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## The Effect of Physical Contact on Pre-slaughter Stress and Fear Reactions in Broiler Chickens

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**Abstract:** This study investigated the effects of regular physical contact on fear and stress reactions and some performance parameters in broiler chickens. Broiler chicks were exposed to inverted handling with an experimenter for 5 min daily (Group-I), upright handling with an experimenter for 5 min daily (Group-II) and no handling (Control) during the study (1-37 days). Tonic immobility (TI) duration and corticosterone concentration were used to measure the levels of fear and stress, respectively. Present findings indicated that physical contact of human had no significant effect on tonic immobility duration, number of induction and the level of corticosterone in broiler chickens. As a result the body weight, feed intake, feed conversion ratio and mortality was not affected by this treatment.

**Key words:** Broiler chicken, fear, stress, tonic immobility

### Introduction

Whatever the type of poultry rearing systems improved relations between humans and chickens are keeping their importance with respect to both welfare and productivity. Human is a common stressor for broilers in many husbandry systems especially during pre-slaughter activities. Hemsworth *et al.* (1994) reported that contact with humans may elicit more fear and stress in smaller species than large animals such as cattle. There have been considerable studies about altering the physiology and behaviour of farm animals by regular contact with humans (Mills and Faure, 1991). The detrimental effects of stressors because of proteolysis and gluconeogenesis induced by corticosterone on growth performance and antibody production of broiler chickens have been studied (Lin *et al.*, 2006). Increased serum corticosterone level has been interpreted as physiological indicators of stress in broiler chickens.

Gross and Siegel (1983) suggest that regular gentle handling can reduce flightiness and levels of aggression within flocks, improve growth, feed conversion ratio. There is evidence that poultry are sensitive to visual contact with humans (Jones and Faure, 1981). Handling of broilers prior to slaughter is a stressor and, exposing chickens to an unfamiliar environment is likely to elicit both fear and stress reactions (Zulkifli and Sti Nor Azah, 2004; Nicol and Scott, 1990; Kannan and Mench, 1997; Rushen *et al.*, 1999). On the contrary, Keer *et al.* (1996) reported that application of intuitively unpleasant handling regimen involving brief suspension by the legs reduced the fear of humans in broiler chicks. However, many authors did not observe significant improvement in growing performance of broilers subjected to similar treatment (Zulkifli and Sti Nor Azah, 2004).

A method that has been used to measure fear levels is

to induce tonic immobility (Benoff and Siegel, 1976; Jones, 1992). Tonic immobility is an anti-predator behaviour shown in situations where the chicken has been caught by a predator. By pretending to be dead, there is a better chance to escape in an unguarded moment (Thompson and Liebreich, 1987). The duration of tonic immobility has been shown to correlate positively with fear and stress levels measured by the serum corticosterone (Lin *et al.*, 2006).

The current study evaluated the effect of physical contact (handling) on pre-slaughter fear and stress reactions in broiler chickens.

### Materials and Methods

This study was carried out in the Poultry Unit of Faculty of Veterinary Medicine, Adnan Menderes University. Three hundred 1-day-old chicks (Cobb 500) were consisted of the material. On day 1, the chicks were individually weighted; wing-tagged and randomly divided in three groups each containing 100 chicks (6 chickens/m<sup>2</sup>). The floors were covered with a 10 cm layer of wood shavings. Ambient temperature was maintained between 22 and 24°C and a constant photo-period of 24 h was provided. The feed supply was changed from starter (3060 kcal ME/kg; 23 % crude protein) to finisher pellet (3200 kcal ME/kg; 22 % crude protein) at 14 days of age. Water was provided by nipple drinkers positioned along one of the side walls of the room (one for 5 chickens). Eight feed trays for each room were placed throughout the room for feeding (10 cm feeder space per chicken). Supplementary heat was supplied in each room during the brooding period by gas heaters.

