EFFECT OF FORCE MOLTING ON EGG PRODUCTION AND EGG QUALITY TRAITS OF BROILER BREEDER HENS

Khalid Hamid Hassan [1] **Wesal Fadil Ali**

Dept. of Animal production, College of Agriculture, University of Diyala, Iraq.

[1]Corresponding author: hassan29875@yahoo.com

ABSTRACT

The study was conducted in the poultry house of animal production Department, College of Agriculture, University of Diyala, during the period 1st Oct 2016 to 22 June 2017. The aims of this study were to determine the effect of force molting by fasting program of Ross 308 and Arbor Acres broiler breeder hens on some productive traits. Four groups (each group consist of 15 hens) were divided randomly as Ross molting (Rm), Ross control (Rc), Arbor Acres molting (Am), and Arbor Acres control (Ac). The results were indicated that there is a significant increase in egg production of Am group compared with the two control groups, while there is a significant reduction in number of egg per hen in Ac group compared with other groups. There is a significant superiority of molting groups in egg shape index compared with Rc. While there is higher albumin weight in Am compared with Rm. There is no significant differences among groups in fertility and hatchability.

Keywords: Force molting, Arbor Acres, Ross 308, egg production.

INTRODUCTION

The broiler industry in Iraq depends on importing of hatching eggs or broiler breeder flocks such as Ross 308, Arbor Acres, Lohmann to supply hatcheries with hatching eggs (Hassan, 2010). Pešic *et al.*, (2016) reported that molting process is effecting on the reproduction system by Thyroid gland hormones, which result increasing the reserves of nutrients in the body of chickens, and the replacement of feathers. Mumma *et al.*, (2006) explain that molting process include increasing the metabolic rate and protein synthesis, along with losing adipose tissue and bone mass.

The force molting provide a tool to improve the production potential of the existing layer flock and represent a valuable as well as economical practice especially for the developing countries (Sharma and Gupta, 2013), because the induced molting reduce the cost of production compared with the replacement of the flock with younger flock (Holt, 2003). The induced molting of the males have adverse effect hence Hassan *et al.*, (2008) reported a significant reduction in fertility and semen quality traits after the force molting by fasting program practiced on Hubbard flex cocks at 65 weeks of age. There are many methods to induced molting in chickens, such as restriction or fasting water and feed, feeding of low sodium (Harms, 1990) or high zinc levels (Berry and Brake, 1987), the hormonal system (Bass *et al.*, 2007), but the preferred method is the fasting program (Carter and Ward, 1981). The aims of this study were to determine the effect of force molting by fasting program of Ross 308 and Arbor Acres broiler breeder hens on the egg production and egg quality traits.

MATERIALS AND METHODS

The study was conducted at the poultry house in College of Agriculture-University of Diyala, in the Province of Diyala, Iraq. The source of the broiler breeder chickens was a private company for hatching eggs, include 30 hens and 10 cocks at 67 weeks of age, from each Ross 308 and Arbor Acres parents. Individually cages were used to house the birds and the data recorded individually for each bird, the fasting induced molting program performed according to Moustafa *et al.*, (2010), and egg production and egg quality traits were recorded during two periods after molting program (each period 30 days).

Statistical analysis

The data analysis performed according to complete randomized design (CRD) and the significance multiple comparisons between means according to Duncan multiple ranges test ($P<0.05$) regardless of whether a significant F resulted from an initial analysis of variance.

RESULTS

The table 1 show a significant effect of induced molting on skip period between egg clutch cycles during the first period after induced molting, hence the Ross control group showed significantly long skip period compared with molting Ross group, and there is no significant body weight differences among groups.

Table 1. Means ± SE of production traits during the first period after induced molting

Groups	Egg Clutch cycle (Egg)	Skip Period (Day)	Egg Number (Egg)	Body Weight (Gram)
Ross Molting	1.49 ± 0.45	1.08 ± 0.04 b	8.18 ± 0.32	4669.56±136.85
Ross Control	0.40 ± 0.08	2.11 ± 1.08 a	6.78 ± 0.58	5240.67±168.82
Arbor Molting	0.92 ± 0.38	1.99 ± 0.24 ab	5.90 ± 2.30	4735.70±461.30
Arbor Control	1.22 ± 0.16	4.24 ± 0.54 ab	6.20 ± 0.20	4858.70±461.30

Means with different letters significantly differ from each other at probability 0.05 according to Duncan multiple ranges.

