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Investigations of some parameters of natural immunity in meat turkeys reared outdoors

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ABSTRACT

The progression of some parameters of natural immunity in meat turkey reared outdoors was investigated. The levels of the haemolytic complement were lower than those obtained in commercial turkeys and in turkeys reared in a controlled environment during one of our previous investigations. The weather conditions could have influenced the trend of the haemolytic complement in turkeys selected for high meat production and kept outside, underlining the possible importance of the rearing system.

Key words: Meat turkeys, Natural immunity, Haemolytic complement.

RIASSUNTO

INDAGINE SU ALCUNI PARAMETRI DI IMMUNITÀ NATURALE IN TACCHINI DA CARNE ALLEVATI ALL'APERTO

Lo scopo di questo studio è stato quello di valutare l'andamento nel tempo della concentrazione ematica di alcuni parametri di immunità naturale in tacchini da carne, allevati all'aperto. I valori del complemento emolitico, risultati più bassi di quelli evidenziati nel corso di una precedente ricerca in tacchini commerciali e in tacchini mantenuti in ambiente controllato, possono essere giustificati dalle condizioni meteorologiche che potrebbero influire anche in maniera consistente in ibridi "spinti" geneticamente, allevati all'aperto.

Parole chiave: Tacchino da carne, Immunità naturale, Complemento emolitico.

Introduction

Welfare in animal farming is one of the main topics of both European and National Legislation; its aim is to ensure acceptable welfare levels along all stages of the production cycle in order to limit environmental stress effects. Monitoring of natural immunity parameters can give precious information on the welfare and on the health of animals.

Chronic stress can influence the natural immune system predisposing the animals to conditioned pathologies since it represents the first and rapid immune response against extraneous organisms (Kimbrell and Beutler, 2001).

In several animals the importance of some parameters of innate immunity (serum bactericidal action, complement activity and lysozyme) in relation to management conditions has been demonstrated. The alteration of value of bactericidal activity in replacement gilts expressed the adjustment to a new environment (Moscati *et al.*, 2004). Literature regarding the adjustment of natural immune response in relation to different rearing systems in birds is scarce (Skeeles *et al.*, 1980; Sotirov *et al.*, 1998).

In one of our previous works (Moscati *et al.*, 2008) we investigated the level of the some serological parameters (serum bactericidal and complement activity and lysozyme) in turkeys from intensive farms and in turkeys kept in experimental conditions in order to evaluate whether and how the tipology of rearing system can affect the non adaptive immune system. The aim of this work was to investigate the same parameters in outdoor turkeys and to evidence the possible differences in values previously detected in meat turkeys reared intensively and in controlled environment.

Material and methods

The investigation was performed in 10 turkeys (BUT-9 hybrids), collected from a commercial farm at one day and reared outdoor, in a period ranging from October to January 2008. They were reared for the first two weeks in a closed premise. In the third week they were moved to a backyard pen where an area of 0.2 m² per bird was allowed, according to Manual B.U.T requirements (Anonymous, 2000). During the day the turkeys could gain a large external space surrounded by wire and they were given *ad libitum* access to a standard corn and soybean turkey ration meeting Manual B.U.T recommended allowances (Anonymous, 2000).

In order to determine bactericidal, complement activity, and lysozyme concentration, blood samplings were collected at: one day (d) (T0), 20 d (T1), 40 d (T2), 60 d (T3), 80 d (T4) and 100 days (T5).

The haemolytic complement assay was carried out in microtitre plates following method previously described (Barta and Barta, 1975).

Serum lysozyme was measured by the lyso-plate assay (Osserman and Lawlor, 1966) and its concentration value was expressed in µg/ml. The serum bactericidal activity was valued following conventional procedures (Amadori *et al.*, 1997). Statistical analysis were performed using the Student's T-test and expressed as mean ± standard deviation (SD). Differences between means were significant at $P \leq 0.001$.

