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EFFECT OF COOL BROODING CLIMATE ON CHICK PERFORMANCE

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INTRODUCTION

Brooding of chicks at lower than recommended temperature was reported by Huston (1965) and Harris et al., (1975) to be acceptable when based on growth and feed efficiency of chicks older than 3 weeks of age, while Sainsbury (1980) reported that the best performance will probably be obtained if the house-temperature is reduced from 30°C during the 1st week to 27°C in the 2nd week and 24°C in the 3rd week. Meanwhile, Pender and Mcdaneil (1983) mentioned that, the successful. brooding of chickens requires an environmental temperature in the 24 to 30°C of range during the first 3 to 4 weeks of growing period. Other workers (Huston et al., 1960; Renwick and Washburn, 1982) reported reduced growth, poorer feed efficiency and increased mortality of chicks brooded at 26.7°C or lower immediately after hatching. In addition, David et al., (1972) mentioned that, meat production fell by 14% in the first week of continuous residence at ambient (35°C) and then remained almost constant for the following 5 weeks.

So, in the present investigation an attempt was made to study the effect of cool brooding on the chicks performance under Egyptian environment conditions in winter season, with accidental managemental failure (insufficant heat warming sources).

MATERIALS AND METHODS

An environmentally uncontrolled broiler house under Egyptian field condition, was divided into two pens. Each was occupied by 500 one-dayold chicks from a commercial source (Hubbard-strain) at private farm located in Minea El-Kamh-Sharkia-governorate. Prior to the start of the investigation, the thermal characteristics desired were determined by electric heat sources at the range of temperature that was expected to be achieved at that season (Temp., 22°C to 18°C) and R.H., 65-70%).

In this investigation all managemental procedures were the same in both trials (feeding, watering, continuous lighting regime, medication and vaccination) except the brooding temperature, where one house was fan ventilated (exhausion fan) and cooled with evaporative pads (Smith and Oliver, 1971), while the brooding temperature was maintained checking of the temperature and when needed, adjustment of individual heating units within the pens (Scott and Washburn, 1984). In the cool brooder temperature started at 24.4°C and R.H. 73.5%, but in the heated one they were 32.8°C and 76.8% respectively.

Ambient temperature (Ta) was recorded daily and weekly and the averages were obtained and also in case of relative humidity (three times daily). Microclimatic conditions of the litter were determined, including moisture content (Wet base. W.B.) of the litter samples were calculated after (Tucker, 1967), pH and temperature.

The birds were group weighed (10-randomly) at weekly intervals for growth rate and the food conversion was obtained.

RESULTS AND DISCUSSION

Several authers studies the importance of brooding climate as well litter microclimate on chick performance and they reported the suitable and non suitable climate for the exact poultry industry (Reece et al., 1972; Sainsbury, 1980; Bohren et al., 1981; Scott and Washburn, 1985).

In this investigation, two groups of chickens, 500 each have been adjusted for the studying the effect of brooding climate including ambient temperature, relative humidity and litter microclimate such as temperature, wet base (moisture content percent) and pH, on mortality rate, live body weight and food conversion under field conditions in Egypt. The first one (control group) was characterized by recommended brooding climate (Ta, 32.5°C and R.H, 76.8%) according to Sainsbury, 1980, while the second group (test) showed some deviation in the temperature (24.4°C) and relative humidity (73.5%).

From the results shown in the table it is clear that the final performance of the tested group (T) was, slight improvement of the mortality ratio (1.13) in T. than in control group (C) (1.7); decrease in final live body weight in T. (650.7) than in (710.0 gm and increase in food conversion of T. (1.96) than in C. (1.48).

Therefore, it can be concluded that the cool brooding affected the birds all over the growing period, with final economic losses (decrease of about 60.3 gms) than the control and less food conversion.

Adjustment of brooding temperature to 32.2°C and R.H. to 76.8% as well as litter microclimate (Tempt. 18°C, W.B., 20% and pH. 6.9) in C. lead to marked decrease in mortality rate (3.2%) compared with that in T.(6%) with an increase in live body weight (105 gm) in C. than in T. (94 gm), and improving food conversion ratio (1.6) in C. than in T. (2.1). Wherease the simulous ambient and microclimate conditions in T.

Table Effect of brooding climatic and microclimatic conditions on chick performance.

