



**EFFECT OF DIFFERENT SEASONS ON GROWTH PERFORMANCE,
IMMUNE RESPONSES AND ANTIOXIDANT STATUS OF BROILER
CHICKENS**

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Received: 30/01/2021

Accepted: 05/03/2021

ABSTRACT: The current experiment was carried out in farm nearby Fayoum research station to study effect of different seasons on growth performance of broiler chicks and detect early indicators for supplementing broilers flocks with antioxidant and immune enhancer. Four flocks from Arbor Acres broiler chicks were reared during summer, autumn, winter, and spring seasons in open side system. Productive performance parameters, complete blood count, antibody titers against Newcastle (NDV), antibody titers against avian influenza (H₅N₁) and some antioxidant parameters were measured. The following results were obtained:

Body weight and body weight gain recorded significantly the highest values during spring seasons but the highest ($P \leq 0.05$) feed intake value was recorded during winter seasons and the best feed conversion value was recorded during autumn ($P \leq 0.05$). Total leukocytes count, heterophilus (H), lymphocyte (L) and H/L ratio were not affected by different seasons. Antibody titers against NDV and H₅N₁ record the highest significant values during summer season while the worst significant antioxidant status recorded during summer season. In contrast during winter values of antibody titers against NDV and H₅N₁ were significantly the worst but antioxidant parameters recorded significantly the best values.

The results of the current study suggested that during winter flocks may need double doses from NDV and H₅N₁ vaccines. However, during summer and autumn seasons, increasing antioxidant supplementation in diets or even drinking water is recommended.

Key words: Broilers, season, Performance, Antioxidants, immunity.

INTRODUCTION

Geographically, ninety percent or more from Egypt lies inside the Sahara desert, thus Egypt climate classified as subtropical and tropical climate. Significant fluctuations in temperatures occurred not only during different season but it is fluctuated daily. In broiler field, prediction of adverse and harms effects that produced from climate fluctuation can be used as an early index for detecting disorders and how broiler breeder treat their flocks in different seasons. Kadim *et al.* (2008) reported that temperatures of different season effected significantly on broiler performance in flocks reared in houses with open-sided. Ipek and Sahan (2006) reported that there were significant differences in body weight, growth rate, feed consumption and feed conversion between broiler chicks that reared in cool temperature (21°C) than control that reared in 33.3 °C after three week of age. Moreover Olfati *et al.* (2018) reported that exposing broiler chicks to heat stress (33±3 ° C) led to a decrease in feed intake by 14.90%, body weight gain by 25.71% and an increase in feed conversion ratio by 13.06% compared with broiler reared under good condition (24±2 ° C). They added that when broiler chicks exposed to cold stress (12±1 ° C), this led to decrease feed intake by 22.05% and body weight gain decreased by 38.32% but feed conversion ratio increased by 22.47% compared with that reared in good condition (24±2 ° C).

The antioxidant resistance systems in poultry include endogenous (internally) antioxidant enzymes such glutathione peroxidase and glutathione reductase. Exogenous (externally) antioxidant includes supplied vitamins like E, B and C (Surai *et al.*, 2019). The levels of

vitamins in broiler diets (starter, grower or finisher) that formatted according to NRC (1994) had ability to satisfy broiler requirements from externally antioxidant reared in natural conditions nevertheless, stressed broiler chicks may be need more amount from antioxidant sources.

Complete blood count may be differed depending on broiler strain and season effect where, Mohamed *et al.* (2012) reported that response of 3 broiler strains (Cobb, Hubbard and Ross) for flocks reared in winter compared with summer season differ depending on broiler strain. Ipek and Sahan (2006) reported that cool temperature exhibited significant changes at 5 wk of age in red blood cell counts, hemoglobin and hematocrit. Immune response in grower chickens affected by environmental temperatures where cellular immunity that represented in white blood cells and heterophil/lymphocyte ratio were affected by heat stress (Mashaly *et al.*, 2004). On the other hand heat stress reduced antibody production in grower chickens (Zulkifi *et al.*, 2000). Olfati *et al.* (2018) reported that cold and heat stress decreased antibody titer, lymphocyte count and increased heterophil and heterophil/lymphocyte ratio. In general cold stress caused retardation in immune function (Zhao *et al.* 2014)

The present experiment was carried out to study effect of different seasons on growth performance and set early indicators for broiler producers to estimate how they can treat its flocks and supplementing immunity enhancers and antioxidant.

