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IMPACT OF ULTRAVIOLET LIGHT ON GROWTH PERFORMANCE, BLOOD PARAMETERS AND SOME BEHAVIORAL STATUS OF BROILER CHICKENS

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ABSTRACT: This experiment was carried out to study the effect of ultraviolet light on growth performance, carcass, body organs, body measurements, bone characteristics, blood parameters and behavioral status of broiler chickens. A total of 225 one-day-old broiler chicks divided randomly into five treatments (3 pens per treatment with 15 birds per pen). Three light types; (LED, UVA or UVB) were followed, each group was exposed to 24 h light/day. The UVA and UVB traits each turn on for 5 h/day "UVA5 & UVB5" and 10 h/day "UVA10 & UVB10". Treatments distribution was as follows: Treatment 1; Light-emitting diode (LED), Treatment 2; Ultraviolet light A5 (UVA5), Treatment 3; Ultraviolet light A10 (UVA10), Treatment 4; Ultraviolet light B5 (UVB5) and Treatment 5; Ultraviolet light B10 (UVB10). According to the findings, compared to the other groups, utilizing UVB5 lamps had a favorable impact on marketing body weight compared to other groups. Regarding cumulative feed consumption, it was shown that the UVB5 and LED groups each consumed more feed when compared to the other groups, and this difference was highly significant. In comparison to other traits, birds exposed to UVB10 had highest dressed carcass values and lowest relative levels of abdominal fat. The LED and UVB10 groups significantly increased in shank length and those exposed to UVA wavelength for 5 hours had higher value of keel bone length compared to other groups. Chickens exposed to UVA5 had a higher value of tibia Seedor Index. Besides, there was increase in plasma calcium level in broiler that exposed to UVA wavelength for 5 hours. Birds exposed to UVB lamps revealed better footpad status compared to other groups.

In conclusion, the obtained results reported beneficial impacts when using UVB light for 5 hour per day in most studied measurements.

Keywords: Broiler, Ultraviolet Light ,Bone, Welfare , Production.

1. INTRODUCTION

Poultry production is the most quickly sector extending in agricultural industry. Environmental changes have raised serious stresses that will extremely affect poultry health and efficiency due to climate change.

The three main components of artificial lighting that affect poultry are light wavelength, intensity, and photoperiod. All three of these components have distinct impacts on the bird (Wei *et al.*, 2020).

It reviewed by (Rana and Campbell, 2021) that use of UV light in poultry production is being expanded to advance poultry welfare and improve productivity; though these shorter wavelengths may be perceived as more typical, poultry can see in the UV spectrum (320–400 nm), which is frequently denied in regular artificial lighting and UVB with wavelengths of 280 to 315 nm activates vitamin D pathways, it also has physical effects that can improve bone health.

Light has been appeared to improve feed intake, growth, and immunity in birds (Huth and Archer, 2015). Fast-growing broiler chickens gain body weight more quickly, and their bone skeleton is crucial to maintaining their weight. The design and operation of an animal's skeletal system is one of its most crucial components (Applegate and Lilburn, 2002). Furthermore, Edwards (2003) discovered that exposure to UV radiation improved the growth performance and shank length, raised serum calcium, phosphorus and ALP activity, and improved the mineralization density of the skeleton.

Broiler production and bone health have been studied extensively (using various ventilation type, feeding system, and lighting programs, for example), but only a small number of research have examined the effects of ultraviolet lighting on chicken bone quality.

Therefore, the current experiment's objective is to determine the impact of UV light type and photoperiod time on the productive performance, blood parameters, bone quality, and associated welfare and behavioral characteristics of the birds. In the same way, the most effective combination of the key elements will be considered in order to increase productivity and bone quality as a new approach to deliver a secure and healthy final product.

2. MATERIALS AND METHODS

2.1. Birds and housing

A commercial hatchery delivered 225-day-old (as hatched) broiler Arbor Acres strain that were un-sexed and had received post-hatch vaccinations for Newcastle Disease Virus and Infectious Bronchitis Virus. Vaccinations and other standard poultry management procedures are followed out precisely. Daily, the general health of the flock, including the temperature, lighting, water, and feed, was checked on the chicks. The experimental chicks were housed in identical management practices and grown in 1.5 m2 pens with wood shavings litter. *Ad-libitum* commercial corn and soy-based diet was given to the birds. The house was kept at a temperature of 31-34 degrees Celsius for the first week, and after that it dropped 3 degrees weekly until the temperature reached to 24-26 degrees Celsius.