Commencing from day 1, the chickens that randomly selected were exposed to handling procedure with an experimenter as follows: Group-I (inverted handling that chicken caught by the legs and held in an inverted

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**Table 1:** TI durations, number of inductions and corticosterone concentrations in groups

	Control Mean±SEM n= 45	Group I Mean±SEM n= 45	Group II Mean±SEM n= 45	P
Duration (s)	128.07±18.10	117.64±16.24	111.84±14.23	-
Induction No.	1.83 ± 0.21	1.51±0.19	1.48 ± 0.13	-
Corticosterone concentration (ng/ml)	4.20 ± 0.16	3.98 ± 0.19	3.87 ± 0.17	-

-:non significant

manner for a few seconds), group-II (upright handling that chicken held for a few seconds using both hands, allowing the chicken to stand still on the floor) and control (non-handling) (Kannan and Mench, 1997). Experimenter spent 5 min for this handling procedure for each room daily basis.

On day 37, a total of 135 chickens (45 chickens from each group) were individually, gently removed with minimum disturbance to flock mates. After capturing the chickens were carried in an inverted manner for a total period of 2 min and placed in plastic transport cages (0.8 m X 0.6 m X 0.3 m) at 10 chickens per cage for 10 min. Then, the chickens were recaptured individually and carried in an inverted manner to a separate room for tonic immobility test (TI). TI induced as soon as the chickens were carried to the test room by restraining them on their right side and wings for 15 seconds (s). The experimenter retreated approximately 1 m away from the test table and waited without noise. A chronometer was used to record latencies until the chicken righted itself. If the chicken righted itself in < 10 s, it was recaptured and the procedure was repeated. If TI was not induced after 3 trials the TI duration was recorded as zero. The maximum duration of TI allowed was 600 s (Benoff and Siegel, 1976).

Broiler chickens were carried in an inverted manner for a total period of 2 min and placed in plastic transport cages at 10 chickens per cage for 10 min like commercial conditions to measure the levels of pre-slaughter stress. Then, the chickens were recaptured individually and carried in an inverted manner to their rooms. Blood samples (2 ml) were collected at one hour after handling and caging procedure from the brachial vein into tubes for corticosterone analysis. The tubes kept in room temperature until the serum was separated. Then the serum samples were immediately assayed. The serum corticosterone concentrations were measured by commercial ELISA kit (Assay Designs, catalogue no: 900-097).

For performance parameters all the chickens were individually weighted on day 37. Total feed intake during the study was recorded and feed conversion ratio (FCR) was determined. Mortality was also recorded daily.

The TI durations and corticosterone concentrations were analyzed using a logarithmic transformation depending on ANOVA assumptions of normality and homogeneity of variance. Data on percentage of mortality were

analyzed by Chi-Square test (Sümbüloğlu and Sümbüloğlu, 1993).

**Results**

Chickens that had been exposed to physical contact with human showed slightly shorter durations of TI than did the controls. TI durations in control, group-I and group-II were found as follows; 128.07, 117.64 and 111.84, respectively. It was determined that physical contact with human had slightly reduced fear reactions in broilers but failed to reach significance (Table 1). Similarly, the induction numbers recorded for each chicken had a tendency to decrease with no statistically significance.

Corticosterone concentrations that accepted as a stress indicator in broilers were influenced by physical contact but this was not significant. Mean corticosterone concentrations were found as 4.20, 3.98 and 3.87 ng/ml in control, group-I and group-II, respectively.

This study revealed that body weights before the departure for slaughter were not affected by physical contact with human. Body weights at 37 days of age in control, group-I and group-II were recorded as 2110.30, 2087.21 and 2103.72 g, respectively (Table 2). Total feed intake and feed conversion ratios of these groups were as follows; 3510.75, 3480.10 and 3477.32 g; 1.66, 1.66 and 1.65, respectively. Mortality ratio was changed between 3.00 and 5.00 during the study (Table 2).

