J. Agric. Sci. Mansoura Univ., 30 (9): 4999 - 5007, 2005

STUDY THE EFFECT OF PULLETS AGE ON THEIR RESPONSE TO INDUCE MOLTING REGIMEN

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ABSTRACT

Molt was induced on 4000 Hy-line (2000 hens at 17 months of age, the younger group, and 2000 hens at 19 months of age, the older group). It was carried out during the period from September 2002 to March 2003 in the Poultry Research Station, Poultry Department., Faculty of Agriculture Fayoum University. The induced molt treatment included 4 days feed withdrawal period and no water at the fourth day only followed by different periods for 7,7,7,26,4 days which in them each hen was received 40 g feed (15 % crude protein) , 60 g (15% crude protein) , 60 g (15% crude protein) , 60 g (17% crude protein) 80 g (17% crude protein) and 100 g (17% crude protein) , respectively . Reduced duration of day light during the treatment as follow: 8 hours / day at the first month then the light period was gradually increased to 17 hours /day at the second month. Carrying out induced molting at 17 months age resulted in a reduction in mortality rate , increased egg production , improved feed conversion and reduced body loss during the treatment , on the other hand , applying induced molting at 19 months of age increased egg weight as compared with the 17 month of age. The economical efficiency was higher when the hens were subjected to induce molting at earlier age (17 months of age).
Keywords: Induce molting regimen, Pullets age, Economical efficiency for molting.

INTRODUCTION

Egg production and egg quality decrease after 12-14 months of laying and natural molt occurs in most individuals. The aim of induced molting is to extend the economically useful life and to regulate market prices (Bell, 1996a and Smith, 1997) .Commercial laying hens are sent to slaughter at 17 to 18 months of age, or they kept for another laying cycle By using artificial methods of molt, the total population stops production at the same time and resumes lay again simultaneously. The resumption of lay for a second year occurs after a resting period and at a slightly lower level compared with the first year of production. Nevertheless, the second production period is at a much higher level than in control groups which were not subjected to this stop (Decuypere, and Verheyene 1986).

Moreover, egg quality is improved in most cases and the casts of raising new pullets are eliminated (Hurwitz *et al*.1998 and Berry .2003). Prolonged food withdrawal with light- dark manipulation is the most common method of induced molting (Holt.1992 ,Bell.1996 b and Ruszier.1998).Artificially molting is the induction of response that is a natural component of the physiology of the hen , for this reason , induced molting has been suggested as the technically correct term instead of forced molting or forced rest .Effectiveness of the induced molting changes according to the methods (Bar *et al* . 2003), Breed (Hurwitz *et al* .1998) , body weight of the flocks prior to molting (Ocak *et al* 2004) and age (Hurwitz *et al* 1998 and Bar *et al* 2001).

The main purpose of this experiment was to study the effect of pullet's age on their response to induce molting regimen for choice of the appropriate age of induced molt treatment.

MATERIALS AND METHODS

The present study was carried out on 4000 Hy-Line hens (2000 hens at 17 months of age (younger group) and 2000 hens at 19 months of age (older group) . It was carried out during the period from September 2002 to March 2003 in the Poultry Research Station, Poultry Department., Faculty of Agriculture Fayoum University. The experiment was conducted in a three tiers cage system, with three birds in each cage .They were located in a deep pit house naturally and mechanically ventilated and artificially and naturally illuminated through the windows. Molting period lasted for 60 days for all groups and during this period all hens were subjected to induced molting regimen as shown in Table (1)

Table 1. Induced molting regimen.

days	Light	Drink	Feed
-7 -1	24 H	Drink	9 kg/100 hens (17% crude protein)
1 3	8 H	Drink	none
4	8H	None	none
5 12	8H	Drink	4kg /100 hens (15 % crude protein)
13 21	8H	Drink	6kg /100 hens (15% crude protein)
22 - 29	8-10 H	Drink	6kg /100 hens (17% crude protein)
30 - 56	10-12 H	Drink	8kg /100 hens (17% crude protein)
57- 60	12-17H	Drink	10kg /100 hens (17% crude protein)

Table 2: Composition and chemical analysis of experimental diets (17 % and 15% crude protein).

