fertile egg stored under room temperature. The result obtained for colour could be due to fertilization process and moisture content that losses during storage.

The interaction effect of storage days and temperature difference on sensory evaluation of fertile and non-fertile eggs is presented in Table 2. The colour and texture was observed to be statistically significant ($p<0.05$) in all the storage days 0, 5, 10, 15 and 20 for both fertile and non-fertile eggs stored in room and refrigerator temperature. The colour of non-fertile eggs was recorded to be the highest at day 10 of refrigerator temperature. While the texture of fertile eggs was recorded to be the highest at day 10 and 15 of room temperature.

Table 1: Main effect of temperature difference on sensory evaluation of fertile and non-fertile eggs

Parameter	Fertile Egg		Non-Fertile Egg		SE M
	Room Temperature	Refrigerator Temperature	Room Temperature	Refrigerator Temperature	
Colour	4.42 ^b	4.70 ^b	5.82 ^a	5.06 ^{ab}	0.19
Odour	2.24	2.60	2.43	2.80	0.15
Aroma	4.12	3.90	3.76	4.00	0.11
Taste	5.97	6.24	5.80	6.15	0.21
Texture	5.81	5.64	5.65	5.36	0.14
Overall Acceptability	6.91	6.93	6.74	6.70	0.13

^{a, b} means with different superscripts within the same row differ significantly ($p<0.05$), SEM means standard error of mean

CONCLUSION

There is no adverse effect of storage days and temperature on sensory evaluation of eggs from both the fertile and non-fertile.

REFERENCES

- Bell, D. (1996). Effects of temperature and storage time on egg weight loss. *Poultry International* **35**(14):56-64.
- Haruna, U., Daneji M.I. & Idi .S (2007). Comparative Economic Analysis of Adopters and Non-adopters in Bauchi LGA, Bauchi State. Proceedings of the 8th Annual conference Nigerian Society for Animal Production, AESON, pp: 55-62.
- Jacqueline P. Jacob, Richard D. Miles and F. Ben Mather(1998):*egg quality*, one of a series of the Animal Sciences Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida,24 (1):1-12.
- Joseph, J. K. and Ogundele, O. G. (1996). Shelf life of hen's egg as influenced by coating with shear butter fat, palm kernel oil and film packaging. *Nigerian Journal of Pure and Applied Science* **11**:398-404.
- Mahendrakar, N.S., Khabade, U.S and Dam, N.P (1988). Studies on the effect of fattening on carcass characteristics and quality of meat from Bannur lambs. *J. Food Sci. Tech.*25: 225-231.
- National Egg Coordination Committee, NECC, (2014): Food and Egg Nutrition. Available at <http://www.e2necc.com/egg-index.html>. Retrieved 20/09/19.
- Samli, H. E., Agha, A. & Senkoylu, N. 2005. Effects of storage time and temperature on egg quality in old laying hens. *Journal of Applied Poultry Research* **14**:548-533.
- SAS (2010). SAS/STAT User's Guide:Version 9.2. SAS Institute Inc., Cary. NC., USA;2010.
- Stadelman, W.J and Coterill, O.J. (1986): The preservation of quality of Shell eggs. In: Stadelmann and Coterill O.J. (eds). *Egg Science and Technology*. Avi Publishing com., Inc, WestPort, Connecticut, USA. United States of Department of Agriculture- Agriculture Marketing Service, USDA-AMS (2000): Egg grading manual. Agricultural Marketing Division. Agricultural Handbook NO.75, U.S. Department of Washington D.C.
- Zeidler, G. (2002). Shell quality and preservation. In Bell, D. D. & Weaver, W. D. Jr. (eds). *Commercial Chicken Meat and Egg Production*. 5th rev. edn. Kluwer Academic Publishers, Norwell, pp. 1199-1217.

Table 2: Interaction effect of storage days and temperature difference on sensory evaluation of fertile and non-fertile eggs

Parameter	Days	Fertile Egg		Non-Fertile Egg		SE M
		Room Temperature	Refrigerator Temperature	Room Temperature	Refrigerator Temperature	
Colour	0	2.00 ^{abi}	2.00 ^{bi}	1.33 ^{bi}	1.33 ^{ai}	0.48
	5	1.5 ^{bi}	1.50 ^{bi}	2.50 ^{bi}	2.83 ^{abi}	0.48
	10	2.83 ^{ai}	3.50 ^{ai}	3.67 ^{aij}	4.50 ^{ai}	0.42
	15	2.22 ^{abj}	2.56 ^{aij}	2.67 ^{abij}	1.56 ^{ai}	0.31
	20	2.67 ^{abi}	3.42 ^{ai}	2.00 ^{ai}	3.58 ^{ai}	0.19
	SE M	0.32	0.42	0.35	0.35	
Odour	0	2.00	2.00	1.33	1.33	0.10
	5	1.50	1.50	2.50	2.83	0.30
	10	2.83	3.50	3.67	4.50	0.30
	15	2.22	2.56	2.67	1.56	0.28
	20	2.67	3.42	2.00	3.58	0.31
	SE M	0.23	0.29	0.29	0.38	
Aroma	0	4.00	4.00	4.00	4.00	0.10
	5	3.67	3.17	3.67	3.00	0.30
	10	4.17	4.33	3.67	4.83	0.30
	15	4.11	3.67	3.56	4.00	0.28
	20	4.67	4.25	3.92	4.08	0.31
	SE M	0.21	0.22	0.20	0.25	
Taste	0	6.67	6.67	6.00	6.00	0.00
	5	4.83	6.33	4.83	5.83	0.26
	10	6.17	6.33	6.33	6.17	0.27
	15	6.11	5.56	5.00	6.44	0.26
	20	6.08	6.33	6.83	6.33	0.26
	SE M	0.66	0.21	0.28	0.21	
Texture	0	6.17 ^{ai}	6.17 ^{ai}	4.83 ^{ai}	4.83 ^{ai}	0.20
	5	5.50 ^{ai}	4.67 ^{ai}	6.50 ^{ai}	4.70 ^{ai}	0.33
	10	6.89 ^{ai}	6.67 ^{ai}	6.67 ^{ai}	6.00 ^{ai}	0.26
	15	6.89 ^{ai}	5.89 ^{aij}	4.67 ^{aj}	5.11 ^{aij}	0.35
	20	4.83 ^{ai}	4.83 ^{ai}	5.58 ^{ai}	6.17 ^{ai}	0.30
	SE M	0.27	0.28	0.29	0.25	
Overall Acceptability	0	5.83	5.83	6.83	6.83	0.15
	5	7.00	7.67	5.5	6.33	0.35
	10	8.00	7.33	6.83	6.17	0.31
	15	7.67	7.00	7.56	7.44	0.26
	20	6.08	6.83	7.00	6.75	0.27
	SE M	0.30	0.26	0.27	0.23	

^{bcd} means with different superscripts within the same row differ significantly (p<0.05)., SEM means standard error of mean^{ijk} means with different superscripts within the same column differ significantly (p<0.05)., SEM means standard error of mean