MATERIALS AND METHODS

Flocks rearing, housing and management:

Four flocks each of which contains 450 one-day- old Arbor Acres broiler chicks

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were reared during the four quarters of the year. The first flock reared in summer season during the period extended from 12 June to 16 July. The second flock reared in autumn season during the period extended from 5 November up to 9 December. The third flock reared in winter season during the period extended from 4 January 7 February. The last flock reared in spring season during the period extended from 14 March 17 April. All flocks that reared in this trail were reared in the same house with open side system. The ambient temperatures were adjusted to be 33 °C, 30°C and 26°C for the first three weeks respectively especially during winter and spring seasons, while during summer ambient temperature increased than this limit during the first three weeks especially through the daytime. Ambient temperature of the flock that reared during summer season were 38°C, 36°C, 38°C, 39°C and 38°C respectively for the five weeks of the current experiment. During winter season the average ambient temperature were 20°C and 18°C for the 4th and 5th weeks of experimental period but during spring the average ambient temperature were 24°C and 24°C for the 4th and 5th weeks of experimental period. During autumn the average ambient temperature were 28, 26°C and 25°C for 3rd, 4th and 5th weeks of experimental period. The relative humidity were recorded daily and the average calculated weekly for the four flocks where the average relative humidity was summarized in table (1).

At one - day - old broiler chicks of each flocks were weighed and distributed into 45 cages where each cages contains 10 chicks treated as one unit to estimate feed intake and body weight hence, feed conversion and body weight gain were calculated for each cage. Chicks were fed

starter diet from 1-12 day of age, grower diet from 13-24 day of age and finisher diet from 25-35 day of age. Composition and calculated analyses of experimental diet were illustrated in Table 2 and all broiler chicks were fed *ad libitum*. Parameters of growth performance were measured and calculated weekly. The day light was supplemented with artificial clear light to obtain continuous light for entire experimental period where clear lamps (1 lamb/16m²) were used.

All flocks vaccinated against Newcastle disease (NDV) where it received Hitchner B1 strain at 6 days of age and LaSota strain at 16 and 26 days of age all in drinking water after thirsty for two hours. Oil Vaccine against NDV (0.5 cm³/bird) was injected in thigh at 13 day of age. Moreover Oil Vaccine against avian influenza H₅N₁ (0.5 cm³/bird) was injected in thigh at 9 day of age.

Samples and biochemical assays:

When each flocks reached 35 day of age 10 blood samples were withdrawn randomly in heparinized test tubes to estimate total antioxidant capacity (TOAC) and malondialdehyde MDA. Ten blood samples from each flocks either were withdrawn randomly in non-heparinized test tubes to determine antibody titer against Newcastle diseases (AbNDV) and avian influenza H₅N₁ (AbH₅N₁). Moreover 10 heparinized blood samples were withdrawn to evaluate complete blood count (CBC) and another 10 heparinized blood samples were withdrawn to estimate glutathione peroxidase (GPx) and glutathione reductase (GS-r).

The test of AbNDV conducted by using preventing from hemagglutination method and the test of AbH₅N₁ were conducted by using commercial Elisa Kits in Reference Lab for Veterinary Quality Control on Poultry Production, Egypt. Ten broiler chicks were slaughtered to estimate Carcass characteristics.