Ingredient		17 % CP	15 % CP
Yellow corn, ground		63.50	66.50
Soybean meal (44%CP)		21.00	17.50
Wheat bran		01.50	03.50
Concentrate (50% CP)		03 50	02.00
Limestone		06.70	06.70
Bone meal		03.00	03.00
Salt		00.40	00.35
*Vit. and Min. premix		00.25	00.25
DL- methionine		00.10	00.10
Lysine		00.05	00.10
Total		100	100
Chemical composition			
Crude protein	%	17.00	15.00
Calcium	%	03.62	03.56
Available phosphorus	%	00.76	00.45
Lysine	%	00.90	00.84
Methionine	%	00.37	00.356
ME, Kcal/Kg diet		2735.00	2730.00

- **Each 2.5 Kg of the Vit and Min. premix contains: Vit A 12000000 IU, Vit.D3 2500000 IU, Vit. E 15 g, Vit. K 2g, Vit. B1 1g, Vit.B2 8 g, Vit B6 2 g, Vit B12 10mg, Choline chloride 1050gm, Biotin 50mg, Folic acid 1gm, Nicotinic acid 30g, Ca pantothenate 10g, Zn. 55g, Cu 10g, Fe 35g, Co 250mg, Se 150mg, I 1g, Min 60g and antioxidant 10g**

Tow hundred hens (100 hens from each group) were monthly weighed during the experiment. Egg number, egg production %, egg weight, egg mass production. feed consumption and the mortality rate were recorded. Feed conversion ratios of the groups were computed by dividing the total egg weight by the total feed consumption. Composition and chemical analysis of the experimental diets are shown in Table (2). Economical study was calculated to compare between the two groups. Statistical analysis was done according to Steel and Torrie (1980) significant differences among treatment means were determined using Duncan s multiple range tests (Duncan.1955).

RESULTS AND DISCUSSiON

The mortality rate was 11.55% and 5.89% for the older and the younger groups, respectively during molting regimen (Table 3). At the same trend. after the regimen, the mortality rate were 7.31% and 4.43% for the older and the younger groups, respectively (Table 4).Increased the mortality during induced molting regimen perhaps due to the direct effect of starvation and / or the indirect effect through depressing the cellular immune response and increased the severity of concurrent intestinal salmonella enteritidis infection (Holt *et al.*1994)

The results indicated that carrying out induced molting at 17 months of age resulted in a reduction of mortality rate; this is perhaps due to that the younger hens can resist the death without food and water more than the older hens during the induced molting regimen, the older hens laid 13494 eggs, while the younger hens laid 19125 eggs (Table 3).

At the same trend, the percent of egg production were 12.64% and 16.26% for the older and the younger groups, respectively. This means that the younger hens can maintain egg production more than the older hens.
After the induced molting regimen, the egg production was 172421 and 200041 eggs for older and younger groups, respectively (Table 4).

Applying the force molting regimen at younger age resulted in an increase in egg production percent (75.32%) instead of 72.38% for the older group (Table 4)

These results are in agreement with Bar *et al* (2001) which indicated that egg production of the molted hens at 501 days of age (16.7 months) was higher than the molted hens at 571 days of age (19 months).

Average egg weight values were 65.74 g and 65.40 g for the older group during and after induced molting regimen, respectively,
While they were 65.20 g and 64.85 g for the younger group, respectively (Tables 3, 4).

This result means that the average of egg weight of the older group was numerically heavier than that of the younger group at either during or after the induced molting regimen. This results are in agreement with Bar *et al* (2001) which indicated that the egg weight of hen induced to molt at 571 days of age (19 months) were slightly heavier than those induced to molt at 501 days of age (16.7 months). This is may be due to that the older hens laid heavier eggs. In general, the induced molting regimen resulted in a reduction of egg weight.

