ScienceDirect

Animal - Science proceedings

Volume 15, Issue 1, March 2024, Pages 164-165

147. Hatchability and physiological performance of broilers chickens given inovo administration of lycopene under heat-stressed environment

O. Ojo [a], D. Tanimowo [b], J. Abubakar [c], A. Akintunde [d]

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Application

Inovo feeding is a viable technology that facilitates extra nutrient deposition into chickens between the late-term embryo stage to early post-hatch period, meant to deliberately promote development of gastrointestinal tract and strengthen the immune system. Table 1

Table 1. Hatching Performance of heat-stressed broilers given *in-ovo* injection of lycopene.

Parameters	**Control (untreated) (T1)**	**S/W(0.5mil/egg) (T2)**	**Lyc(0.125mg/0.5/egg) (T3)**	**Lyc(0.25mg/0.5/egg) (T4)**	**Vit.C. (0.25/0.5/egg) (T5)**	**SEM**	***P* v**
Hatched eggs	12.33^{bc}	15.67^{a}	14.67^{a}	13.33^{ba}	10.67^{c}	0.6	0
Un-hatch eggs	4.33^{b}	0.33^{c}	1.33^{c}	3.33	6.33^{a}	0.53	0

Parameters	Control (untreated) (T1)	S/W(0.5mil/egg) (T2)	Lyc(0.125mg/0.5/egg) (T3)	Lyc(0.25mg/0.5/egg) (T4)	Vit.C. (0.25/0.5/egg) (T5)	SEM	P v
Dead embryo	1.00[b]	0.00[b]	0.33[b]	1.33[b]	4.67[a]	0.89	0
Mortality after Hatched	0.67[aa]	0.00[a]	0.33[a]	0.667[a]	1.00[a]	0.47	0
Livability	11.67[b]	15.67[a]	14.67[a]	12.67[b]	9.67[c]	0.49	0

Introduction

Continous changes in climatic condition globally has caused an out-play of extreme weather conditions, culminating into heat-stress, experienced by man and livestock. Heat stress (HS) results into an increase in production and activity of reactive oxygen species, which negatively impact the physiological mechanism and hatchability of chickens. I*novo* feeding of chickens with phytonutrients and plant products has been reported to improve their defenses against various diseases like contagious bursal disease, influenza virus and new castle disease. Restricting chicken embryos the access to extra nutrient supply, at the later stage of development may prevent freshly hatched chicks from growing and developing into their full potential. Lycopene is a phytochemical, known for its powerful free radical-scavenging qualities and thermoregulatory potential, according to its thermotolerance effect on heat-stressed animals (Han et al. 2020). Antioxidant activity (peroxyl-radical scavenging) of lycopene has been noted to be twice as efficient as beta-carotene and 10 times higher than alpha-tocopherol in extinguishing ability. Revealation shows that lycopene supplementation could improve antioxidant capacity, immune function and regulate lipid metabolism in chicks, especially at hatching (Lee et al., 2016). Although lycopene has been proven to have ROS scavenging abilitites, however, i*n-ovo* injection of lycopene administration in HS broilers has not been well documented. This research was conducted to evaluate the hatchability and physiological performance of broilers chickens given *in-ovo* administration of lycopene under heat-stressed environment.

Material and methods

The pre-hatching, hatching data collection was carried out at Broncho hatchery, Oluyole, Ibadan, Nigeria. Three hundred Arbor-Acre broiler breeder hatching eggs were obtained from Farmer's Agro, Ibadan, with mass average of 53.5 g. Eggs were incubated according to standard hatchery practices for 21 days using Chick Master, single stage setter and hatcher (Ohio, USA). Incubation temperature, relative humidity used was 37.7°C and 70–75% relative humidity from 1 to 18 days of incubation;

while 36.66°C and 75–82% was used from 19 to 20 days of incubation. On the 18th day of incubation, eggs were removed from incubator and candled to separate unfertilized ones or dead embryos. Fertile eggs (N = 240) were selected from set eggs and sanitized using alcoholic antiseptic solution, prior to experimental injection of lycopene. The eggs were divided into 5 experimental groups with 48 fertile eggs per group, replicated thrice with 16 fertile eggs per replicate. The frozen lycopene was thawed and reconstituted using sterile water to form varying concentration of sterile water-lycopene homogenized solution. Eggs were cleaned prior to injection to ensure a sterilized *in-ovo* injection procedure. Thereafter, a pin head-sized hole was made on each egg, just below air cell, injections were performed using insulin syringe (0.25mm × 8mm) on the 18th day of incubation. Experimental groupings were; Negative Control: Eggs not injected (T1); Positive Control: Eggs injected with 0.5 ml of sterile water (SW) (T2); Lyc 0.125 Group: Eggs injected with 0.125 mg of lycopene + 0.5 ml of SW (T3) ; Lyc 0.25 Group: Eggs injected with 0.25 mg of lycopene + 0.5 ml of SW (T4); Vitamin C Group: Eggs injected with 0.25 mg of Vitamin C + 0.5 ml of SW (T5). Immediately after injection, site was sealed using a sterile sealant and eggs were returned to the incubator. On the 21st day of incubation, temperature was decreased gradually (hour by hour) from 36.66 to 36.11°C till onset of pipping. The hatched chicks in each group were transferred into different units within the brooding pen for post-hatch data collection. The pre-hatching mortality (18–21 day), hatchability, liveability, and physiological performance at post hatch were subjected to statistical analysis. All data collected were statistically analysed with SAS software, using One-way analysis of variance (ANOVA). Means were separated using Duncan Multiple Range Test.

Result

Results recorded statistically ($P < 0.05$) highest values of unhatched chicks, dead embryo and mortality after hatch in T5 injected with 0.25 vitamin C/0.5mls SW). Statistically ($P < 0.05$) elevated number of hatched eggs was noted in T2 (0.5 mls SW/egg) and T3 Lyc(0.125 mg/0.5/egg), while the significantly ($P < 0.05$) depressed livability value was observed in T5 (0.25 vitamin C/0.5 mls SW). Rectal and body temperatures were within the normal range of 41–42°C.

Conclusion

In conclusion, *in-ovo* injection of either saline water (SW) at 0.5 mls or lycopene at 0.25 mg 1.25 mg of lycopene/ 0.5 mls saline water (SW) is recommendable

Acknowledgements

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