All groups were exposed to continuous 24 hours of light/day. The UVA and UVB groups each turn on for 5 h/day “UVA5 & UVB5” and 10 h/day “UVA10 & UVB10” instead of LED bulbs. Used bulbs with UVA wavelength range was (315-400 nm), while UVB wavelength range was (280-315 nm). Bulbs height about 1.5 m from the bird’s level.

2.2. Experimental treatments

The experiment followed a simple design. Three light types, totaling five treatments,15 experimental pens with 15 birds each, three replications. The photoperiod treatments whereas follows: Treatment 1; 24 h of Light-emitting diode (LED), Treatment 2; 19 h LED + 5 h for Ultraviolet-A (UVA5), Treatment 3; 14 h LED + 10 h for Ultraviolet-A (UVA10), Treatment 4; 19 h LED + 5 h for Ultraviolet-B (UVB5) and Treatment 5; 14 h LED + 10 h for Ultraviolet-B (UVB10).

From their first day of life through the entire five-week period, the birds got exposed to light (5 h/day) for (T2 & T4) and (10 h/day) for (T3 & T5). After three weeks of age, the lamps were positioned 1.5 meters above the ground immediately over each pen and were timer controlled. The lamp height was adjusted to the chickens' growth. A commercial diet was used as follow: starter (1 to 14 days), grower (15 to 27 days), and finisher (28 to 35 days) were the three phases of the feeding diet *Ad-libitum* pellets of offered food.

2.3. Growth performance, carcass yield and body measurements

At ages 1, 7, 14, 21, 28, and 35 days, body weights were measured. The same time periods' feed consumption was calculated. To account for feed consumption and feed conversion ratio, dead bird weight was recorded. At 35 days, 5 randomly selected birds per treatment were slaughtered and dissected, and measurements were made of the tibia and carcass characteristics. Feed was weighed and recorded, and feed consumption was calculated by subtracting any remaining feed from the total amount of feed while taking mortality into account at the end of the week. Body measurements were obtained from the same previous 5 birds per treatment to measuring the body depth, shank length and keel bone length with caliper digital (in mm).

2.4. Tibia bones sampling, radiographic and measurements

Five chickens from each treatment were selected for the tibia bone sampling based on their average live body weight. The wet tibia weight of the birds was calculated after the birds had been slaughtered by removing the tibia bones from both sides, cleaning them of any soft tissues and cartilages, and weighing them in relation to their live body weight, as shown by (Abdelaziz *et al*., 2019). Bone physical measures were conducted using the proper tibia bones. According to the procedure outlined by Samejima *et al.* (1989), the tibia length (TL) and tibia width (TW) were measured with a digital caliper with 0.01 mm precision. The tibia Seedor index (TSI), which displays the mineral density of the tibia as an absolute number (Seedor *et al.*, 1991), was used to compute the maximum breaking force. Radiographic image of the broiler’s tibia at 35 days of age exposure to different light types was analysis (Cruickshank and Sim,1986).

2.5. Blood samples and determination of plasma biochemical

From each treatment, five birds were chosen at random and slaughtered by bleeding. Each blood sample was immediately divided into two portions: one for EDTA anticoagulant treatment and the other for serum separation (and subsequent storage at 20 °C). To determine serum corticosterone concentrations, we utilized the radioimmunoassay technique established by Wingfield and Farner in 1975. The alkaline phosphatase enzyme and plasma concentrations of calcium and phosphorus were measured using commercial kits and a spectrophotometer in accordance with the manufacturer's instructions.

2.6. Gait score

The broiler chicken welfare quality assessment protocol was applied to five chicks per treatment. Depending on their gait, the birds were assigned a score of 0 (normal gait), 1, or 2 (impaired movement and reluctant step). To be normal, one must be able to walk without any trouble. Birds were capable of walking at least 1.5 m with a balanced gait. Unable to walk was referred to as being "impaired". Even though their movement was unsteady, birds were able to move at least 1.5 meters. Reluctant was defined as having a severe impairment to their walking abilities, making it challenging for them to stand and move around. For statistical analysis, the percentage of focused broilers in each pen within each test result was established.

2.7. Foot Pad Dermatitis (FPD) and Litter ammonia

Footpad dermatitis, contact dermatitis, bumble foot, and pododermatitis are some of the various names for this disorder, which is characterized by superficial to deep inflammatory and necrotic lesions on the surface of the toes and footpads (Shepherd and Fairchild, 2010). The welfare of the chicken can be affected by contact dermatitis, which can result in lesions on the feet, hocks, and breast**.** Wet litter is a key risk factor for this condition.