**Discussion**

Physical contact involves important changes in both physical and social environments the best known and potentially most frightening event encountered by broiler chickens. Kannan and Mench (1997) reported that regular handling or increased human contact has been reported to produce a number of beneficial effects in broilers. Zulkifli and Sti Nor Azah (2004) determined that regular handling had reduced tonic immobility reactions in broilers. However, Nicol (1992) observed that handled broilers exhibited longer tonic immobility reactions after transportation than non-handled ones. Bizeray *et al.* (2002) stated that the age of the broiler had significant effect on mean TI duration in broiler chickens (TI durations were recorded as 134.2 and 103.9 s for 3 days and 20 days old broilers, respectively). However, a direct comparison cannot be made between stress and fear reactions, it's thought that they are related (Jones and Faure, 1981). Marin *et al.* (2001) reported that fear levels were heightened (TI duration had been reached to 327.9 s from 181.0 s) in broiler chickens that had been exposed to an acute restraint stressor one hour earlier. Zulkifli and Sti Nor Azah (2004) stated that tonic immobility duration in broiler chickens in case of visual contact with humans had been decreased to 108 s from 176 s was recorded for control counterparts). Mills and Faure (1991) indicated that the duration of tonic immobility response in Japanese quails at the age of 6

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Table 2: Some performance parameters in groups

Parameter		Control Mean±SEM n= 97	Group I Mean±SEM n= 95	Group II Mean±SEM n= 97	P
Body weight (g)	Day 1	42.28±0.29	43.71±0.34	42.09±0.31	-
	Day 37	2110.30±33.62	2087.21±25.12	2103.72±26.29	-
Total feed intake (g) (1-37 days)		3510.75	3480.10	3477.32	-
Feed conversion ratio (FCR)		1.66	1.66	1.65	-
Mortality (%)*		3.00	5.00	3.00	-

- : non significant. \*Chi-Square test was used for mortality analysis.

weeks were found as 172 s. These conflicting findings can be attributed to differences such as the frequency and time of handling.

Barnett *et al.* (1994) indicated that besides improved growing performance chickens that experience additional human contact show a lower corticosterone response to handling than chickens that have had minimal exposure to humans. Jones and Faure (1981) suggested that avoiding fear may prevent excessive adrenocortical activity during stressful situations. Kannan and Mench (1997) reported that mean corticosterone level in handling and non-handling groups were found as 4 ng/ml and 6 ng/ml, respectively. They also stated that handling method had no significant effect on corticosterone concentration (Mean corticosterone level were detected as 6 ng/ml and 3.8 ng/ml for inverted and upright handling groups, respectively) in broilers. The difference in the mean serum corticosterone concentration between treatment groups (group-I and group-II) and the control group was 0.22 and 0.33 ng/ml but the difference was not significant. It was determined that upright handling had lower influence on the corticosterone level than inverted handling. Hemsworth *et al.* (1994) found that broilers that were upright handled regularly had a lower corticosterone than those that were not handled. But this result was significant only for the chickens had been handled for 12 min that was not realistic under commercial rearing conditions. Additionally, Kettlewell and Turner (1985) reported that regular handling was less effective when handling is of short duration and broiler meat tenderness and water holding capacity were reduced after 2 h of transportation. On the other hand, broilers had been exhibit excessive susceptibility because of unfamiliar handlers during pre-slaughter activities. For this reason, it was considered that commercial handling can be much more stressful process than the type of inverted handling used in this study (by holding both of the legs instead of only one leg in commercial conditions).

Zulkifli and Sti Nor Azah (2004) reported that tactile contact by humans may result in improved growth performance in broilers. Authors calculated the body weight, feed intake and FCR at 42 days of age as 2044g, 3767g and 1.89; 2009g, 3949g and 2.01, respectively.

Similarly, mortality ratios according to the groups were found higher (5.6 % and 5.4 % for control and human contact group, respectively) than this study. The difference may be attributed to the ages of these flocks. Finally, this study revealed that upright handling was less fearful to broilers than inverted handling despite the lack of significance. Similarly, mean corticosterone concentrations related to stress were found highest in control group than the treatment groups. It was thought that the stress and fear response to pre-slaughter handling and caging can be minimised to one extent by repeated handling during the production period.

