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STUDY ON THE MALPOSITION AND MALFORMATION IN INDIGENOUS CHICKEN EMBRYOS

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Abstract: Break open studies were undertaken to study the malposition and malformation of unhatched indigenous chicken eggs procured from three hatcheries in and around Chennai. Out of 1009 unhatched eggs, 381 were of late embryonic death and 49 (12.89%) showed malposition of embryo. Out of 435 embryos (mid and late embryonic death), 19 (4.36%) embryos showed malformations. The present study revealed that malposition and malformation observed are one of the main causes for poor hatchability.
Keywords: Chicken, malposition, malformation, embryo.

Introduction

The avian embryo progresses through a series of positions throughout the incubation period and ends in normal position for hatching. Just prior to the beginning of the hatching process, embryos of chicken move into a normal position, characterized by the long axis of the body being aligned with the long axis of the egg. The head is curled forward and to the right with the beak tucked under the right wing and the tip of the beak pointed towards the air cell in the large end of the egg and any deviation from this was considered as malposition. Malpositioned embryos are unable to pip the eggshell and escape due to improper positioning within the egg (Wilson *et al*., 2003).

Six embryonic malposition were described in early studied. The following classifications of malposition have been generally accepted (Wilson *et al*., 2003).

I Head between the thighs

II Head in small end of the egg

III Head to left instead of under the right wing

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IV Head normal, but embryo rotated so that the beak is buried away from the air cell

V Feet over the head

VI Beak over right wing or over and under wing

Malformation of avian embryos is a common finding in breakout studies. Malformed embryos could not change the position in the incubation or could not pip the egg shell which leads to death of embryos. Deficiency or excess of vitamins and minerals, autosomal lethal mutations, inbreeding and heterosis may cause the embryonic malformations. Malposition and malformation of embryos end up in embryonic mortality and decreased hatchability (North, M.O. 1984).

Materials and Methods

One thousand and nine unhatched indigenous (includes Aseel, Kadaknath and Chittagong) chicken eggs were collected from three hatcheries in eight different batches. Methods of examination of dead-in-shell was to break open the shell by means of blunt end of scalpel at the large end of the egg and carefully peeling off the shell around the air cell. Then sufficient shell was removed to expose and determine the position of the embryo in relation to the air cell, after observing the position embryos were gently taken out by using forceps and observed for malformation (Rudraprasad *et al.*1996).

Results

Malposition was recorded in eight different batches and is presented in Table 1 and images in plate 1. Out of 381 late embryonic mortalities recorded, 49 (12.89%) showed malposition of embryo and the remaining 332 (87.13%) showed normal position i.e. head under the right wing. Out of 49 malpositioned embryos, highest malposition observed was feet over the face 19 (38.77%), followed by head between the thighs 13 (26.53%), head under left wing 9 (18.36%), beak over the right wing 4 (8.16%) and head near the small end of the egg (8.16%). Highest malposition was observed in batch H 11/50 (22.00%) whereas lowest malposition was observed in batch F 3/95 (3.15%).

Malformation was recorded in eight different batches and are presented in Table 2 and images in plate 2. Out of 435 embryos, 19 (4.36%) embryos showed malformations. Out of 19 embryos, 7 (36.84%) embryos showed crossed beak which was the highest malformation recorded followed by absence of upper beak 4 (21.05%), brachygnathia 2 (10.52%), polymelia 1 (5.26%), exposed brain 1 (5.26%), not grown left hind leg 1 (5.26%), deformed head 1

(5.26%), twins 1 (5.26%), and eviscerated intestine 1 (5.26%), Highest malformation was recorded in Batch G 5 (26.31%) whereas no malformation was recorded in batch E.

Discussion

It was observed that out of 381 late embryonic mortality, 49 (12.89%) showed malposition. Out of 49 malpositioned embryos, highest malposition observed was feet over the face 19 (38.77%) followed by head between thighs 13 (26.53%), head under left wing 9 (18.36%), beak over the right wing 4 (8.16%) and head in the small end of the egg 4 (8.16%). These findings are in accordance with the reports of Kalita *et al.* (2013b) who observed (43/416) 10.33%, (29/101) 28.71% malposition such as head towards the small end of the egg and head in between thighs in indigenous chicken eggs and Vanaraja chicken eggs respectively. However, the percentages of malposition were higher in Vanaraja chicken than our study.

While Rudraprasad *et al.* (1996) recorded proportion of beak above the right wing (24.98%) followed by head in the small end of the egg (12.60%) and the least being embryo rotated with beak away from the air cell (2.84%) but in our study embryo rotated with beak away from the air cell was not observed. Beak above the right wing (8.16%) and head in the small end of the egg (8.16%) were the least frequent malpositions.