2.8. Statistical Analyses

Statistical differences between groups were examined using SAS 9.1.3 software (SAS Institute Inc., Cary, NC, USA, 2004), which uses a one-way analysis of variance. The means of the control group and each experimental group were compared using the Duncan's multiple range test. *P*-values of less than 0.01 or 0.05 were used for statistical significance. They were measured in seconds and recorded as state events for the examination of behavioral response data.

3. RESULTS AND DISCUSSION

3.1. Growth Performance

Impact of light types and photoperiods exposure times (LED, UVA5, UVA10, UVB5 and UVB10) on the live body weight of broilers at different ages is presented in Table (1). The treatment exposed to UVB wavelength for5 hours increased live body weight compared to the LED group (control) or UVA5 and UVA10 in different ages, especially at 28 and 35 days, which the difference was significant among groups. The heaviest individuals weight were those exposed to UVB for 5 hours (2.594 kg), while the lowest individuals weight were those exposed to UVA for 10 hours (2.454 kg) at 35 day of age may be for beneficial effect of short time exposure for UV to activate some biochemical processes in the body and help for vitamin D production, while at long time exposure for UV often decreasing immune system efficient, this agreed with (Youssef *et al.* 2019) who reported that influence of Ultraviolet radiation wavelength on environment surrounding the birds leads to improve immune system without a harmful effect in birds. Figure 1showed the live body weight during different periods of feeding (Starter, grower and finisher diets). During the first, second and third periods of feeding, birds which exposed to UVB5 and UVB10 were closed to control at increasing body weight than UVA traits. In Contrary, House *et al.* (2020) reported that there were no differences between LED and UV lighting treatments was found in 42nd day old for body weight.

Body weight gain of broilers at different ages is shown in Table (2). It observed that there was a significant difference in the body weight gain among groups at the period from 28th-35th day of age and non-significant difference was observed at all ages previous 28th day of age. The birds exposed to UVB wavelength for5 hours had the best weight gain (2.55 kg) followed by UVB10 (2.52 kg) and LED group (2.51 kg) at marketing age of 35 day, while the lowest individuals of weight gain were those exposed to UVA for 10 hours (2.41 kg) and UVA5 (2.455 kg). In this content, Zhang *et al.* (2006) reported that because broilers kept in UV-enriched habitats have higher amounts of growth hormone, calcium, and phosphorus, it has been discovered that incandescent bulbs enhanced with UV light improve broiler growth. Broiler chicks exposed to UVA bulbs may grow slower early on because they are more active. This is supported by research from Bailie *et al.* (2013), which found that UVA bulbs promote increased activity in broiler chicks.

Concerning to feed consumption trait it could observe that there was no significant difference in consumed feed during all ages among different groups as viewed in Table (3). The birds exposed to UVB5 recorded a highest feed consumption value with no significant difference (3.593 kg), while individuals exposed to UVA10 had a lowest feed consumption value (3.457 kg).

Feed conversion ratio results are summarized in Table (4). Chickens exposed to UVB for 5 hours wavelength had significantly lower and the best feed conversion ratio when compared to other groups, especially at 35th day of age (1.409). While birds of UVA5 and UVA10 groups had significantly highest and worst FCR value (1.435 and 1.442) compared to other groups. Whereas House *et al.* (2020) revealed that no differences between LED and UV lighting treatments were found at 42nd day feed conversion ratio. Also, Zhang *et al.* (2006) found that UV broilers in 42-D did have numerically better FCR compared with those reared under control conditions.

According to Zhang *et al.* (2006), broilers kept in UV-enriched environments had higher levels of growth hormone, calcium, and phosphorus, which promoted the development of their skeletons. On Contrary, James *et al.* (2020) revealed that male broilers raised with UVA + UVB for 8 hours showed that broilers could attain finishing weights sooner than controls, broiler chicks given UVA for 18 hours photoperiod exhibited slower initial growth rate than control broilers (LED). Daryatmo *et al.* (2021) reported that treatment supplemented with UV light significantly affected the parameters of final body weight, feed consumption and daily weight gain but not significant for FCR parameter. The effect of giving UV-B light is because the chickens that are given UV-B light are in comfortable conditions for activities.