Age	Brooding climate				Litter microclimate						Performance parametters					
	Temp °C		R.H %		Temp °C		W.B %		pH		Mortality rate %		L.B.Wt gms/wk		Food conversion F.C.rato	
	C	T	C	T	C	T	C	T	C	T	C	T	C	T	C	T
1st wk	32.5± 0.6	24.4°C 1.2	76.8± 1.6	73.5± 2.3	18	19	20	27	6.9	8.6	3.2	6	105	94	1.6	2.1
2nd wk	28.5± 0.9	23.0 2.1	76.2± 1.9	56.8±	22	25	28	30	7.6	7.8	1.6	2.3	200	220.5	1.75	2.37
3rd wk	27.3± 1.4	23.7± 3.6	70.5± 1.4	59.7±	26	27	36	33	7.9	7.8	2.7	4.13	415	339.5	1.6	1.7
4th wk	24.2± 0.8	21.8± 2.3	65.7± 2.9	55.1±	28	24	28	28	7.7	6.9	1.7	1.13	710	650.7	1.5 / 1.48	1.7 / 1.96

Key Words:

Tempt: Temperature
R.H. : Relative humidity
W.B. : Wet base of litter (moisture content).
L.B.wt: Live body weight
F.C. : Food conversion.

were Ta (24.4 °C) R.H. (73.5%) and 19°C 27% W.B. and 8.6 pH respectively.

During the 2nd week, the health state appeared good, in both groups as morbidity was neglected approximately, no-diseases, mortality rate was decreased in comparison with the 1st week, the increase in body weight was however higher in the test group than that in the control one by 20.59. decreased than in T. (200.5 gms) at 2nd. week of age. Slight increase in F.c was observed in the control group, while obvious decrease was seen in the other test group (2.37). Such improvement in mortality rate of test (T) might be contributed to physiological acclimatisation (Sykes and Fataftah, 1985), comfortable climatic and microclimatic conditions, Reece and Lott (1981) recommended, for chicks grown on litter, that R.H. should be maintained in a range of 50 to 70% and litter wet base at the 25 to 30%. Generally, growth rate and body weight are depressed in young birds (4 weeks or older) grown in temperature greater than 29°C (Adam and Rolger, 1968; Deaton, et al., 1978).

At the 3rd week of age, increased mortality rate was noticed in C (2.7%) than the 2nd week. But it was still less than in T. (4.13). Live body weight was increased in C (415 gm) than in the 2nd week, and also than in T. (339.5 gm). Food conversion was improved in C (1.6 ratio) than the 2nd week as well as the T. (2.37 ratio).

However, the increased mortality rate in T. despite reasonable Ta (23.7°C) at that age (Sainsbury, 1980), could be due to the cummulative effect of acute cold stress early in life, that may alter the chick perfomance all over the growing period
with no neglection of the litter microclimate
to which the chicks are in direct contact with where humidity is a critical factor on determining heat stress in poultry (Reece, et al., 1972).

Concerning the 4th week of age here was, a decrease in mortality rate in C (1.7) than the 3rd week, but it was slightly higher than in T. (1.13). Food conversion in C was approximately the same as the 3rd week (1.5), slight improvement than in T. (1.7).

These results could explain how the suitable climatic and microclimatic situation, rearrangement of some managemental difficulties existed in 3rd week and chick's ability to conserve its temperature during cold stress, were interacted to enhance proper performance (David, et al., 1972).

Conclusively brooding of one-day old chicks just post-hatching, under cool environment (24.4°C), expose them to acute cold stress. The non-specific responses were manifested clearly in this study, as increased mortality rate, increased food consumption especially in the first few days.

The mortality rate was decreased with age, due to the acquired experience to cool environment (Physiological acclimatisation) unless in intervens with other multiple stressors, like ammonia, diseases, increases in wet base of litter and ambient R.H.

Therefore, it is advised to avoid as much as possible these managemental difficulties (brooding tempt, and R.H) as well as the litter microclimate, to mitigate or alleviate the stressfulness effect of acute cold environment.

SUMMARY

Brooding of young chicks (0-4 wk) in cool environment (24.4 °C) exposed them to acute stress especially for the 1st few days which was reflected on the health state of the bird all over the growing period. Economic losses were, due to the decrease in live body weight (60.3 gm) and the difference in food conversion (1.96) in comparison with (1.48) in control one (1.48).

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