Results and discussion

The results are summarized in Table 1 and Figure 1. Bactericidal activity and haemolytic complement increased with age (11.92 to 68 and 3.7 to 49 respectively). The values detected at T5 were significantly hi-

Figure 1. Progression of the haemolytic complement , bactericidal activity and lysozyme values in turkeys at different ages.

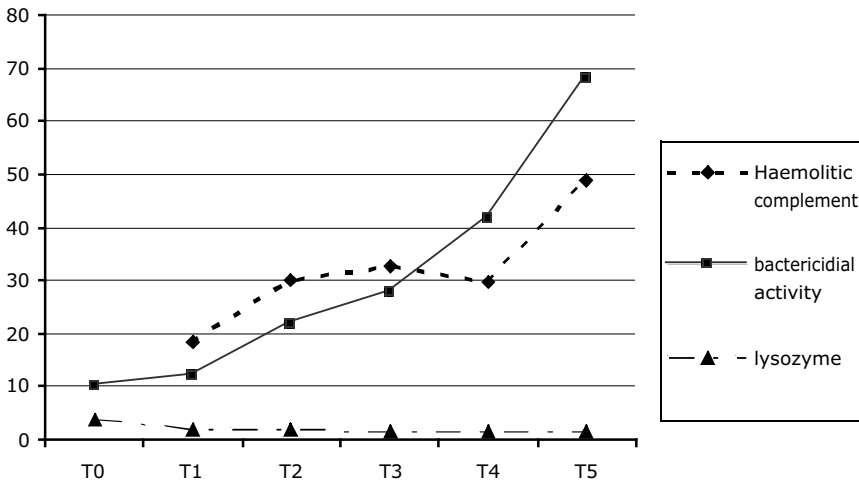


Table 1. Medium value (±SD) of the bactericidal activity, lysozyme and haemolytic complement.

Samples	Bact. activity (%)	Lysozyme (µg/ml)	Haemolytic compl. CH50
T0	10.17	2.32	3.7 ^C
T1	11.92	1.85	18,30 ^D
T2	21.73	1.79	29.86
T3	27.61	1.49	32.86
T4	41.82 ^A	1.57	29.76 ^E
T5	68 ^B	1.6	49 ^F

^{A,B; C,D; E,F}: $P \leq 0.001$.

gher than T4 values. Lysozyme concentration does not present age related variations. In our work the haemolytic complement concentration and bactericidal activity rose with age in relation to the development of the natural immune response in agreement with what observed in other studies (Skeeles *et al.*, 1980; Sotirov *et al.*, 1998; Moscati *et al.*, 2008). It should be stressed that the value of haemolytic complement concen-

tration was significantly lower than those determined at 50 and 100 days in an our previous study where the turkeys, kept in a controlled environmental and commercial farm, were investigated (Moscati *et al.*, 2008). It should also be underlined that the animals were from the same hybrid type (BUT-9) and were given to the same diet.

It can be explained by the fact that the weather conditions can influence these hy-

birds selected for high meat production, as observed in commercial hybrid pigs in outdoor breeding farm (Battistacci *et al.*, 2007). Lysozyme concentration showed a constant trend independent of the age, as observed in swine (Sensi *et al.*, 2006) and in turkeys in our previous studies (Moscati *et al.*, 2008). Conversely chickens showed a high value of the serum lysozyme at hatching (56µg/ml), that decreased progressively with age (Mughetti *et al.*, 2007).

Conclusions

The literature regarding changes of the parameters of the non adaptive immunity is scarce in birds (Skeeles *et al.*, 1980; So-

tirov *et al.*, 1998). In this work it is likely that the autumnal and winter conditions influenced the haemolytic complement in turkeys, selected for high production and used to being reared indoors. The result obtained in turkeys reared intensively and in optimal environment showed no significant differences in bactericidal activity, lysozyme and haemolytic complement concentrations. However their evaluation, though it is able to give a general idea about the health status of the animal, can be reliable as a welfare marker only if associated with other productive and sanitary indicators. Further studies should be performed in chickens to confirm the decrease of lysozyme with the age.

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