3.2. Carcass and giblets

Carcass and giblets are showed in Table (5). There was not any significant difference among groups in each carcass, gizzard, liver, heart and abdominal fat weight percentage. Furthermore, it could be observed that birds exposed to UVB10 had higher carcass percentage value (75.154%) and lower relative abdominal fat compared to other groups. On contrary, according to James *et al.* (2020), Broiler chicks exposed to UV light showed variations in growth, and end weight but no differences in the weight of the breast meat yield or legs. They also revealed that a wide range of environmental, genetic, and nutritional factors influence the carcass composition of broiler chickens, which may have variable interactions with lighting parameters. Li *et al.* (2014) resulted that supplementation of UVB light did improve carcass in quail.

3.3. Body measurements

Light types and photoperiod influencing body measurements (body depth, shank length and keel bone length) at 35 days revealed in Table (6). The LED, UVB5 and UVB10 groups had significantly increased shank length (94.25, 92.3 & 93.5 mm) of the birds compared to other groups. Chickens exposed to UVB wavelength for 10 h had higher value of body depth and those exposed to UVA wavelength for 5 hours had higher value of keel bone length when compared to others. According to Zhang *et al.* (2006), the UVB wavelengths (280-315) have a physiological effect on bone health by activating vitamin D pathways and enhancing skeletal health.

3.4. Bone characteristics

Table (7) reveals the effect of light types and photoperiods on tibia width, length, and tibia Seedor Index at 35 days of age. This study resulted that chickens that exposed to UVA5 showed a higher value of Seedor Index (256.449 mg/mm) than other groups. Concerning to Tibia width, UVB5 and UVB10 group chickens had a higher significant value (8.916 and 9.164 mm) when compared to remained groups. Figure (2) showed radiographic image of broiler chickens tibia from different groups which affected by light type and photoperiod time and reported that broilers exposed to UVB and LED bulbs showed a good development of tibia bone formation, length, cartilage status and well mineralization on contrary of those exposed to UVA bulbs.

According to Zhang *et al.* (2006), broilers kept in UV-enriched environments had higher amounts of the growth hormone, calcium, and phosphorus, which promoted the development of their skeletons. Daryatmo *et al.* (2021) indicated that chickens treated with UV light have increased bone growth which is related to the increase in meat attached to the bones, so that the final body weight and daily body weight gain were high.

3.5. Blood parameters

Blood parameters data are summarized in Table (8). There was no significant difference among groups in calcium, phosphorus and alkaline phosphatase enzyme. The results disagree with the findings of Zhang *et al.* (2006) who showed that, UV wavelengths caused a rise in serum calcium, demonstrating the light's positive physiological effects. The production of vitamin D3 from UVB is essential for bone mineralization and skeletal growth because vitamin D3 increases calcium and phosphorus absorption in the intestine (Edwards, 2003).

The UVB group with both 5 photoperiod times (4.463pg/mL) and 10 photoperiod (4.769 pg/mL) exposure revealed an increasing significantly values in plasma corticosterone concentration compared to LED and each photoperiod of UVA bulbs. On the contrary, House *et al.*, (2020) reported that LED treatment had higher plasma corticosterone concentration (2.303 pg/mL) than the UV treatment (665pg/mL); Additionally, They demonstrated that lighting can affect avian stress responses, such as plasma corticosterone concentrations, by demonstrating that chicks grown without UV light supplementation were more stressed and grew more asymmetrically in response to longer-term stress than birds raised with UV light treatment.

The results disagree with the findings of Sobotik *et al.* (2020) found that UVB birds had the lowest corticosterone levels. Therefore, compared to LED birds, those birds are less stressed. They reported that plasma corticosterone, an important stress hormone, is a reliable sign of stress in chicken species. Plasma corticosterone levels, a key stress hormone, has been shown to be a reliable measure of stress in poultry species, with lower concentrations indicating lower levels of stress (House *et al.*, 2020).

3.6. Litter ammonia and Gait score

Current data indicated that using of UVB bulbs in chicken farms improve litter quality by significantly reduce litter ammonia (Table 9) and reduce the negative effect of litter on footpad status (Figure 4). UVB bulbs in chicken farms improved litter quality by significantly reduce litter ammonia and Gait score recorded a best state specially for chickens exposed to UVB5 group. Gait score recorded a best state for chickens exposed to UVB5 group. Broilers exposed to UV wavelengths showed improvement of walking ability with lower gait scores that agreed with (Dávila *et al.,* 2011). Broilers reared in UVA light bulbs and UVA + UVB light bulbs had better Bristol Gait Scores compared to the control (James *et al.*, 2018).