Table 3. Effect of pullets age at induce molting regimen on mortality rate, egg production , feed consumption and feed conversion during the regimen

Items / Age		No. of hens	Mortality Rate(%)	No. of eggs	Egg Prod (%)	Egg weight	Egg mass	Feed Cons.	Feed conv.
First month	A	2000	08.55^{a} +0.05	06288^{b} +63	11.22^{b} +0.12	62.80^{a} +0.45	0394.88^{b} +3.56	2785.96^{b} +25.43	07.06^{a} +0.05
	B	2000	03.97^{b} +0.03	13638^{a} +125	24.35^{a} +0.20	62.77^{a} +0.38	0855.67^{a} +7.54	3679.38^{a} +34.89	04.30^{b} +0.04
Second month	A	1830	03.00^{a} +0.03	07206^{a} +67.33	14.06^{a} +0.21	62.68^{a} +0.30	0451.67^{a} +5.34	4143.09^{a} +42.78	09.17^{a} +0.05
	B	1960	01.92^{b} +0.02	05487^{b} +55.89	10.17^{b} +0.15	62.47^{a} +0.33	0342.77^{b} +3.98	3484.75^{b} +36.98	10.16^{a} +0.06
Total	A	3830	11.55^{a} +0.05	13494 +155	25.28^{b} +0 29	125.48^{a} +1.90	0846.55^{b} +9.54	6929.05^{a} +75.87	16.23^{a} +0.20
	B	3960	05.89^{b} +0.03	19125^{a} +201	34.52^{a} +0.38	125.24^{a} +1.78	1198.44^{a} +12.88	7164.13^{a} +75.65	14.46^{b} +0.19
Mean	A	1915	05.77^{a} +0.04	06747^{b} +79	12.64^{b} +0.18	62.74^{a} +0.38	0423.27^{b} +4.99	3463.52^{a} +39.97	08.11^{a} +0.05
	B	1980	02.95^{b} +0.02	09062^{a} +98	16.26^{a} +0.19	62.56^{a} +0.34	0599.22^{a} +6.56	3582.06^{a} +41.76	05.98^{b} +0.07

(a, b, c) means with in each column with different superscripts are significantly different at ($P<0.05$).
A : 19 month age group.
B : 17 month age group.

Table 4. Effect of pullets age at induce molting regimen on mortality rate, egg production , feed consumption and feed conversion after the regimen.

Months \ Items		No. of hens	Mortality Rate(%)	No. of eggs	Egg Prod(%)	Egg weight	Egg mass	Feed Cons.	Feed conv.
First month	A	1775	1.59 b +0.02	34099 +320	68.59b +2.08	65.70a +0.41	2239.96b +21.7	5707.32a +54.87	2.51 +0.01
	B	1940	1.81 a +0.01	41521 +378	77.27 a +2.11	64.65a +0.40	2684.33a +24.9	5412.92b +50.33	2.02 +0.01
Second month	A	1746	1.59 a +0.01	34069 +302	73.06 b +1.55	65.55a +0.48	2342.35b +23.8	5233.00b +53.22	2.23 +0.01
	B	1915	0.69 b +0.01	41243 +367	76.92 a +1.83	64.94a +0.38	2678.30a +24.6	5436.20a +54.61	2.03 +0.01
Third month	A	1717	1.26 a +0.01	35530 +322	73.94 a +1.82	64.89a +0.50	2306.12b +21.9	4766.00b +46.33	2.07 +0.01
	B	1902	0.81 b +0.01	39953 +356	75.02 a +1.97	64.86a +0.48	2591.35a +23.7	5338.18a +50.15	2.06 +0.01
Fourth month	A	1678	1.26 a +0.01	33521 +309	73.01 a +1.34	64.97a +0.39a	2177.85b +19.98	4399.25b +49.56	2.02 +0.01
	B	1886	1.08 b +0.01	39072 +345	73.99 a +1.56	64.90a +0.35	2535.77a +23.54	5122.25a +51.22	2.02 +0.01
Fifth month	A	1640	1.61 a +0.01	35184 +312	73.30 a +1.85	64.90a +0.33	2283.40b +20.12	4658.20b +44.67	2.04 +0.01
	B	1861	1.08 b +0.01	38252 +352	73.42 a +1.98	64.92a +0.33	2483.30a +22.56	5065.97a +47.66	2.04 +0.01
Total	A		7.31 a +0.07	172421 +998	361.90a +5.66	326.01a +6.05	11241.8b +101.5	24687.1b +210.93	2.196 +0.01
	B		4.43 b +0.04	200041 +907	376.62a +6.87	324.27a +5.98	12713.2a +99.87	26011.3a +220.65	2.046 +0.01
Mean	A	1711	1.64 a +0.01	34484 +306	72.38 a +1.95	65.20a +0.31	2248.3b +19.56	4937.42b +43.76	2.196 +0.01
	B	1900	0.88 b +0.01	40008 +398	75.32 a +1.98	64.85b +0.35	2542.6a +20.43	5202.26a +45.34	2.046 +0.01

