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EFFECT OF COLOURED LIGHT ENVIROMENTS ON SOME BEHAVIOURAL PATTERNS,PHYSIOLOGICAL ASPECTS AND PERFORMANCE OF BROILERS

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INTRODUCTION

Nowadays, poultry industry is considered as one of the most important branchs in the field of animal production. Birds with special gentic make-up need careful and precise systems of management, which can provide the birds with the most suitable and comfortable environmetnal components. This environment is essential for encouraging the birds to express their genetic potentialities. However, comfort environment provides the birds with bodily needs which can be reflected in the form of proper behavioural patterns displayed by the birds. Behavioural patterns are represented by different activities of the birds. These activities can be considered as body signals denoting the different physiological activities which are occurring inside the bird's body.

However, applying the proper program and management, creats a suitable and comfortable environment surrounding the birds. Within this environment the birds can display the normal behavioural patterns according to their ages and due to the proper environmental stimuli. The present investigation is to study the effect of different coloured lights as environmental motivation on the behavioural and physiological responses of broiler chickens and consequently their performance.

MATERIAL AND METHODS

Sixity four one day old chicks (Hubbard strain) of both sexs were randomly divided into four groups. The population density was 10 birds/m^2. Each gorup was provided with definite coloured lamp. The used lamps were yellow, red, blue and white. In all groups the light intensity ranged from 3-5 watt/meter. The birds were fed on broiler diet, vaccinated against Newcastle disease at 7, 18 and 33 days old and reared under proper hygienic conditions. The birds were weighted weekly in order to obtain body gain, growth rate and feed efficiency. Blood samples were collected weekly on EDTA for haematological investigations as erythrocytic count **(Wintrobe, 1967)**, Packed

cell volume (Cohen, 1967), haemoglobin estimation (Pilaski, 1972), total leucocytic count (Natt and Herrick's 1952) and differential leucocytic count (Lucas and Jamroz, 1961). Moreover, certain behavioural patterns including immobile activities (resting and sleeping) and mobile activities (preening, wing-leg stretch, feeding, drinking, flighting, fighting, frolking and feather pecking) were recorded. The birds were kept away as for as possible from any discomfort stimuli in order to be habituated with various components of the surrounding environment. Statistical analysis of obtained data were performed according to the method of Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

The obtained results dealing with the effect of coloured light environment on behavioural patterns and performance were recorded in table (1). These results revealed that at the end of the first week it was observed that chickens which were reared on the red colour gave the highest figures of average body wt., feed efficiency and immobile/mobile ratio. It can be suggested that the red colour gave achance for the chicks to consume more time for resting and sleeping which might be reflected on them by raising body gain, feed efficiency and immobil/mobile ratio (IM/M). The slight decrease in IM/M ratio recorded in chicks reared under the white colour environment led to decrease in the gain in body weight as well as the feed efficiency of the chickens of this gorup. Moreover, at the end of the second week, the blue colour was accompained with

Table(1): Effect of different coloured light environments on the behavioural parameters and performance of different groups of chickens at the 1st, 2nd, 3rd, and 7th weeks of the experiment

weeks	Colour	Sum of Immobile activities	Sum of mobile activities	IM/M Ratio	Performance			
					Body weght gm	Body gain gm	Feed cons gm	Feed Eff.
First	White	41.50	120.90	0.40:1	133.76±5.6	96.76±4.8	130.62±5.6	1:1.35
	Red	52.70	115.30	0.45:1	147.30±5.9	110.30±4.9	116.91±4.4	1:1.06
	Yellow	48.30	116.01	0.41:1	138.02±5.44	101.02±4.96	130.31±5.16	1:1.29
	Blue	41.40	92.92	0.44:1	129.82±5.14	92.92±4.81	102.21±4.28	1:1.1
Second	White	59.40	143.60	0.41:1	305.16±7.0	171.4±6.1	258.81±7.7	1:1.51
	Yellow	55.00	137.00	0.40:1	304.76±7.1	166.74±5.2	258.44±7.1	1:1.55
	Blue	55.70	105.50	0.52:1	310.30±7.1	180.47±7.1	245.43±7.34	1:1.36
	Red	45.50	106.28	0.42:1	323.50±7.14	176.20±6.12	259.01±7.34	1:1.147
Third	White	58.90	112.10	0.52:1	493.26±8.2	188.10±7.01	344.22±8.4	1:1.83
	Red	60.20	152.70	0.39:1	495.62±8.1	172.12±6.4	361.45±8.1	1:2.1
	Yellow	61.60	134.30	0.45:1	479.86±22	175.10±6.22	330.93±8.11	1:1.98
	Blue	58.40	122.00	0.47:1	487.72±8.08	177.33±6.37	333.38±8.63	1:1.88
Seventh	White	50.10	208.00	0.28:1	158.3±29.3	269.4±6.7	1104.5±27.1	1:4.1
	Red	48.20	189.80	0.25:1	1428.81±28.1	227.70±7.1	1038.31±25.2	1:4.5
	Yellow	59.40	197.00	0.30:1	1602.36±30.3	318.30±8.1	980.36±15.4	1:3.1
	Blue	48.90	182.70	0.26:1	1478.2±28.12	248.80±6.45	1062.37±25.11	1:4.27