3.7. Footpad lesion scores

Regarding footpad dermatitis, chickens that exposed to UVB lamps revealed better footpad status compared to other groups and these birds were more comfort and had normal behavior during walking and movement (Figure 3). By activating vitamin D pathways and enhancing skeletal health, Bone health is physiologically impacted by UVB wavelengths. (Zhang *et al.*, 2006). According to studies by Zhang *et al.* (2019) and Güz (2022), ultraviolet light reduced rickets and tibial dyschondroplasia skeletal deformities while also increasing bone ash and plasma calcium. Physical welfare measures taken from birds under the same two light sources showed no substantial differences between groups in gait score and footpad dermatitis (Kristensen *et al.,* 2006).

4. CONCLUSION

Results obtained reported that there was an added value and benefits when using UVB light up to 5 hour per day to improves growth performance and had the lowest footpad dermatitis lesion score and litter ammonia concentration, while birds exposed to UVA light up to 10 hour per day are less stressed having lowest corticosterone levels. Maximizing the added value of broilers performance is by applying a suitable lighting type with interaction to photoperiod time exposure to achieving the best productivity.

5. Acknowledgement

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Table (1): Weekly live body weight of tested groups (kg) at different ages.

		0 day	7 day	14 day	21 day	28 day	35 day
Treatments	**T1: LED**	0.044	0.196	0.540	1.094	1.819[a]	2.554[b]
	T2: UVA5	0.044	0.194	0.529	1.074	1.789[ab]	2.499[c]
	T3: UVA10	0.044	0.193	0.522	1.074	1.739[c]	2.454[d]
	T4: UVB5	0.044	0.199	0.543	1.115	1.830[a]	2.594[a]
	T5: UVB10	0.044	0.196	0.544	1.118	1.822[a]	2.564[ab]
	Prop.	NS	NS	NS	NS	*	*

* P≤0.05, NS: Not Significant, [a,b,c] Means within the same row with different letters are significantly different

Table (2): Body weight gain (kg) of the tested groups at different ages

		0-7 day	7-14day	14-21day	21-28day	28-35day	overall
Treatment	T1: LED	0.152	0.344	0.555	0.725	0.735[a]	2.510[a]
	T2: UVA5	0.151	0.335	0.545	0.715	0.710[b]	2.455[b]
	T3: UVA10	0.149	0.329	0.552	0.664	0.715[b]	2.410[b]
	T4: UVB5	0.155	0.345	0.572	0.715	0.764[a]	2.550[a]
	T5: UVB10	0.152	0.348	0.574	0.704	0.742[ab]	2.520[a]
Prop.		NS	NS	NS	NS	*	*

* P≤0.05, NS: Not Significant, [a,b] Means within the same row with different letters are significantly different

Table (3): Feed consumption (kg) of tested groups during different stages of age.

		0-7 day	7-14 day	14-21 day	21-28 day	28-35 day	overall
Treatment	T1: LED	0.130	0.387	0.669	1.064	1.329	3.580
	T2: UVA5	0.129	0.383	0.663	1.053	1.293	3.522
	T3: UVA10	0.129	0.380	0.677	0.981	1.308	3.475
	T4: UVB5	0.129	0.385	0.685	1.045	1.349	3.593
	T5: UVB10	0.129	0.395	0.693	1.054	1.308	3.579
	Prop.	NS	NS	NS	NS	NS	NS

* P≤0.05, NS: Not Significant

Table (4): Feed conversion ratio (FCR) of tested groups during different stages of age.

		0-7 day	7-14 day	14-21 day	21-28 day	28-35 day	overall
Treatment	T1: LED	0.859	1.126[b]	1.207	1.468	1.808[ab]	1.426[ab]
	T2: UVA5	0.855	1.145[a]	1.217	1.474	1.822[a]	1.435[a]
	T3: UVA10	0.865	1.154[a]	1.227	1.476	1.829[a]	1.442[a]
	T4: UVB5	0.834	1.117[b]	1.197	1.462	1.766[b]	1.409[b]
	T5: UVB10	0.849	1.134[ab]	1.207	1.498	1.763[b]	1.420[b]
Prop.		NS	*	NS	NS	*	*

* P≤0.05, NS: Not Significant, [a,b] Means within the same row with different letters are significantly different

Table (5): Carcass, giblets and abdominal fat relative to live body weight.