The study revealed that out of 435 embryos, 19 (4.36%) embryos showed malformations. Out of 19 embryos, 7 (1.60%) embryos showed crossed beak which was the highest malformation recorded followed by absence of upper beak 2 (0.45%), twisted neck 2 (0.45%), polymelia 1 (0.91%), exposed brain 1 (0.91%), not grown left hind leg 1 (0.91%), deformed head 1 (0.91%), twins 1 (0.91%) and eviscerated intestine 1 (0.91%).These findings are in accordance with the reports of Kalita *et al.*(2013a) who observed 7.88% and 9.90% malformation in crossbred (PB-2 x Indigenous) and Vanaraja dead-in-shell embryo respectively. Though, the malformation like exposed brain and deformed head were not observed by them. In contrary to our findings, Kalita *et al.* (2013b) observed low percentage of malformations 3/241 (0.72%) such as twins, abnormally large left leg and intestinal prolapse.

The study revealed higher percentage of crossed beak followed by absence of upper beak. In contrary to the above finding, Butcher and Nilipour (2015) observed exposed brain (29%), deformed beak (27%) without eye(s) (25%), four legs (10%), No upper beak (8%) and deformed twisted leg (1%). However, embryos without eyes were not observed in our study.

Conclusion

The present study revealed that malposition and malformation observed are one of the main causes for poor hatchability.

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Table 1. Malposition

Batch	Head under right wing (normal position)	Head under left wing	Head between legs/thighs	Feet over face/head	Beak over the right wing	Head near the small end	Malposition
Batch A (n= 56)	49 (87.50%)	1 (1.78%)	3 (5.35%)	2 (3.57%)	1 (1.78%)	0 -	7 (12.5%)
Batch B (n= 26)	23 (88.46%)	1 (3.84%)	0 -	1 (3.84%)	1 (3.84%)	0 -	3 (11.53%)
Batch C (n= 48)	40 (83.33%)	1 (2.08%)	3 (6.25%)	3 (6.25%)	0 -	1 (2.08%)	8 (16.00%)
Batch D (n= 42)	35 (83.33%)	1 (2.38%)	1 (2.38%)	5 (11.90%)	0 -	0 -	7 (16.66%)
Batch E (n= 33)	27 (81.81%)	3 (9.09%)	0 -	1 (3.03%)	1 (3.03%)	1 (3.03%)	6 (18.18%)
Batch F (n= 95)	92 (96.84%)	1 (1.05%)	0 -	1 (1.05%)	1 (1.05%)	0 -	3 (3.15%)
Batch G (n= 31)	27 (87.09%)	0 -	0 -	2 (6.45%)	0 -	2 (6.45%)	4 (12.90%)
Batch H (n= 50)	39 (78.00%)	1 (2.00%)	6 (12.00%)	4 (8.00%)	0 -	0 -	11 (22.00%)
% of malposition	332 (87.13%)	9 (18.36%)	13 (26.53%)	19 (38.77%)	4 (8.16%)	4 (8.16%)	49 (12.86%)

Table 2. Malformation

Batch	Crossed beak	Absence of upper beak	Polymelia	Exposed brain	Not grown left hind leg	Deformed head	Brachygnathia	Twins	Eviscerated intestine	Total
Batch A (n=56)	1 (1.78%)	0 -	0 -	0 -	1 (1.78%)	0 -	0 -	0 -	0 -	2 (10.52%)
Batch B (n=29)	1 (3.44%)	1 (3.44%)	0 -	0 -	0 -	1 (3.44%)	0 -	0 -	0 -	3 (15.78%)
Batch C (n=51)	0 -	1 (1.96%)	1 (1.96%)	0 -	0 -	0 -	0 -	0 -	0 -	2 (10.52%)
Batch D (n=44)	0 -	1 (2.27%)	0 -	1 (2.27%)	0 -	0 -	0 -	0 -	0 -	2 (10.52%)
Batch E (n=38)	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -	0 -
Batch F (n=98)	1 (1.02%)	1 (1.02%)	0 -	0 -	0 -	0 -	0 -	0 -	0 -	2 (10.52%)
Batch G (n=41)	3 (7.31%)	0 -	0 -	0 -	0 -	0 -	0 -	1 (2.43%)	1 (2.43%)	5 (26.31%)
Batch H (n=78)	1 (1.28%)	0 -	0 -	0 -	0 -	0 -	2 (2.56%)	0 -	0 -	3 (15.78%)
TOTAL (n=435)	7 (36.84%)	4 (21.05%)	1 (5.26%)	1 (5.26%)	1 (5.26%)	1 (5.26%)	2 (10.52%)	1 (5.26%)	1 (5.26%)	19 (4.36%)

Plate 1

1a. Head under the right wing (Normal position)

1b. Head under the left wing

1c. Feet over the face/head

1d. Head between legs/thighs

Plate 2

2a. Absence of upper beak

2b. Crossed beak

2c. Crossed beak

2d. Brachygnathia