Statistical analysis: Data of all experimental flocks were statistical analyzed using one way ANOVA procedure (spss, 2007). Variables showed significant differences at F-test ($P \leq 0.05$ or less) were compared to each other's using Duncan's Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Growth performance:

Body weight (BW) and body weight gain (BWG) were affected significantly by season's differences. Summer season caused significant retardation in BW and BWG compared with other seasons during grower, finisher and entire growth period. In contrast, growing broiler during spring significantly achieved the highest BW during grower and entire periods. Winter season followed spring season in improving BW and BWG. For all stages of growing periods winter season achieved significant improvement in BW and BWG compared with summer season and these results in a full agreement with Osti *et al.* (2017) who reported that body weight was significantly greater during winter compared with summer season and similar results obtained by Ipek and Sahan (2006) and Osti *et al.* (2017). This is may be due to heat stress during summer season caused harm effect in BW and BWG where Yousaf *et al.* (2019) reported that heat stress caused harmful effect on BW and Liu *et al* (2020) reported that heat stress decreased BWG. Feed intake was affected significantly by different seasons where feed intake of broiler chicks that reared in winter seasons recorded significantly the highest values followed by spring season especially for Entire period. In contrast the lowest significantly values of feed intake recorded during autumn season

followed by summer season. Regarding retardation of feed intake during summer season this may be due to heat stress during summer season significantly decreased feed intake (Liu *et al*, 2020). Decreasing FI during summer season may be due either to feed was lifted far from broiler chickens at midday to 4PM during the last two weeks of age.

The lowest values ($p \leq 0.05$) for FI were recorded during finisher and entire periods at autumn season this may be due to the average values of relative humidity during this season (Table, 1) was the highest values. Relative humidity and high ambient temperature were thermal factors that reduced feed intake (Mascarenhas *et al*, 2020). On the same manner Ying *et al* (2019) reported that relative humidity decreased average daily feed intake. Feed conversion (FC) affected significantly by different seasons as shown in Table 3. The worst FC values recorded during winter seasons and this result was in a full agreement with Osti *et al.* (2017) who reported that broiler chicks that reared during winter FC had significantly ($p \leq 0.05$) higher FC than that reared in other seasons. Increasing FI during winter may be due to energy that used for maintenance in broiler chickens may increase during this season and this in a full agreement with Nogueira *et al.* (2013) who reported that energy requirements that used for maintenance during winter was increased.

Carcass characteristics:

Data in Table (4) indicated that each of Giblets, Abdominal fat%, heart% and spleen% didn't affected significantly by different seasons in contrast dressing%, liver% and gizzard% affected significantly by different seasons. Dressing percentage differ significantly ($p \leq 0.002$) depending on seasons

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different. During summer seasons broiler chicks yielded significantly ($p \leq 0.05$) lower dressing weight percentage compared with winter season. This results was disagreement with Sarma *et al* (2020) who found higher dressing percentage for broiler reared during summer but lowest percentage for broiler reared during winter season. Our results may be more logical because final body weight of broiler reared in winter recorded higher values compared with than final body weight of broiler reared in summer. The results of Humam *et al* 2019 demonstrated that as final body weight increase as dressing weight percentage increase. Insignificant effect of seasons was observed on giblets weight percent and this result was in agreement with Sarma *et al* (2020). Moreover Yousaf *et al.* (2019) reported that summer season caused significant decrease in dressing weight percentage.

Complete blood count:

Results in Table 5 indicated that each of red blood cells (RBCs) hemoglobin (Hb) and hematocrit (Ht%) were affected significantly by different seasons. Broiler chickens of flocks that reared during summer seasons recorded significantly the lowest RBCs, Hb and Ht% values. The result of RBCs during summer season was in a full agreement with Donkoh (1989) who reported that decreased in RBCs, Hb and Ht% were observed in broiler reared in temperature ranged from 30-35 °C he presented data indicated that decreasing ambient temperature increased RBCs, Hb and Ht%. Moreover, Yahav and Hurwitz 1996 reported that exposure to high temperature, decreased hematocrit and similar results was obtained by Mohamed *et al.* (2012) who reported that RBCs, Hb and Ht% were decreased during summer

season compared with winter season.

Immune responses:

The results of cellular immunity (Table, 5) demonstrated that different seasons didn't affect white cell profile where heterophil (H), lymphocyte (L) and H/L ratio didn't differ significantly among the four seasons. Insignificant effect of seasons on white cell profile may be due to all flocks during different seasons reared in broiler cages that may be reduced exposing broiler chickens to pathogenic bacteria. Moreover the four flocks were treated equally in regarding to supplementing antibiotics when chickens exposed to pathogenic bacteria. The results of humoral immunity indicated that during summer season AbNDV and AbH₅N₁ recorded significantly the highest values but during winter it recorded the lowest values (Table, 5).

