

EFFECT OF SEASON AND SEX ON SOME PRODUCTIVE TRAITS OF PEKIN DUCK REARED INTENSIVELY UNDER IRAQI CONDITIONS

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ABSTRACT

This study was conducted at Poultry farm/Department of Animal Production/College of Agricultural Engineering Sciences/University of Baghdad, were divided into two experiments one during summer and second during winter seasons to study the effect of season and sex on productive performance of Pekin duck reared in an intensive system under harsh Iraqi conditions. A hundred fifty, one day old ducklings were used in each experiment. On 14 day of age, birds were sexed then randomly divided into nine replicates (pens) (5 replicates for females and 4 for males). Results indicated that season has significant effects on studied traits. Body weight, weight gain and food consumption were significantly ($p < 0.01$) higher in birds reared in winter than those reared in summer, whereas no significant differences existed in feed conversion ratio and mortality. Males revealed highly significant ($p < 0.01$) in body weight and weight gain compared with females in both seasons. Study revealed that pekin duck performance were slightly effected and resisted to acute high temperature during summer. Pursuant to, it can be reared pekin duck in intensive system throughout year in Iraq.

Key words: bird, summer, winter, body weight, weight gain, sex.

الغبان والحسني

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تأثير الموسم والجنس على بعض الصفات الانتاجية للبط البكيني المربي بنظام التربية المكثفة في ظروف العراق

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باحث

قسم الانتاج الحيواني - كلية علوم الهندسة الزراعية - جامعة بغداد

المستخلص

تم إجراء الدراسة في حقل الدواجن التابع لقسم الانتاج الحيواني، كلية علوم الهندسة الزراعية، جامعة بغداد. إذ قسمت الى تجربتين نفذت التجربة الاولى خلال فصل الصيف والثانية خلال فصل الشتاء وذلك لدراسة تأثير الموسم والجنس على الاداء الانتاجي للبط البكيني المربي تربية مكثفة في الظروف المناخية العراقية القاسية. استخدم مئة وخمسون من افراخ البط بعمر يوم واحد لكل تجربة قسمت الى تسع مكررات (كن) بعد ان تم تجنيسها بعمر 14 يوم (5 مكررات للإناث ، 4 مكررات للذكور). أظهرت النتائج التأثير المعنوي للموسم على الصفات المدروسة حيث ارتفع معنوياً ($P < 0.01$) كل من وزن الجسم والزيادة الوزنية واستهلاك العلف للطيور المرباة في فصل الشتاء مقارنةً بالصيف، في حين لم تظهر فروقات معنوية في معامل التحويل الغذائي والهلاكات بين الموسمين. أظهرت الذكور تفوقاً عالي المعنوية ($P < 0.01$) في وزن الجسم والزيادة الوزنية مقارنةً بالاناث في كلا الموسمين. بينت الدراسة التأثير الخفيف في اداء البط البكيني ومقاومته العالية لارتفاع درجات الحرارة الشديد خلال فصل الصيف. وبناءً على ذلك يمكن تربية البط البكيني في نظام التربية المكثفة طوال السنة في العراق.

الكلمات المفتاحية : طيور، الصيف، الشتاء، وزن الجسم، الزيادة الوزنية، الجنس.

INTRODUCTION

Poultry industry is considered one of important economical sectors that involves in food security by ensuring global needs of meat and egg (13), which represents the major source of animal protein in many countries around the world (20). High environmental temperature in a different countries such Iraq is considered the most serious problem facing poultry production (19,3). In domestic birds, high temperature above thermoneutral zone leads to decrease in feed intake, body weight and weight gain (15,4), an increase in water intake and mortality (9,5), deterioration in feed conversion, reduction in performance and physiological functions (14,17) and finally inhibits immunity (1). Duck is waterfowl bird that domesticated since four thousands year in Asia, where the majority are reared according its convenient to the environment and used for human consumption (22). There are many pure breeds of duck classified into meat, egg and both production, Pekin duck still is the predominant among them (24). Duck is characterized with high resistance to common diseases that infect other poultry and are tolerant to harsh conditions (11), beside to its meat has high nutrient value (25). As a result of that global duck production and consumption were increased during last five decades (13). Since along time Iraqi people used to rear and consume local Iraqi duck, which characterized with low productivity and mostly existing in rural areas. Modern duck breeds such as Pekin duck were recently entered Iraq, and farmers started rearing it in an open system with small number of birds. There are a few studies concerning with rearing duck in controlled intensive system under high temperature (2), in addition there is no such studies were conducted in Iraq, thus this study has been done.