	LBW	Carcass	Gizzard	Liver	Heart	Abdominal fat
T1: LED	2.62	71.175	0.93	2.124	0.596	1.132
T2: UVA5	2.51	72.489	0.91	2.118	0.549	1.109
T3: UVA10	2.50	72.139	0.97	2.094	0.600	1.091
T4: UVB5	2.68	74.460	0.90	2.123	0.596	1.100
T5: UVB10	2.66	75.154	0.91	2.091	0.557	1.081
Prop.	NS	NS	NS	NS	NS	NS

* P≤0.05, NS: Not Significant

Table(6): Body measurements of the tested groups.

		Body depth (mm)	Shank length (mm)	keel bone length (mm)
Treatment	T1: LED	103.50	93.50[a]	136.75
	T2: UVA5	100.34	85.13[ab]	137.61
	T3: UVA10	102.84	79.28[b]	135.90
	T4: UVB5	103.25	92.32[a]	136.55
	T5: UVB10	105.50	94.25[a]	132.86
Prop.		NS	*	NS

* $P \leq 0.05$, NS: Not Significant, [a,b] Means within the same row with different letters are significantly different

Table(7): Tibia length, width and Tibia Seedor Index of the tested groups

		Tibia Length (mm)	Tibia width (mm)	Tibia Seedor Index (mg/mm)
Treatment	T1: LED	118.18	8.465[ab]	247.447
	T2: UVA5	116.24	8.327[b]	256.449
	T3: UVA10	115.93	8.165[b]	238.143
	T4: UVB5	118.70	8.916[a]	242.965
	T5: UVB10	116.40	9.164[a]	244.817
Prop.		NS	*	NS

* $P \leq 0.05$, NS: Not Significant, [a,b] Means within the same row with different letters are significantly different

Table (8): Effect of light type on blood calcium, phosphorus, alkaline phosphatase, and corticosterone at 35 d of age

		Calcium (mg/dl)	Phosphorous (mg/dl)	alkaline phosphatase (U/L)	plasma corticosterone (pg/mL)
Treatment	T1: LED	8.352	5.315	2386	3.195[b]
	T2: UVA5	8.964	5.140	2488	3.255[b]
	T3: UVA10	8.204	5.546	2305	3.137[b]
	T4: UVB5	8.392	5.535	2252	4.463[a]
	T5: UVB10	8.728	5.212	2287	4.769[a]
Prop.		NS	NS	NS	**

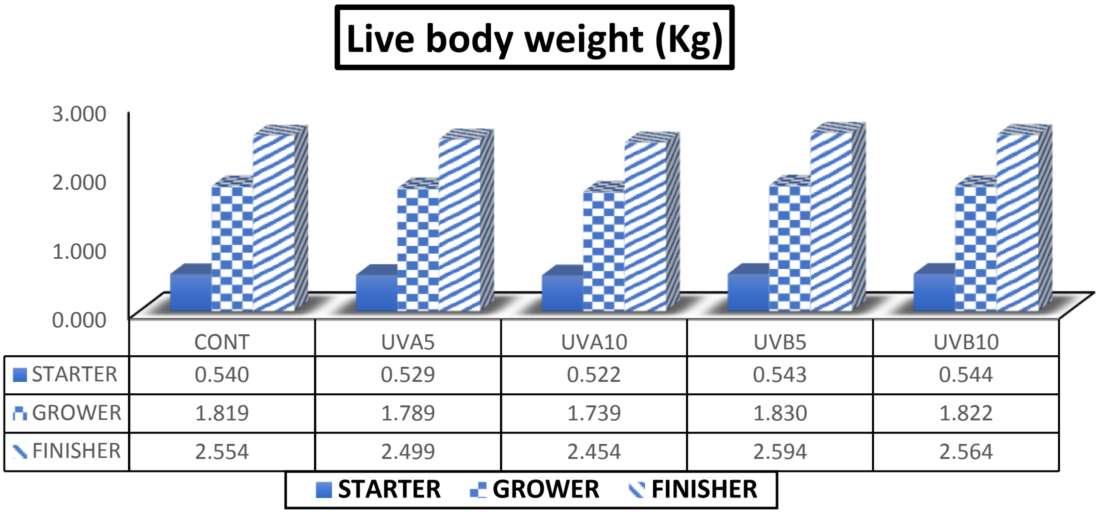
* $P \leq 0.05$, ** $P \leq 0.01$, NS: Not Significant, [a,b] Means within the same row with different letters are significantly different

Table (9): Litter ammonia and welfare status

		Litter ammonia (ppm)	Gait score
Treatment	T1: LED	11.32[a]	0.394
	T2: UVA5	11.85[a]	0.324
	T3: UVA10	10.59[b]	0.392
	T4: UVB5	8.12[c]	0.462
	T5: UVB10	8.08[c]	0.323
Prop.		*	NS

* $P \leq 0.05$, NS: Not Significant, [a,b] Means within the same row with different letters are significantly different

Values represent scoring the gait as 0 (normal gait), 1 (impaired movement), or 2 (reluctant step).