Regarding white blood cell profile the results were in a full agreement with Osti *et al.*, (2017) and similar results obtained by Yalcin, *et al.* (2004). Regarding results of AbNDV cold stress affected AbNDV depending on chicken strain (Spinu and Degen, 1993) and during winter vaccination improved AbNDV immediately in the flocks (Bari *et al.* 2018). Hence titer of AbNDV may be lowered quickly during winter where experimental flocks were vaccinated at 26 day of age then samples were withdrawn at 35 day of age so AbNDV depressed. Moreover Xylouri-Frangiadaki and Samouhos (2000) reported that level of AbNDV offer adequate protection for NDV disease during summer season. Li *et al.*(2020) reported that number of LaSota vaccine doses affected AbNDV and growth performance in vaccinated broiler chickens. So in winter it may be suitable to vaccinate the first dose of

LaSota more early at 11, 21 and insert more one dose at 31 day of age. Increasing efficiency of NDV vaccination may be applied by increasing single dose (1000 dose per 1000 bird) to be double dose (2000 dose per 1000 bird). Where Igwe *et al.* (2019) suggested that vaccinated LaSota with a double dose procedure improved vaccine performance for controlling velogenic of Newcastle disease. Moreover

Antioxidant status:

Regarding antioxidant plasma component (TAOC and MDA) of broiler chickens, the data in Table (5) indicated that both of TAOC and MDA were affected significantly by different seasons. The TAOC values recorded significantly the highest values during winter seasons followed by spring, autumn and summer respectively. In contrast MDA showed an opposite arrangement, where MDA values in plasma of broiler chickens recorded significantly the highest values during summer season followed by autumn, winter and spring respectively. The data of antioxidant enzymes Table (5) indicated that seasons affected significantly ($p \leq 0.001$) on GPx, nevertheless GS-r was not affected. Heat exposure as a chronic heat stress that occurred during summer season depressed sharply ($p \leq 0.05$) GPx and this depression were alleviated as environmental temperature decreased during autumn and spring. In contrast during winter season and when broiler chicks exposed to chronic cold stress, the results exhibiting significant improvement in GPx and insignificant improvement in GS-r.

The reduction in antioxidant plasma component and antioxidant enzymes during summer and autumn seasons may be due to free radical increased as

environmental temperature increased. Moreover the data of growth performance recorded significant decrease in feed intake as environmental temperature increased hence, consumption of external antioxidant (such vitamins mainly E and C and minerals mainly selenium) that supplemented in diets formatted according to NRC (1994) were decreased. Decreasing antioxidant activities, agree with (Ando *et al.*, 1997) who reported that heat stress increased free radical through disturbance of electron transport in cell membrane may be by causing molecular changes in primarily lipids, proteins, DNA, and other molecules (Bruskov *et al.*, 2002).

Free radical (FRs) divided into two main categories that include reactive nitrogen species and reactive oxygen species where equilibrium between FRs and antioxidants is important for keeping physiological function (Lobo *et al.*, 2010). Antioxidant system involves internally substances mainly include GPx and externally substances like vitamins E and C (Surai *et al.*, 2019). Reactive oxygen byproducts resulted from aerobic reactions then accumulated in the cell and produced toxic status for cell (Margis, *et al.*, 2008). They added that reactive oxygen produced superoxide, hydroxyl and hydrogen peroxide radicals.

