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Effect of Tranquilizers and Bird Density on Chicken Growth under Heat Stress

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600 Fayoumi chicks were divided randomly into two groups. The first group was brooded in low density (15 brid/m²), the second group was brooded at a high density (30 bird/m²). Every group was divided into five sub-groups. The subgroups were supplied respectively with 0.0.,0.5 and 1.0 ppm reserpine, 0.5 and 1.0 ppm hydroxyzine in the ration. The birds were reared in batteries under high temperature (90°F) from the day of hatch until the 12*th* week of age.

High density was very harmful to growing chicks. It was quite clear that economic characters (body weight, and feed efficiency) was significantly depressed. Meanwhile, the morality rate was increased.When different levels of tranquilizers were added to the ration of the growing chicks from the date of hacth till 12 *th* week of age under different density, there was an improvement in body weight, feed efficiency and mortality rate. The lower level of reserpine (0.5 ppm) was better under high and low density than the higher level (1.0 ppm).

Stresses imposed on an animal, evokes the reactions of the adrenal-pituitary axis. Tranquilization reduces the intensity of the "alarm reaction" and enables the animal to adjust adequately to the stress, thus inhibiting the cases of hyperexcitement. Pure reserpine at levels between 0.1 and 2.0 ppm when incorporated into the feed of chicks or poults stimulate growth and increasd weight gain and improved feed conversion (Huston, 1959). Higher reserpine level were associated with lower weight gain (Casey *et al.*, 1963).

Addition of reserpine and hydroxyzine at level 0.5 and 1.0 ppm improved feed efficiency. The effect of low level was more pronounced than the high level (Kicka, 1973). Reserpine and chlopromazine prolonged survival of chicks under high temperature (Burger and Lorenz 1960). Also reserpine at the levels 0.075, Lorenz 1960). Also reserpine at the levels 0.075, 0.15, 0.25 and 0.30 ppm caused a highly significant reduction in mortality rate, (Slinger *et al.*, 1962).

The heaviest males were produced at a density of 465 cm² in cages and 743 cm² on the floor, (Deaton *et al.*, 1970). A density of 279 cm² significantly depressed body weight for both sexes in cage and floor pens. High density (279 cm²/bird) increased mortality rate and decreased livability (Deaton *et al.*, 1970 and Ruszler and Quisenberry, 1970).

The importance of adding tranquilizers to the ration of the growing chicks has been emphasized by Kicka (1973). The purpose of this study was to compare growth characteristics of Fayoumi chicks in low and high density under heat stress, different levels of tranquilizers.

Material and Methods

This investigation was carried out at the Poultry Experimental Station, Animal Production Department, Faculty of Agriculture, Cairo University.

Six hundred Fayoumi chicks were used in this experiment. The chicks were divided randomly into two groups. The first group was brooded at a low density (15 bird/ m^2). The second group was brooded at a high density (30 bird/ m^2). Every group was divided into five subgroups. The subgroups were supplied respectively with 0.0, 0.5 and 1.0 ppm reserpine, 0.5 and 1.0 ppm hydroxyzine in the ration. The birds were reared in batteries under constant high temperature of 90°F from the day of hatch until the 12 *th* week of age.

The ration used was composed of 35% maize, 9% Faba beans, 12% wheat bran, 12% rice bran, 20% decorticated cotton seed meal and 6% fish meal. The ration was supplemented by 0.5% salt (sodium chloride), 1% bone meals, 3% clacium gluconate and 2% feed supplement Pfizer vitamin A+D_3 (Vitamin A 5000 IU/g and Vitamin D_3 500 IU/g).

Body weight at hatch, 4,8 and 12 weeks of age birds were weighed. Feed intake was also measured for each subgroup to calculate the feed conversion at these ages. Mortality rate was computed every four weeks from hatch up to 12 weeks.

Statistical analysis were carried out according to Steel and Torrie (1960). Tests of significance for the separation of means were also made (Duncan, 1955).