MATERIALS AND METHODS

This study was conducted at the Poultry farm, Department of Animal Production, College of Agricultural Engineering Sciences, University of Baghdad, included two experiments performed, the first one during summer and the second during winter. Hundred fifty one day old Pekin ducklings breed were used for each experiment, reared for 49 days. Birds were purchased from local private hatchery.

Initial body weight of day old were 49.6 g and 41.5 g for first and second experiments respectively. All birds were divided randomly into pens (1.5 X 2m) with 25 birds in each. Birds were reared on 3-5cm thickness sawdust litter for the first two weeks of age, after that birds were sexed, then each sex was randomly distributed into pens (5 replicates for females and 4 for males) with 16-17 birds each and 5-6 birds/ m² density. Birds were accessed freely to water and feed. House temperature and humidity were recorded by digital TCH-4 device, china company (Table 1 and 2). Starter and grower rations of mash diet were introduced to birds (Table 3). Air cooler was used during summer and gas heater during winter to get required temperatures. Lighting system was 23h light and 1h dark daily. All data were statistically analyzed (23).

RESULTS AND DISCUSION

Tables 4 and 5 indicate a significant ($P < 0.01$) increases in live body weight and weight gain at 7 and 14 days of age for birds reared in summer in comparison to that reared in winter, whereas inversely happened at 21, 28, 35 and 42 days and for the total period (1-42 days). Sex revealed its effects on body weight and weight gain in summer and winter, since males had higher body weight than female at 14, 21, 28, 35, 42 and 49 days of age, excluding 28 and 35 days exhibited no significant differences between sex in winter (Table 6, 7). Weight gain response to sex had nearly the same trend with lower differences between sex (Table 7). In comparison with winter, birds reared in summer revealed a significant ($P < 0.01$) decrease in feed consumption at all periods recorded, unless 1-7 days period (Table 8). Season had no significant effect on feed conversion ratio, excepting 15-21 days period which indicated a significant deterioration in summer with counterpart in winter (Table 9). No significant differences in mortality between birds of both seasons (winter and summer), which had the same percentage (3.3%) (Figure 1). The high live body weight and weight gain at 7 and 14 days of age in summer could be due to the differences between the initial body weight for ducklings, which was 49.6 g and 41.5 g in summer and winter respectively. (18) and (6) mentioned that initial body weight has

significant ($P < 0.01$) effect on body weight of ducklings and broiler chicks at 1 and 2 week of age, then the differences started to diminish with advancing in age. The significant improvement in body weight, weight gain and feed conversion ratio mainly concerned to increase of feed intake, which a result of decrease in temperature during winter. On the contrary high summer temperature played crucial role in decrease feed intake, that negatively effect on body weight, weight gain and deterioration of feed consumption ratio. It is well known that heat stress causes wide

damages in physiological functions then performance in poultry, such as increase body temperature and mortality (16), inhibits appetite followed by feed intake decrease (19), decrease of body weight and weight gain and deterioration of feed consumption ration (7,8) and finally decrease immunity against diseases (12). In general, previous studies already revealed the effects of sex on body weight, feed intake, mortality and heat tolerance in poultry, which is mostly in favor of males (10).

Table 1. Mean temperatures and relative humidity inside rearing duck house during summer season

Age (week)	Temperature (°C)			Relative Humidity (%)		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean
1	27.9	36.8	32.3	35.3	64.1	45.3
2	29.8	39.7	33.5	24.3	51.2	42.9
3	30.1	38.2	33.5	36.5	55.3	45.8
4	27.1	38.6	33.0	30.4	53.6	41.7
5	29.0	41.5	33.6	26.4	51.9	39.2
6	28.8	38.4	34.0	31.7	53.4	40.8
7	24.5	35.3	29.1	33.8	63.2	47.4

Table 2. Mean temperatures and relative humidity inside rearing duck house during winter season

Age (week)	Temperature (°C)			(%)relative humidity		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean
1	22.1	36.4	29.0	32.8	76.3	45.3
2	20.2	36.0	26.0	36.7	76.3	54.5
3	19.0	34.0	24.2	45.0	75.0	60.0
4	18.5	28.0	23.1	47.3	74.1	59.6
5	18.4	28.1	23.0	35.0	62.8	43.3
6	14.7	29.5	23.1	30.5	69.1	49.0
7	14.4	29.6	20.0	37.6	71.6	51.9

Table 3. Composition and calculated analysis of experimental diets for the starter and finisher rations