* = Results of performance expressed as means ± S.E.

highest figures of average body gain, feed efficiency and IM/M ratio in contrast with the yellow colour which gave the lowest figures. This can be attributed to the increase in the percentage of immobile than that of mobile activities. The yellow colour helped the chicks to display higher dynamic activities with lower percentage of immobile actions, which inturn was reflected in the form of lowering both feed efficiency and body gain. The results obtained at the end of the third week showed that the white colour gave the most impressive IM/M ratio, while the red colour was of lower figures. So, it can be suggested that within the white colour the chicksdisplayed less efforts in dynamic activities and showed relatively increased rate of immobile actions. Accordingly, higher feed efficiency was obtained. The worst feed efficiency showed by the red colour may be attributed to the excessive energy consumed by the birds. The birds under the red colour showed a highest rate of dynamic activities in proportion to relatively lower rate of immobile ones.

The results of haematological investigation are recorded in Table (2). These results revealed that during the first three weeks no changes have been recorded in the blood parameters of all groups. This may be attributed the lowered sensitivity of adrenal cortex in the early weeks of the rearing period is low to stress stimuli. This conclusion is in complete agreement with those of **Siegel (1961); Wise and Frye (1973); Gould and Siegel (1978); Divis and Siopes (1985).**

The results of the 4th, 5th, 6th and 7th weeks showed that the yellow colour induced the highest body gain as well as highest feed efficiency while, the red colour continued its adverse effect in the last 4 weeks. In addition, the yel-

Table (2): Effect of coloured light environments on the heamatological parameters of different groups of chicken at the 3rd & 7th weeks of the experiment.

Colours	RBCs (mill/mm³)		PCV (%)		Hb (g%)		WBCs (th/mm³)		Hetrophil (%)		Lymphocyte (%)	
	3rd. week	7th. week	3rd. week	7th. week	3rd. week	7th. week	3rd. week	7th. week	3rd. week	7th. week	3rd. week	7th. week
Yellow	2.75 ± 0.25	2.92 ± 0.28	26.70 ± 6.11	20.70 ± 6.69	9.42 ± 2.95	9.86 ± 3.24	27.21 ± 4.12	29.2 ± 5.12	22.14 ± 7.21	22.76 ± 6.81	64.12 ± 14.87	65.11 ± 15.43
Red	2.90 ± 0.42	3.18* ± 0.41	27.20 ± 7.22	30.13* ± 3.24	9.87 ± 3.24	10.7* ± 3.78	26.30 ± 3.43	27.8* ± 4.18	23.72 ± 8.71	27.12* ± 7.12	65.12 ± 14.78	58.12 ± 14.48
Blue	2.71 ± 0.25	2.88 ± 0.29	26.40 ± 6.21	29.31 ± 7.01	9.48 ± 2.99	9.82 ± 3.21	26.70 ± 3.69	28.70 ± 4.38	22.14 ± 7.22	26.12 ± 6.98	63.12 ± 15.28	63.41 ± 15.22
White	2.80 ± 0.26	2.91 ± 0.33	27.10 ± 6.22	29.71 ± 6.98	9.70 ± 3.13	9.87 ± 3.25	27.11 ± 4.11	20.10 ± 5.08	23.10 ± 7.10	22.70 ± 7.11	66.11 ± 15.63	65.12 ± 15.12

e Values expressed as means ± S.E.
* Sig. at P< 0.05

low colour group showed the highest performance without any deviation in the haematological figures than those of control ones (white). Contrast results were induced by the red colour which showed some haematological changes. So, it can be suggested that the red colour led to increased irritability, loss of social organization accompanied with increassed percentage of agonistic behaviour. Accordingly, disturbance and upsetting of the internal homeostasis of the birds were induced. Dependantly, typical picture of adverse response of adrenal gland on blood was recorded. The increase in the erythrocytic count usually observed in the stressed birds can be attributed to the indirect action of the adrenaline on the erythropiotic system (Sturkie, 1978). Also, the increased heterophilic count and less numbers of lymphocytes are results of the adrenal cortex hyperstimulation due to the action of prolonged stress on the birds, the picture which was observed in the chickens reared under red environment.

It can be concluded that, the yellow light environment expresses itself as the best comfortable, suitable and optimum medium for rearing broilers. Chickens reared under yellow environment showed normal behavioural patterns as well as optimum growth rate during the different stages of rearing period. These are reflection of the proper equilibrium in the dynamic and static homeostasis. This equilibrium appeared from the normal blood picture of the group of chicks exposed to yellow colour.

SUMMARY

The present investigation was done to study the effect of different coloured light environments on some behavioural patterns, physiological aspects and performance. Thus, 64 one day old chicks were divided randomly to four groups exposed to different coloured light environments (yellow, red, blue and white). The results revealed that:

1. The red, blue and white coloured environments were the suitable media for the proper performance during the first 3 weeks of the rearing period, respectively.

2. The yellow colour environment was the most comfortable medium during the last four weeks of the rearing period of chickens that reflected positively on the ethology, physiology and performance of the birds.

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