Measuring the Responses of Different Genotypes of Slow Growing Broilers Toward Short-Term Heat Challenge Test

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ABSTRACT

This study was performed to evaluate the responds of different genotype of slow growing broilers with regard to heat stress. A number of 102 females from the slow growing broiler hybrids (Hubbard ISA I657, S757N and I957) were raised from hatch until week 5 in 3 pens under the same room temperature of 30°C beginning from week 3 until 5. Twenty four experimental birds of each genotype were individually exposed for 15 minutes to a short-term heat test at 30°C (control) and 35°C between weeks 3, 4, and 5. The rectal temperatures before and after heat exposure were measured and the latency until panting was recorded. Strain differences were significant for body weight, daily weight gain and relative growth rate (P<0.01). For I657, S757N and I957, respectively, body weight in week 5 averaged 815.8±81.2, 924.0±87.9 and 1269.3±136.3 g. Daily gain averaged 22.0±9.8, 25.5±13.1 and 34.9±17.6 g/d, whereas relative growth rate ranged between 11.5±5.5, 13.9±6.9 and 13.0±6.1 %. Rectal temperatures after short-term heat stress were 42.4±0.7°C, 42.4±0.7°C and 42.7±0.7°C, with strains differing significantly (P<0.01). The level of heat stress temperature significantly influenced latency until panting (P<0.01). When exposed to 35°C, birds started panting within 10.95±2.43 (I657), 12.26±2.61 (S757N) and 10.16±2.36 (I957) minutes. The chi-square analyses revealed significant influences of the heat level and the strain on the frequency of birds panting (P<0.01). After 35°C test, 96% (I657), 100% (I957) and 67% (S757N) of birds demonstrated panting (P<0.01), while strain differences were not significant for frequency of birds panting exposed to 30°C.

Key words: slow growing broilers, short-term heat stress, rectal temperatures, panting, growth

INTRODUCTION

Heat stress is one of the important stress factors especially in tropical and subtropical environments which affected the productive performance of broilers. High mortality decreased feed consumption and poor body weight gain as disadvantages have been reported by many authors. Beside high ambient temperature, the large contribution to heat production occurs in the bird itself since metabolic production increases as the body weight of bird progresses (Lott *et al*., 1998).

Under hot environment, heat production decrease whereas heat dissipation increase. When air temperature climbs, the breathing frequency of birds increases and the evaporative heat loss enhances significantly (Wiernuz and Teeter, 1996) and dissipated through respiratory evaporation as the main avenue (Hillman *et al*., 1985).

Increased heat tolerance is reflected in lower body temperature and the limit of temperature tolerance is affected by body weight. Sykes and Fataftah (1986) reported the index of heat tolerance is the increasing rate of rectal temperature from the start and after one hour of exposure. Value of 2^{o}C/h or more reflects rapidly rising body temperature meanwhile, value of $\leq 0.5^{o}$C/h indicates effective heat tolerance.

The intensive genetic selection for rapid growth rate has been associated with increased susceptibility of broilers to heat stress. Birds selected for rapid growth demonstrate higher body temperature (low heat tolerance) compared to slow growing birds which have a greater tolerance to high temperatures (Cahaner and Leenstra, 1992, Berong and Washburn, 1998).

The present experiment was conducted to develop a suitable method to measure reactions of slow growing broilers towards heat stress and to evaluate the differences between three genotypes of commercial slow growing broiler hybrids with regard to heat stress reactions.