In general alleviating side effect of free radical and improving antioxidant statuses during winter and spring seasons may be due to chickens during the first three weeks reared in optimal temperature and the ambient temperature decreased during the last two weeks to be near optimal temperature or slightly less. On the other hand during summer season ambient temperatures during different weeks of rearing periods (1-5wks) were higher than optimal temperature as indicated in Table

(1). The ambient temperature during summer season may be caused heat stress that increased lipid peroxidation as pointed from MDA values (table, 5) and free radical may be increased generation of MDA (Altan *et al.*, 2003) and superoxide production is significantly increased by heat stress (Mujahid *et al.*, 2005)

CONCLUSION

The results from this study indicated that broiler during summer season may need excess amount of antioxidant higher than recommendation of NRC (1994). The results indicated either that flocks reared during winter may need excess amount of immune enhancer drugs and may need either increasing efficiency of vaccination techniques through application of double dose procedure or decreasing vaccination interval period specially for LaSota vaccine

Table (1): Ambient temperature and relative humidity for four year seasons.

Season Week	Summer		Autumn		Winter		Spring	
	T	RH	T	RH	T	RH	T	RH
First	38	35	33	40	33	30	33	35
Second	36	40	30	50	30	35	30	40
Third	38	45	28	50	26	45	26	45
Fourth	39	35	26	45	20	45	24	35
Fifth	38	35	25	45	18	45	24	35
Average	37.8	38	28.4	46	25.2	40	27.4	38

T: ambient temperature RH: relative humidity

Table(2): Composition and calculated analysis of Starter, grower and finisher diets.

Composition (per 100 Kg)	Starter (1-10 day)	Grower (11-24day)	Finisher (25-40 day)
Yellow Corn	52.28	59.05	63.19
Soybean meal (44%CP)	34.00	26.70	22.5
Corn gluten (60% CP)	6.00	7.00	6.30
Oil	3.00	3.00	4.00
Di-Calcium phosphate	1.84	1.67	1.59
Lime stone	1.43	1.20	1.10
L- Lysine Hcl	0.32	0.31	0.28
Dl -Methionine	0.26	0.20	0.17
Sodium Chloride	0.24	0.24	0.24
Sodium bicarbonate	0.23	0.23	0.23
Vitamins Premix *	0.10	0.10	0.10
Minerals Premix**	0.30	0.30	0.30
Total	100.00	100.00	100.00
Calculated analysis %			
Crude Protein	23.17	21.25	19.04
Metabolizable Energy (Kcal/Kg)	3100	3110	3207
Ether extract	5.63	5.08	6.88
Crude fiber	3.80	3.45	3.22
Calcium	1.04	0.90	0.84
Av. Phosphorus	0.50	0.45	0.43
Lysine	1.44	1.24	1.09
Methionine	0.68	0.60	0.54
Methionine+Cytine	1.06	0.95	0.86

* Supplied per kg of diet: Vit. A, 11000 IU; Vit. D3, 5000 IU; Vit. E, 50 mg; Vit K3, 3mg; Vit. B1, 2mg; Vit. B2 6mg; B6 3 mg; B12, 14 mcg; Nicotinic acid 60mg; Folic acid 1.75 mg, Pantothenic acid 13mg; and Biotine 120 mcg.

**Supplied per kg of diet: Choline 600 mg; Copper 16mg; Iron 40mg; Manganese 120 mg; Zinc 100mg; Se 0.20 mg and Idoine 1.25mg.

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Table (3): Effet of diffèrent sassons on growth performance.