Ingredients (%)	Starter (1-14 days)	Finisher (15-49 days)
Wheat	30.4	41.1
Corn(maize)	34.0	40.0
Soybean meal (48 % protein)	28.5	12.55
Protein concentrate ¹	5.0	5.0
Calcitic limestone	0.6	0.7
Di-calcium phosphate	0.5	0.25
Oil	0.6	-
NaCl	0.2	0.2
Vitamin and mineral premixes ²	0.2	0.2
Total	100	100
Calculated analysis ³		
Crude protein (%)	22	16.15
Metabolizable energy (kcal/kg)	2940.37	3033.89
Calcium (%)	0.68	0.63
Available phosphorus (%)	0.41	0.34
Methionine (%)	0.48	0.4
Lysine (%)	1.2	0.79
Cystine (%)	0.35	0.27

¹Each1kg of Protein concentrate contains protein 40%, fat 5%, fiber 2.2%, moisture 7.13%, calcium 4.2, phosphorus 4.68%, lysine 3.85%, methionine 3.7%, methionine plus cystine 4.12%, metabolizable energy 2017 kcal and antioxidant 900 mg. ²Each1kg of vitamin and mineral premixes contains vitamins A 500 IU, D₃ 600 IU, E 10 mg, B₁ 3 mg, B₂ 2 mg, B₆ 2 mg, B₁₂ 5 mg, C 10 mg, niacin 15 mg and folic acid 500 µg. ³ according to (21)

Table 4. Effect of season on weekly mean live body weight (g) for both sexes of Pekin Duck (mean ± standard error)

Age (day)	mean live body weight (g/bird)				Significant level
	Summer		Winter		
7	210.09	± 2.13	188.75	± 1.98	**
14	595.87	± 5.70	528.57	± 5.78	**
21	949.46	± 6.86	1043.73	± 7.25	**
28	1358.22	± 10.36	1572.23	± 10.19	**
35	1701.52	± 15.34	2027.23	± 13.02	**
42	1949.32	± 20.28	2478.86	± 15.96	**
49	2254.53	± 24.63	2867.44	± 16.49	**

** (P < 0.01) season has significant effect

Table 5. Effect of season On weekly and total weight gain (g) for both sexes of Pekin duck (mean ± standard error)

Period (day)	Mean weight gain (g/ bird/week)				Significant level
	summer		winter		
1-7	160.49	± 2.13	147.25	± 1.98	**
8-14	385.78	± 4.24	339.81	± 5.96	**
15-21	353.58	± 6.96	515.15	± 9.41	**
22-28	408.76	± 6.96	528.50	± 12.96	**
29-35	343.29	± 8.09	455.00	± 16.75	**
36-42	247.80	± 8.05	451.63	± 20.33	**
43-49	305.20	± 8.83	388.58	± 21.86	**
Total Peroid	2204.93	± 24.63	2825.94	± 16.49	**

** (P < 0.01) season has significant effect

Table 6. Effect of sex on mean weekly live body weight (g) of Pekin Duck in summer and winter seasons(mean ± standard error)

age (day)	mean live body weight in summer (g/bird/week)			mean live body weight in winter (g/bird/week)		
	males	females	Significant level	males	females	Significant level
14	618.45 ± 8.09	576.01 ± 8.01	**	547.25 ± 9.29	512.13 ± 7.14	*
21	990.15 ± 9.68	913.65 ± 9.68	**	1075.91 ± 10.41	1015.41 ± 10.10	**
28	1444.23 ± 14.17	1282.55 ± 14.97	**	1589.17 ± 14.09	1557.33 ± 14.06	NS
35	1805.45 ± 21.96	1610.07 ± 21.40	**	2038.79 ± 17.55	2017.07 ± 18.99	NS
42	2100.38 ± 30.60	1816.40 ± 26.99	**	2537.95 ± 22.47	2426.87 ± 22.54	**
49	2408.02 ± 37.58	2113.47 ± 32.39	**	2957.95 ± 26.54	2787.80 ± 20.39	**

*, ** and NS mean sex has significant effect at levels ($P < 0.05$), ($p < 0.01$) and no significant effect respectively.