Results and Discussion

Body weight

The average body weight, at all ages, was highest for chicks reared under low density than those reared under high density (Table 1). Addition of tranquilizers to the ration of the growing chicks from the date of hatch till 12 *th* week of age increased body weight as compared to the control groups. With few exceptions, at all ages, the highest increase in body weight was observed under high density than low density. This result proves that the tranquilizers are particularly effective in opposing the deleterious effect of high density and high temperature in stunting the growth of chickens. Moreover, tranquilizers reduced the physical activity, as observed during the experiment, thus reduced energy expenditure. The action of those tranquilizers is thought to be mediated through the nervous system to the organs of digestion and assimilation. The low level of tranquilizers gave the acceleration of growth, also reserpine was more effective than hydroxyzine.

Feed conversion

The average feed efficiency, for the 12-week period, was greater when the chicks were reared under high density (4.5:1), with or without tranquilizers than when the group was reared under low density (3.9 : 1) (Table 2). The addition of tranquilizers to the ration of growing chicks improved feed efficiency. The average feed efficiency for the treated groups, under high density compared to the control groups of 4.6 : 1 and 5.5 : 1 respectively.

TABLE 1. Average body weights (g) for chicks at different densities treated with tranquilizers under high brooding temperature.

Bird density	Levles of tranquilizers ppm		Age in weeks			
			0	4	8	12
Low (15 / m²)	Control	0.0	27	117 bcde	231 de	546 c
	Reser-	0.5	30	150 a	352 a	695 a
	pine.	1.0	29	140 ab	279 bcd	674 ab
	hydroxy-					
	zine.	0.5	30	136 abc	314 ab	690 a
		1.0	30	126 bcde	235 de	600 bc
High . . . . (30 / M²)	Control	0.0	30	86 f	167 f	365 d
	Reser-	0.5	30	134 abcd	295 b	668 ab
	pine	1.0	31	111 de	244 de	652 ab
	Hydroxy-	0.5	30	115 cde	289 bc	602 bc
	zine	1.0	31	103 eF	219 e	451

These results indicate that during the growing period tranquilizers were effective in improving feed efficieny under high density and high temperature.

The efficiency of feed utilization was improved in the chicks supplied with low level of tranquilizers (3.7:1) than those receiving the high level (4.3:1). Premachandra *et al.* (1959) reported that low level of reserpine have no effect on thyroid function in chicks, and hence do not act by suppressing thyroid activity in improving feed efficiency and growth. The improved feed conversion by the treated chicks may be due to the faster growth in the treated chicks. Also, the tranquilizers affect efficiency through the reduction of physical activity

TABLE 2. **Feed efficiency intervals for chicks at different densities treated with tranquilizers under high brooding temperature**

Bird density	Levels of tranquilizers ppm		Periods in weeks			
			0 — 4	4 — 8	8 — 12	0 — 12
Low (15 / m²)	Control	0.0	3.1	5.4	5.3	4.6
	Reserpine	0.5	2.3	3.2	4.6	3.4
		1.0	2.5	4.7	4.2	3.8
	Hydroxy-	0.5	2.6	3.9	4.5	3.6
	zine.	1.0	2.8	4.9	4.7	4.1
High (30 / m²)	Control	0.0	4.0	5.7	6.9	5.5
	Reserpine	0.5	2.8	4.3	4.8	4.0
		1.0	3.5	5.2	4.4	4.3
	Hydroxy-	0.5	3.1	4.2	4.5	3.9
	zine.	1.0	3.7	5.0	6.0	4.9

Mortality rate

Mortality rate increased when chicks were reared under high density with or without tranquilizers than those reared under low density (Table 3). The major causes of mortality were diarrhea, and cannibalism especially under high density. These results may generally be due to the effect of high temperature and density.

Tranquilizers supplementation to the ration of growing the chicks decreased mortality rate. The average reduction in mortality rate were 11.2 and 12.1% for chicks reared under high and low density respectively. The highest reduction in mortality than the higher levels. Under high and low density reserpine caused, also, higher reduction in mortality rate than hydroxyzine.