Body weight (g)				
Seasons	1 day	Starter	Grower	Finisher
Summer	41.56±0.13	183.24 ^b ±2.20	659.27 ^d ±18.93	1529.01 ^d ±29.92
Autumn	42.71±0.18	178.55 ^b ±3.05	729.33 ^c ±15.67	1632.45 ^c ±34.50
Winter	41.00±0.00	203.26 ^a ±0.91	795.68 ^b ±20.07	1941.00 ^b ±27.20
Spring	42.11±0.13	214.72 ^a ±1.74	875.73 ^a ±10.35	2027.69 ^a ±27.76
P values	NS	0.001	0.001	0.001
Body weight gain (g)				
	Starter	Grower	Finisher	Entire period
Summer	141.64 ^b ±2.16	476.03 ^d ±19.45	869.74 ^b ±14.70	1487.41 ^d ±30.02
Autumn	137.47 ^b ±3.11	550.78 ^c ±13.84	903.12 ^b ±24.60	1591.37 ^c ±34.53
Winter	161.22 ^a ±0.89	592.42 ^b ±19.44	1145.32 ^a ±8.56	1898.96 ^b ±27.19
Spring	172.06 ^a ±1.74	661.01 ^a ±10.14	1151.97 ^a ±19.61	1985.03 ^a ±27.72
P values	0.001	0.001	0.001	0.001
Feed intake (g)				
	Starter	Grower	Finisher	Entire period
Summer	193.15 ^b ±2.85	735.27 ^b ±14.01	1408.02 ^c ±26.82	2336.44 ^b ±30.03
Autumn	181.51 ^c ±2.43	756.33 ^b ±15.33	1332.53 ^d ±38.37	2270.38 ^c ±45.04
Winter	221.47 ^a ±1.16	975.32 ^{ab} ±3.04	1926.47 ^a ±21.10	3123.26 ^a ±23.23
Spring	217.36 ^a ±4.72	1008.82 ^a ±9.42	1842.40 ^b ±11.19	3068.58 ^b ±12.33
P values	0.001	0.001	0.001	0.001
Feed conversion (g feed/g gain)				
	Starter	Grower	Finisher	Entire period
Summer	1.37 ^a ±0.02	1.57 ^b ±0.05	1.62 ^a ±0.04	1.58 ^b ±0.04
Autumn	1.32 ^{ab} ±0.02	1.38 ^c ±0.02	1.48 ^b ±0.03	1.43 ^c ±0.02
Winter	1.37 ^a ±0.01	1.68 ^a ±0.05	1.68 ^a ±0.01	1.65 ^a ±0.01
Spring	1.26 ^b ±0.03	1.53 ^b ±0.03	1.60 ^{ab} ±0.03	1.55 ^b ±0.02
P values	NS	0.010	0.001	0.002

a,b,...= Means in the same column with different superscripts, differ significantly ($p \leq 0.05$); NS = Not Significant ($p \leq 0.05$)

Table (4): Effet of diffèrent sassons on carcass characteristics.

Season	Dressing%	Giblets%	Abdominal fat%	Liver %	Heart %	Gizzard %	Spleen %
Summer	67.02 ^b ±0.84	4.68±0.08	1.68±0.04	2.47 ^a ±0.06	0.53±0.02	1.59 ^b ±0.04	0.14±0.00
Autumn	69.41 ^a ±1.07	4.75±0.09	1.74±0.05	2.33 ^a ±0.06	0.56±0.02	1.71 ^a ±0.03	0.15±0.01
Winter	71.41 ^a ±0.26	4.88±0.04	1.71±0.04	2.42 ^a ±0.03	0.58±0.01	1.76 ^a ±0.03	0.15±0.01
Spring	70.14 ^a ±0.63	4.45±0.07	1.56±0.10	2.18 ^b ±0.04	0.53±0.01	1.60 ^b ±0.03	0.14±0.00
P values	0.002	NS	NS	0.001	NS	0.002	NS

a,b,...= Means in the same column with different superscripts, differ significantly ($p \leq 0.05$). NS = Not Significant ($p \leq 0.05$);

Table (5): Effect of different season on complete blood count, immune responses and antioxidant status.