There is a significant reduction in number of eggs per hen in the Arbor control group compared to Arbor molting group during the second period after induced molting, and there is more reduction in Arbor control group in egg clutch cycle compared with other groups, and there is significant reduction in live body weight compared to molting groups, while there are no significant differences among groups in respect of skip period during the second period after induced molting (Table 2).

Table 2. Means±SE of production traits during the second period after induced molting

Groups	Egg Clutch cycle (Egg)	Skip Period (Day)	Egg Number (Egg)	Body Weight (Gram)
Ross Molting	0.98 ± 0.35	1.31 ± 0.51	7.23 ± 1.09 ab	4999.72±138.40 ab
Ross Control	1.03 ± 0.77	1.80 ± 1.14	7.86 ± 2.87 ab	5210.50±153.15 a
Arbor Molting	1.95 ± 0.66	1.47 ± 0.97	9.62 ± 0.87 a	4431.25±157.25 b
Arbor Control	0.21 ± 0.21	0.67 ± 0.67	2.00 ± 2.00 b	5111.50±136.50 a

Means with different letters significantly differ from each other at probability 0.05 according to Duncan multiple ranges test.

The results showed a significant superiority of Ross molting and Arbor molting groups in the egg shape index compared to Ross control group (Table 3), also, there is a significant high albumin weight in eggs of Arbor molting group compared to Ross molting group, while there are no significant differences among groups in other egg quality traits.

Table 3. Means ± SE of egg quality traits during the first period after induced molting

Traits	Ross Molting	Ross Control	Arbor Molting
Egg weight (g.)	68.54 ± 1.22	79.85 ± 7.90	70.07 ± 2.76
Shell weight(g.)	8.82 ± 0.42	12.09 ± 2.96	8.60 ± 0.40
Yolk weight(g.)	23.38 ± 1.37	23.67 ± 0.55	23.20 ± 1.22
Albumin weight(g.)	36.33 ± 1.85 b	44.07 ± 5.94 ab	50.48 ± 6.43 a
Albumin high (mm)	4.18 ± 0.53	4.74 ± 0.66	4.36 ± 0.60
Yolk high (mm)	17.96 ± 0.70	16.91 ± 0.19	19.92 ± 0.43
Yolk diameter (mm)	43.55 ± 0.53	45.15 ± 0.73	45.06 ± 1.14
Shell thickness (mm)	0.38 ± 0.01	0.41 ± 0.00	0.40 ± 0.01
Shape index (%)	73.89 ± 0.47 a	62.53 ± 9.67 b	72.44 ± 1.76 a
Haugh unit	55.72 ± 6.83	74.56 ± 6.44	58.95 ± 6.98

Means with different letters significantly differ from each other at probability 0.05.
There is no data for Arbor control because this group stopped egg production.

The egg quality traits during the second period after molting represented in Table 4 which record significant superiority of Ross molting and Arbor molting in Yolk diameter compared with Ross control group, while there are no significant differences were recorded among the other egg quality traits during the second period after molting.

Table 4. Means ± SE of egg quality traits during the second period after induced molting

Traits	Molting Ross	Control Ross	Molting Arbor
Egg weight (g.)	68.67 ± 1.43	74.08 ± 1.20	69.60 ± 2.36
Shell weight(g.)	8.49 ± 0.21	8.94 ± 0.15	8.12 ± 0.31
Yolk weight(g.)	22.26 ± 0.81	23.49 ± 0.46	23.45 ± 1.02
Albumin weight(g.)	34.07 ± 3.58 b	43.11 ± 0.99 a	36.07 ± 1.84 ab
Albumin high (mm)	4.84 ± 0.78	4.26 ± 0.74	5.28 ± 0.67
Yolk high (mm)	14.50 ± 2.33	14.34 ± 1.94	16.46 ± 0.64
Yolk diameter (mm)	43.59 ± 0.71 a	40.64 ± 1.00 b	44.16 ± 0.54 a
Shell thickness (mm)	0.36 ± 0.02	0.33 ± 0.02	0.35 ± 0.02
Shape index (%)	79.71 ± 0.47	73.87 ± 4.98	73.36 ± 0.96
Haugh unit	69.38 ± 7.87	60.26 ± 7.90	67.96 ± 6.87

Means with different letters significantly differ from each other at probability 0.05 according to Duncan multiple ranges test.
There is no data for Arbor control because this group stopped egg production.