Table7. Effect of sex on mean weekly and total weight gain (g) of pekin duck in summer and winter seasons (mean ± standard error)

Age (day)	mean weight gain in summer (g/bird/week)			mean weight gain in winter (g/bird/week)		
	males	females	Significant level	males	females	Significant level
15-21	371.69 ± 6.87	337.64 ± 5.83	**	528.65 ± 14.47	503.28 ± 12.28	NS
22-28	454.07 ± 9.39	368.89 ± 10.15	**	513.25 ± 20.17	541.92 ± 16.68	NS
29-35	361.22 ± 10.91	327.52 ± 11.79	*	449.62 ± 22.27	459.73 ± 24.65	NS
36-42	294.92 ± 13.92	206.33 ± 10.26	**	499.16 ± 30.87	409.80 ± 26.80	*
43-49	307.63 ± 13.02	303.06 ± 12.00	NS	420.00 ± 32.42	360.93 ± 29.57	NS
Total period (1-49)	2358.42 ± 37.58	2060.87 ± 32.39	**	2916.45 ± 26.54	2746.30 ± 20.39	**

*, ** and NS mean sex has significant effect at levels ($P < 0.05$), ($p < 0.01$) and no significant effect respectively

Table 8. Effect of season on mean weekly and total feed consumption (g/bird) in both sexes of pekin duck (mean \pm standard error)

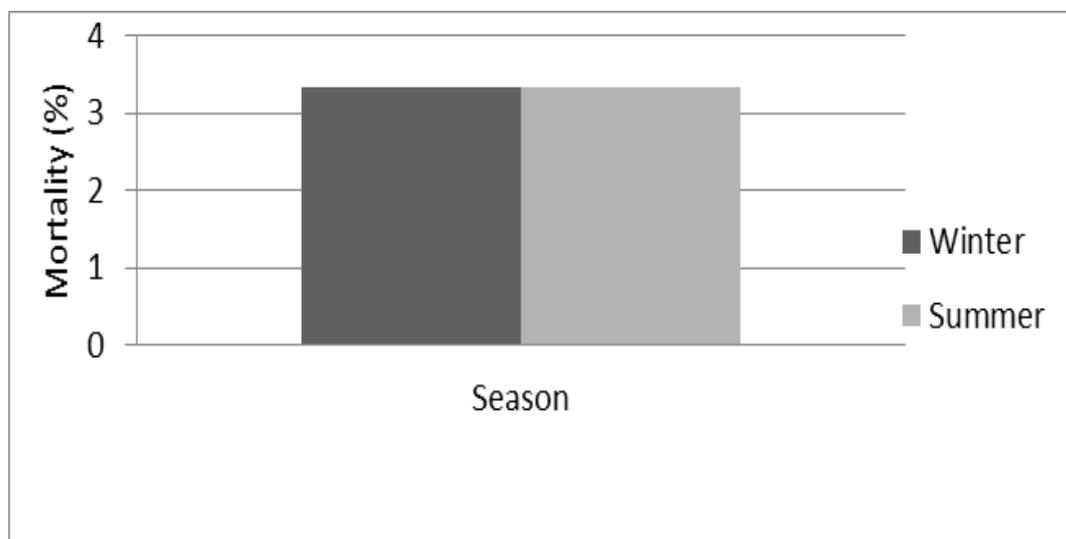
Period (day)	Mean feed consumption (g/bird/week)				Significant level
	summer		winter		
1-7	213	\pm 11.27	189	\pm 9.71	NS
8-14	601	\pm 14.68	514	\pm 18.65	*
15-21	878	\pm 33.04	1116	\pm 36.95	**
22-28	1082	\pm 33.40	1447	\pm 50.07	**
29-35	1090	\pm 37.44	1534	\pm 52.76	**
36-42	1044	\pm 32.05	1716	\pm 56.95	**
43-49	1277	\pm 49.36	1681	\pm 43.75	**
Total period	6185	\pm 122.12	8197	\pm 160.63	**

*, ** and NS mean sex has significant effect at levels ($P < 0.05$), ($p < 0.01$) and no significant effect respectively.

Table 9. Effect of season on feed conversion ratio in both sexes of pekin duck (mean \pm standard error)

Period (day)	feed conversion ratio (g feed/ g weight gain)				Significant level
	summer		winter		
1-7	1.33	\pm 0.07	1.28	\pm 0.08	NS
8-14	1.56	\pm 0.12	1.51	\pm 0.08	NS
15-21	2.48	\pm 0.09	2.17	\pm 0.12	*
22-28	2.65	\pm 0.14	2.74	\pm 0.17	NS
29-35	3.18	\pm 0.20	3.37	\pm 0.16	NS
36-42	4.21	\pm 0.27	3.80	\pm 0.21	NS
43-49	4.19	\pm 0.20	4.33	\pm 0.32	NS
total period	2.80	\pm 0.11	2.90	\pm 0.13	NS

* and NS mean sex has significant effect at levels ($P < 0.05$), and no significant effect respectively.

**Figure 1. Effect of summer and winter seasons on total mortality of Pekin duck**

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