Parameters	Complete blood count			Immune responses					Antioxidant status			
				Cellular immunity			Antibody titer		Component		Enzymes	
Season	RBCs ×10 ⁶	Hb	Ht%	H%	L%	H/L ratio	AbNDV	AbH ₅ N ₁	TOAC mmol/l	MDA nmol/ml	GPx (mU/ml)	GS-r)U/L(
Summer	3.09 ^c ±0.05	11.74 ^c ±0.25	31.81 ^c ±0.56	28.55 ±0.36	65.37 ±0.35	0.44 ±0.01	8.84 ^a ±0.03	7.87 ^a ±0.04	0.63 ^d ±0.09	9.02 ^a ±0.91	581.72 ^d ±22.97	7.93 ±1.55
Autumn	3.34 ^b ±0.07	13.74 ^a ±0.08	35.96 ^a ±0.20	28.77 ±0.47	64.55 ±0.61	0.45 ±0.01	7.86 ^b ±0.03	6.85 ^b ±0.05	0.78 ^c ±0.02	5.64 ^b ±0.23	655.36 ^c ±23.72	13.44 ±0.34
Winter	3.44 ^a ±0.12	12.96 ^b ±0.39	34.01 ^b ±0.91	28.85 ±0.66	65.54 ±0.69	0.44 ±0.02	6.40 ^c ±0.17	6.02 ^c ±0.19	1.12 ^a ±0.11	3.02 ^c ±0.37	949.97 ^a ±18.49	9.38 ±0.53
Spring	3.64 ^a ±0.03	13.77 ^a ±0.10	36.00 ^a ±0.33	29.11 ±0.75	65.60 ±0.78	0.45 ±0.02	8.04 ^b ±0.20	7.09 ^b ±0.24	1.02 ^b ±0.06	2.91 ^d ±0.45	707.95 ^b ±13.57	9.15 ±0.58
P values	0.039	0.015	0.031	NS	NS	NS	0.019	0.035	0.019	0.023	0.001	NS

a,b,...= Means in the same column with different superscripts, differ significantly ($p \leq 0.05$) NS = Not Significant ($p \leq 0.05$).

RBCs = red blood cells Hb= hemoglobin Ht%= hematocrit H%= heterophil L% = lymphocyte

AbNDV = antibody titer against Newcastle diseases AbH₅N₁ = antibody titer against avian influenza

TOAC= total antioxidant capacity MDA= malondialdehyde

GPx= glutathione peroxidase GS-r = glutathione reductase

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الملخص العربي

تأثير اختلاف فصول السنة على أداء نمو بداري التسمين والحالة الفسيولوجية وحالة مضادات الأكسدة

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أجريت التجربة الحالية في مزرعة مجاورة لمحطة بحوث الدواجن بالفيوم لدراسة تأثير اختلاف فصول السنة على أداء نمو دجاج بداري التسمين و التنبؤ بمؤشرات مبكرة فيما يخص اضافة مضادات الاكسدة ومحفزات المناعة. تم تربية أربعة قطعان من كتاكيت بداري التسمين الاربوايكرز خلال فصول الصيف والخريف والشتاء والربيع تحت نظام التربية المفتوح . تم قياس مقاييس الأداء الإنتاجي ، عمل فحص دم شامل ، منحنى الأجسام المضادة لمرض النيوكاسل (NDV) وأنفلونزا الطيور (H_5N_1) وبعض مقاييس حالة مضادات الأكسدة.

تم الحصول على النتائج التالية:

سجل وزن الجسم والزيادة في وزن الجسم أعلى القيم معنوياً خلال فصل الربيع ولكن سجلت أعلى قيمة معنوية لكمية الغذاء المستهلك خلال فصل الشتاء و سجلت أفضل قيمة تحويل غذائي خلال فصل الخريف. لم يتأثر إجمالي عدد كرات الدم البيضاء، الخلايا المتعادلة (H)، الخلايا الليمفاوية (L) ونسبة H/L باختلاف فصول السنة. منحنى الأجسام المضادة لمرض النيوكاسل (NDV) وأنفلونزا الطيور (H_5N_1) أعلى القيم معنوياً وأسوأ حالة لمضادات الأكسدة تم تسجيلها خلال موسم الصيف. وعلى النقيض من ذلك ، فخلال فصل الشتاء كان منحنى الأجسام المضادة لمرض النيوكاسل (NDV) وأنفلونزا الطيور (H_5N_1) هي الأسوأ ، بينما سجلت مقاييس مضادات الأكسدة أفضل القيم لها.

التوصية التي تم استخلاصها من الدراسة هي:- مراعاة زيادة جرعات لقاحات NDV و H_5N_1 لتكون جرعات مضاعفة خلال الشتاء وزيادة مضادات الأكسدة في عليقة البداري أو حتى مياه الشرب خلال كلا من فصلي الصيف والخريف.

الكلمات الدالة: بداري التسمين، فصول السنة، الأداء، مضادات الأكسدة، المناعة.