The Table 5 revealed significant reduction in hen day egg production (H.D. %) of Arbor control group in both all hens production and persistence hens in production in first and second periods, while there is no significant differences between Ross molting and Arbor molting groups in the first and second periods.

Table 5. Means ± SE of Hen day egg production (%) during the first and second period after induced molting of total hen and persistency hens

	Total hens		Persistency hens	
Groups	First period	Second period	First period	Second period
Ross Molting	29.00 ± 3.00	34.00 ± 2.00 ab	41.00 ± 4.00	44.00 ± 5.00 a
Ross Control	29.00 ± 14.00	28.00 ± 5.00 b	42.00 ± 23.00	30.50 ± 5.50 a
Arbor Molting	16.00 ± 1.00	42.00 ± 0.50 a	20.00 ± 1.00	42.50 ± 0.50 a
Arbor Control	21.50 ± 5.50	6.50 ± 3.50 c	30.00 ± 10.00	10.00 ± 0.50 b

Means with different letters significantly differ from each other at probability 0.05 according to Duncan multiple ranges test.

DISCUSSION

There were non-significant differences in the live body weight of the molting groups during the first period after molting process (Table 1), these results may be refer to the success of the molting process for losing the adipose tissue without significant reduction in the body weight, and be suitable for reactivate the female reproduction system during the second cycle of production, these results not agree with Scheideler *et al.,* (2002), but agree with Willis *et al.* (2008); Gongruttananun *et al.,* (2013) whom reported no significant reduction in the live body weight due the rest period after molting process.

The increase of number of eggs per hen in Arbor molting group compared with Arbor control during the second period (Table 2) confirm the positive effect of molting due the losing of adipose tissue around the female reproductive system and the rest period after the molting process (Mohammed and Ali, 2015). The significant effect of molting program on shape index (Table 3) agree with previous studies (Ahmad *et al.,* 2014 ; Bell and Weaver, 2002) and the non-significant effect of molting in other quality traits of egg agree with Gongruttananum and Saengkudrua (2016) ; Al-Bast (2011). The significant differences between groups in egg production during the first and second periods (Table 5) agree with Al-Bast (2011) and not agree with Aygun and Yetisir (2013).

The results of this study recorded that forced molting program by fasting improved the egg production traits compared with control groups.

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تأثير برنامج القلش الاجباري في بعض صفات انتاج البيض وصفات نوعية البيضة لأمات فروج اللحم

خالد حامد حسن [1] **وصال فاضل علي**

قسم الانتاج الحيواني – كلية الزراعة – جامعة ديالى.

[1] المسؤول عن النشر: hassan29875@yahoo.com

المستخلص

اجريت هذه الدراسة في حقل الطيور الداجنة التابع الى قسم الانتاج الحيواني – كلية الزراعة – جامعة ديالى، خلال المدة من 1 / 10 / 2016 ولغاية 22 / 6 / 2017. استهدفت الدراسة تحديد تأثير القلش الاجباري باستخدام التصويم لقطعان امات روز 308 واربر اكرز على بعض الصفات الانتاجية. تم تقسيم القطيع الى اربع مجاميع وكما يأتي: مجموعة روز قلش، مجموعة روز سيطرة، مجموعة اربر قلش، مجموعة اربر سيطرة. اظهرت النتائج وجود زيادة معنوية في انتاج البيض في مجموعة اربر قلش مقارنة مع مجموعتي السيطرة، كما سجلت النتائج حصول انخفاض معنوي في عدد البيض دجاجة$^{-1}$ في مجموعة اربر سيطرة مقارنة مع بقية المجاميع. واظهرت النتائج وجود قيم متفوقة معنويا في دليل شكل البيضة لمجموعتي القلش الاجباري مقارنة مع مجموعة روز سيطرة. تفوقت مجموعة اربر قلش على مجموعة روز قلش في وزن الالبومين في البيضة، ولم تسجل فروق معنوية بين المجاميع في نسبتي الخصوبة والفقس.

الكلمات المفتاحية: القلش الاجباري، اربر اكرز، روز 308، انتاج البيض.