	CONT	UVA5	UVA10	UVB5	UVB10
STARTER	0.540	0.529	0.522	0.543	0.544
GROWER	1.819	1.789	1.739	1.830	1.822
FINISHER	2.554	2.499	2.454	2.594	2.564

Figure (1): Live body weight (kg) during different periods (starter, grower and finisher).

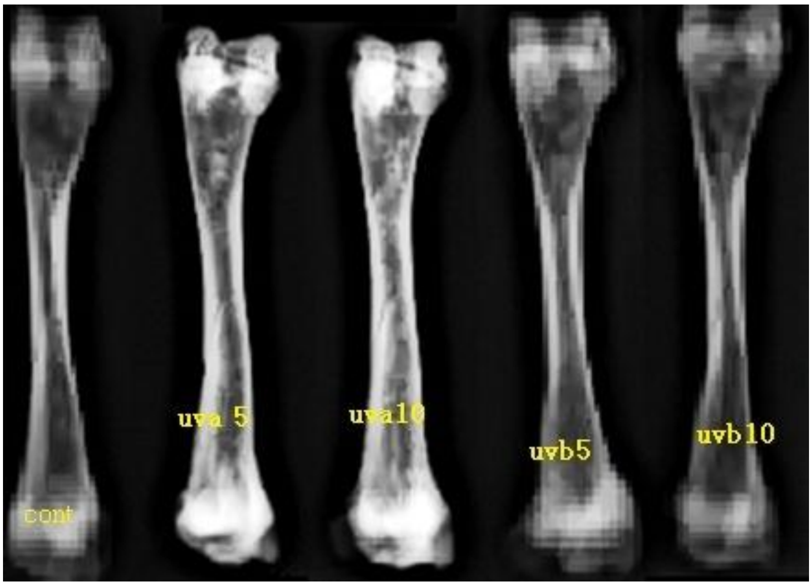
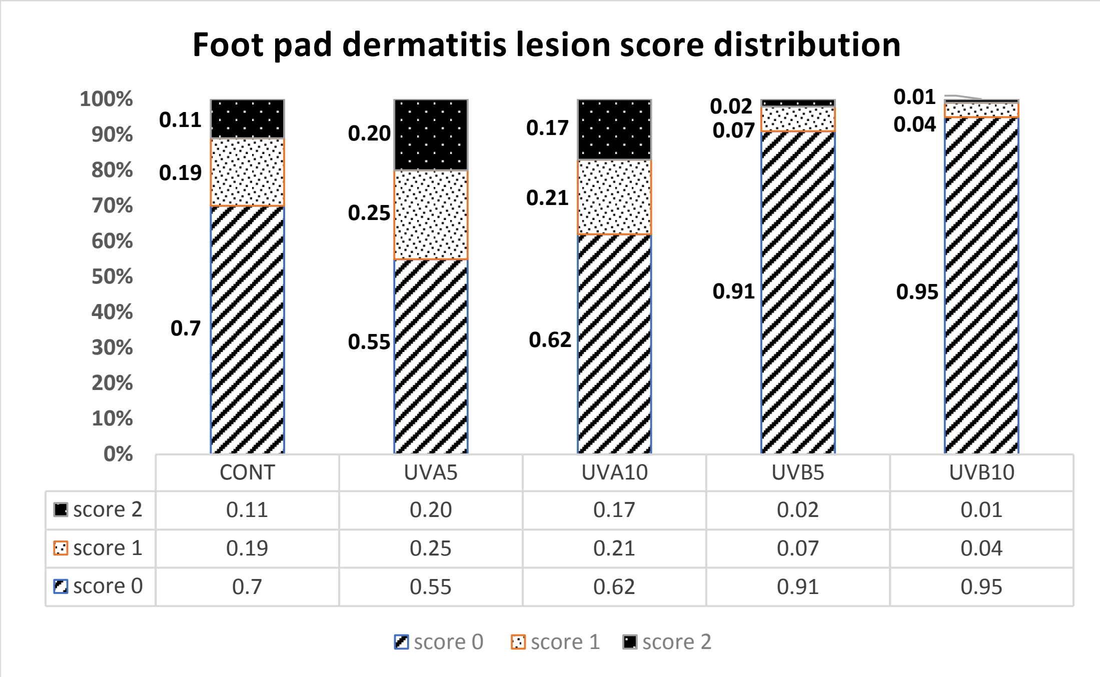