Practical Application

From the previous discussions we can conclude that high environmental temperature and bird density are very harmful to growing chicks. It was quite clear that economic characters (body weight and feed efficiency) were significantly depressed. Meanwhile, the mortality rate was increased. These disastrous effect of heat stress and bird density were accompanied by abnormal rate of the physiological reactions.

TABLE 3. Percent mortality for chicks at different densities treated with tranquilizers under high brooding temperature.

Bird density	Levels of tranquilizers ppm		Periods in weeks			
			0–4	4–8	8–12	0–12
Low (15 / m²)	Control	0.0	8.3	7.2	9.1	23.3
	Reserpine	0.5	3.3	1.7	1.8	6.7
	Hydroxy-zine.	1.0	6.7	0.0	7.1	13.3
		0.5	3.3	1.7	3.4	8.3
		1.0	8.3	3.6	7.4	16.3
High	Control	0.0	6.7	9.0	13.7	26.7
	reserpine	0.5	3.3	3.4	5.4	11.7
	Hydroxy-zine.	1.0	6.7	1.8	9.1	16.7
		0.5	3.3	3.4	5.4	11.7
		1.0	11.7	1.9	9.6	21.7

In this work it was also noticed that tranquilizers supplementation to the diet of the growing chicks from the date of hatch till 12 *th* week of age under high and low density and heat stress, improved the economic characters. This beneficial effect of tranquilizers was acquired through its role in maintaining the normal physiological activities against the heat stress and bird density. Reserpine, however, was more effective than hydroxyzine.

Adding tranquilizers at the rate of 0.5 ppm in the diet could be recommended level during the growing period, especially during the high environmental temperature and high density.

These economic benefits of tranquilizers addition on native Fayoumi fowl, are expected to be augmented if applied to the less heat tolerant European breeds. The hypersensitivity could be modified by tranquilizers supplementation.

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تأثير المهدئات وتزاحم الطيور على نمو الكتاكيت تحت درجات الحرارة العالية

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تتكون مادة هذه الدراسة من ٦٠٠ كتكوت عمر يوم قسمت عشوائيا الى مجموعتين . المجموعة الأولى حققت بحيث كان عدد الكتاكيت فى المتر المربع ١٥ كتكوتا . والمجموعة الثانية حضنت بحيث كان عدد الكتاكيت فى المتر المربع ٣٠ كتكوتا . قسمت كل مجموعة من هذه المجاميع الى خمسة أقسام وأعطيت هذه الاقسام صفر ، ٠ر٥ ، ١ر٠ جزء فى المليون من الـ reserpine، ٠ر٥ ، ١ر٠ من الـ Hydroxyzine مع الغذاء على التوالى . كل المجاميع حضنت فى بطاريات تحت درجة حرارة ثابتة (٩٠ف°) من تاريخ الفقس حتى عمر ١٢ أسبوع .

تزاحم الكتاكيت (٣٠ طائر \ م٢) كان له تأثيرا ضارا على نمو الكتاكيت ، فقد لوحظ انخفاض الصفات الاقتصادية (وزن الجسم ومعامل الاستفادة من الغذاء) ، أما نسبة التفوق قد ارتفعت .

اضافة المهدئات الى غذاء الكتاكيت من تاريخ الفقس حتى عمر ١٢ أسبوعا أدى الى زيادة وزن الجسم ومعامل الاستفادة من الغذاء وانخفاض نسبة التفوق . المستوى المنخفض من المهدئات (٥ر٠ جزء فى المليون) كان تأثيره أفضل على الصفات الاقتصادية أكثر من المستوى المرتفع وخاصة عندما كانت الكتاكيت مزدحمة (٣٠ طائر/م٢) أو أقل تأخر فى الحمل

كذلك وجد أنه تحت تأثير الحرارة العالية وتزاحم الكتاكيت كان تأثير الـ reserpine أفضل من تأثير Hydroxyzine على الصفات الاقتصادية.