(a, b, c) means with in each column with different superscripts are significantly different at (P<0.05).

A : 19 month age group.

B : 17 month age group

This is may be due to the effect of starvation during the first fourth days of the regimen. Although , the older group laid heavier eggs but it produced total egg mass of 846.55 kg and 11276.3kg , respectively during and after the regimen which were lesser than that of the younger group during and after the regimen , 1198.44 kg and 13134.01kg,respectirely (Tables 3,4).

This result is due to that the younger hens laid more eggs, and hens responded better and expressed their responses more intensively when induced to molt earlier.

Applying the induced molting regimen at the younger age (17 months) affected the feed conversion during and after the regimen (5.98 and 2.046. respectively) compared with (8.11 and 2.196) for the older group during and after the regimen, respectively (Tables 3, 4)). The higher feed consumption and feed conversion ratio of the older group compared to the younger group with similar egg weight might be related to the higher maintenance requirements and abdominal fat ratios of the older group compared to the younger group. Moreover , the lower feed consumption of the younger group can be explained by the egg weight, which is lower in the younger group as the egg weight is one of the factors affecting the feed consumption , support this hypothesis , the older group was heavier in weight than younger group Thus flocks must be avoided to become heavier at the end of the first production year in order to attain higher performance du ing the second production cycle

Performing the induced molting regimen resulted in a decrease the body weight by 33% and 20% for the older and the younger group, respectively, (Table 5). Perhaps this is due to that the older group was heavier than the younger group. This is in agreement with the results of Ocak *et al* (2004) which indicated that body weight losses of hen in heavier groups were higher ($p<0.01$) than those of lighter group.

Older group (heavier at the same time) had higher body losses at end of the regimen due to the fact that heavier group had higher body weight losses during the resting period.

Responses to fasting fall into three distinct phases(Webster, 2003), which are the initial adaptation phase, phase of long term economy and phase of rise in rate of specific body mass loss due to increase the transition from phase 2 to phase3 therefore, is characterized by the fact that proteins are no longer spared , and the fasting bird experiences accelerated loss of much mass. Significant lipid reveres remain at the start of the phase and fast catabolism continues concurrent with protein catabolism to supply energy needs. During the phase 3, lipid reserves become depleted, and muscle loss from protein catabolism reaches a point at which depletion occurs and hence, the fasting bird cannot be reefed beginning an irreversible progression to death.