### References

- Barnett, J.L., P.H. Hemsworth, D.P. Hennessy, T.H. McCallum and E.A. Newman, 1994. The effects of modifying the amount of human contact on behavioural, physiological and production responses of laying hens. *Appl. Anim. Behav. Sci.*, 41: 87-100.
- Benoff, F.H. and P.B. Siegel, 1976. Genetic analyses of tonic immobility in young Japanese quail (*Coturnix coturnix japonica*). *Anim. Learn. Behav.*, 4: 160-162.
- Bizeray, D., C. Leterrier, P. Constantin, G. Le Pape and J.M. Faure, 2002. Typology of activity bouts and effect of fearfulness on behaviour in meat-type chickens. *Behav. Proc.*, 58: 45-55.
- Gross, W.B. and H.S. Siegel, 1983. Evaluation of heterophil/lymphocyte as a measurement of stress in chickens. *Avian Dis.*, 27: 972-979.
- Hemsworth, P.H., G.J. Coleman, J.L. Barnett and R.B. Jones, 1994. Behavioural responses to humans and the productivity of commercial broiler chickens. *Appl. Anim. Behav. Sci.*, 41: 101-114.
- Jones, B.R., 1992. The nature of handling immediately prior to test affects tonic immobility fear reactions in laying hens and broilers. *Appl. Anim. Behav. Sci.*, 34: 247-254.
- Jones, B.R. and M.J. Faure, 1981. The effects of regular handling on fear responses in the domestic chick. *Behav. Proc.*, 6: 135-142.
- Kannan, G. and J.A. Mench, 1997. Prior handling does not significantly reduce the stress response to pre-slaughter handling in broiler chickens. *Appl. Anim. Behav. Sci.*, 51: 87-99.

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- Keer, K.S., B.O. Hughes, P.M. Hocking and R.B. Jones, 1996. Behavioural comparison of layer and broiler fowl: measuring fear responses. *Appl. Anim. Behav. Sci.*, 49: 321-333.
- Kettlewell, P.J and M.J.B. Turner, 1985. A review of broiler chicken catching and transport systems. *J. Agri. Eng. Res.*, 31: 93-114.
- Lin, H., S.J. Sui, H.C. Jiao, J. Buyse and E. Decuypere, 2006. Impaired development of broiler chickens by stress mimicked by corticosterone exposure. *Comp. Biochem. Physiol.*, 143: 400-405.
- Marin, R.H., P. Freytes, D. Guzman and B.R. Jones, 2001. Effects of an acute stressor on fear and on the social reinstatement responses of domestic chicks to cage mates and strangers. *App. Anim. Behav. Sci.*, 71: 57-66.
- Mills, A.D. and J.M. Faure, 1991. Divergent selection for duration of tonic immobility and social reinstatement behaviour in Japanese quail (*Coturnix coturnix japonica*). *Appl. Anim. Behav. Sci.*, 105: 25-38.
- Nicol, J.C., 1992. Effect of environmental enrichment and gentle handling on behaviour and fear responses of transported broilers. *Appl. Anim. Behav. Sci.*, 33: 367-380.
- Nicol, J.C. and G.B. Scott, 1990. Pre-Slaughter handling and transport of broiler chickens. *Appl. Anim. Behav. Sci.*, 28: 57-73.
- Rushen, J., A.A. Taylor and A.M. Passille, 1999. Domestic animal's fear of humans and its effect on their welfare. *Appl. Anim. Behav. Sci.*, 65: 285-303.
- Sümbüloğlu, K. and V. Sümbüloğlu, 1993. *Biyostatistik*. Özdemir Yayıncılık, Ankara.
- Thompson, K.R. and M. Liebreich, 1987. Adult chicken alarm calls enhance tonic immobility in chicks. *Behav. Proc.*, 14: 49-61.
- Zulkifli, I. and A. Sti Nor Azah, 2004. Fear and stress reactions and the performance of commercial broiler chickens subjected to regular pleasant and unpleasant contacts with human being. *Appl. Anim. Behav. Sci.*, 88: 77-87.