Figure (2): Radiographic image of the broiler's tibia of 35-d-old exposure to different light types



	CONT	UVA5	UVA10	UVB5	UVB10
score 2	0.11	0.20	0.17	0.02	0.01
score 1	0.19	0.25	0.21	0.07	0.04
score 0	0.7	0.55	0.62	0.91	0.95

Figure (3): Footpad dermatitis lesion score

Figure (4): Negative effect "right" and positive effect "left" of litter on footpad dermatitis.

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الملخص العربي

تأثير الأشعة فوق البنفسجية على أداء النمو، وصفات الدم وبعض الاعتبارات السلوكية لدجاج اللحم

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أجريت هذه التجربة لدراسة تأثير الأشعة فوق البنفسجية على بعض المقاييس الانتاجية لدجاج اللحم مثل أداء النمو والذبيحة وأعضاء الجسم ومقاييس الجسم وخصائص العظم وصفات الدم والحالة السلوكية. تم تقسيم إجمالي عدد 225 كتكوت لحم عمر يوم بشكل عشوائي الي خمس معاملات "3 أعشاش لكل معاملة، بكل عشة 15 طائر". تم استخدام ثلاثة أنواع من الإضاءة "الليد، فوق البنفسجية A، فوق البنفسجية B" مع استخدام فترات زمنية مختلفة " 5 ساعات و10 ساعات". كان توزيع المعاملات كالتالي: "معاملة 1: ليد – معاملة 2: فوق بنفسجية A5 – معاملة 3: فوق بنفسجية A10 – معاملة 4: فوق بنفسجية B5- معاملة 5: فوق بنفسجية B10. بالرجوع الي النتائج وبالمقارنة مع بقية المعاملات وجد أن استخدام لمبات الاشعة فوق البنفسجية لمدة 5 ساعات كان له تأثير جيد على وزن الجسم عند التسويق مقارنة مع بقية المجاميع. بالنسبة للاستهلاك التراكمي للعلف اتضح أن المجموعتين المعرضتين للأشعة فوق البنفسجية لمدة 5 ساعات واللمبات الليد كليهما استهلك كمية أكثر من العلف مقارنة مع بقية المجاميع، وهذا الاختلاف كان مرتفع المعنوية. عند المقارنة مع بقية المجاميع وجد أن الطيور المعرضة للأشعة فوق البنفسجية لمدة 10 ساعات حققت قيم أعلي من النسبة المئوية للذبيحة ومستويات أقل من النسبة المئوية لدهن البطن. وجد أن المجموعتين المعرضتين للأشعة فوق البنفسجية لمدة 10 ساعات واللمبات الليد كليهما حقق زيادة معنوية في طول عظمة الساق فيما سجلت المجاميع المعرضة للأشعة A مدة 5 ساعات قيم أعلي لطول عظمة القص مقارنة ببقية المجاميع. أوضحت مجموعة الدجاج المعرضة للأشعة A لمدة 5 ساعات قيم أعلي من دليل سيدور لعظمة الدبوس. كان هناك زيادة في مستوي الكالسيوم ببلازما الدم للدجاج المعرض للأشعة A مدة 5 ساعات. تبين أن استخدام لمبات الاشعة فوق البنفسجية من النوع B في مزارع الدجاج تحسن من جودة الفرشة عن طريق تقليل تركيز الامونيا بالفرشة ودرجة Gait مسجلة أفضل حالة للدجاج خاصة المعرض لخمس ساعات. الطيور المعرضة للمبات B حققت أفضل حالة لباطن القدم مقارنة مع بقية المجاميع. خلاصة النتائج تشير الي وجود تأثيرات معنوية لأغلب الصفات المدروسة عند استخدام لمبات الاشعة فوق البنفسجية من النوع B لمدة 5 ساعات في اليوم.

الكلمات الدالة: دجاج لحم، أشعة فوق البنفسجية، عظم، رفاهية، إنتاج.