Table 5 . The effect of pullets age at induce molting regimen on body weight loss

Items \ Groups	Older group			Younger group		
	Weight	Difference	%	Weight	Difference	%
During induce molting						
First month	1.83 +0.25			1.51 +0.22		
Second month	1.21 +0.20	- 0.62	33.88	1.21 +0.21	- 0.30	19.86
After induce molting						
First month	1.29 +0.20	- 0.54	29.51	1.28 +0.20	- 0.23	15.23
Second month	1.36 +0.19	- 0.47	25.68	1.39 +0 20	- 0.12	07.95
Third month	1.56 +0.23	- 0.27	14.75	1.42 +0.20	- 0.09	05.96
Fourth month	1.65 +0.25	- 0.18	9.84	1.49 +0.23	- 0.02	01.32
Fifth month	1 79 +0 26	- 0.04	2.18	1.53 +0.22	+ 0.02	01.32

Economic efficiency:

Regarding the cost of feeding to egg production , the data of economical evaluation was carried out as fallows

1- Total revenue L.E.= Egg number local price per egg = IR

2- Total feed cost , L.E= Total feed intake X price per ton = IF

3- Net revenue, L.E =Total revenue -Total feed cost = NR

4- Economic efficiency = NR / IF

The data in Table 6 indicated that the total revenue (L.E) was higher in the younger group (47485.0 L.E) compared to the older group (40280.0 LE). Also , the net revenue (L.E) values followed the same trend , it was 14310 L.E and 8588 L.E for the younger and the older group , respectively .

Table 6 : The economical evaluation of egg production of two molting hens age.

Item \ Groups		Older group	Younger group
Total feed intake	Ton	31.616	33.175
Price of feed	LE/ton	1000.000	1000.000
Total feed cost	LE	31616.000	33175 000
Egg number		185915.000	219166.000
Price of egg	LE/egg	0.216	0 216
Total revenue	LE	40157.600	47339.900
Net revenue	LE	8541.600	14164.900
Economic efficiency	%	27.170	42.700

The interesting feature of the present observation is that the applying of the induced molting at earlier age (17 months) has higher economical efficiency value than the older age (19 months) , especially , in such country as Egypt , the egg numbers is more important than the egg weight because the price of the egg was affected by the number more than the weight.. This study was calculated according to the feed and the eggs price at 2002 in Egypt.

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دراسة تأثير عمر الدجاج البياض علي استجابتها لبرنامج القلش

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أجريت عملية القـلش لعدد ٤٠٠٠ دجاجة هاى لاين (٢٠٠٠دجاجة عمر ١٧ شهرا، ٢٠٠٠دجاجة عمر ١٩ شهرا) في مزرعة كلية الزراعة بالفيوم خلال الفترة من شهر ديسمبر ٢٠٠١ وحتى يوليو٢٠٠٢. شملت عملية القـلش ٤ أيام بدون طعام وكذلك تم منع الماء في اليوم الرابع فقط ثم كانت المعاملات الغذائية لكل دجاجة / يوم للـــفـترات التالية ٤، ٢٦، ٧، ٧، ٧ يوم كالتالي:-

٤٠ جرام (٦٥% بروتين خام)، ٦٠جرام (١٥% بروتين خام)، ٦٠ جرام (١٧% بروتين خام)، ٨٠ جرام (١٧% بروتين خام)، ١٠٠ جرام (١٧% بروتين خام) على التوالي. تم تقليل ساعات الإضاءة إلى ٨ ساعات / يوم في الشير الأول ثم بدأت الإضاءة في الزيادة تدريجيا حتى وصلت إلي ١٧ ساعة / يوم في نهاية الشير الثاني .

- أدى أجراء عملية القـلش للدجاج عمر ١٧ شهرا إلى تقليل نسبة النافق، زيادة إنتاج البيض، تحسين قيمة التحول الغذائي وكذلك تقليل نسبة الفقد في وزن الجسم أثناء إجراء عملية القـلش .
- من ناحية أخرى فإن إجراء عملية القـلش عند عمر ١٩ شهرا تسبب في إنتاج بيض أثقل وزنا
- أما عند حساب الكفاءة الاقتصادية لإنتاج البيض من كل من القطيعين فإن المجموعة الأصغر عمرا كانت أكثر كفاءة اقتصاديه من المجموعة الأكبر عمرا