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Parental Care During Incubation, Brooding and Growth Rates of Egyptian Baladi Pigeon Nestlings

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Abstract: Parental care and nestling growth rates of50 pairs of Egyptian baladi pigeon were observed during incubation and brood care from June and July 2015 at private farm, Meni El kameh and El Sharkia governorate. ((25 ♀ and 25 ♂) pigeon with varying age and levels of reproductive experience and work divided into 3 experiment in period 9 weeks for determine the effect of both parent pigeon setting hours during incubation at nest, sex and previous breeding experience level on egg hatchability and growth rate of Egyptian baladi pigeon nestlings. The study has shown that of both parent pigeon setting hours no effect on egg hatchability, while both parent pigeon sex and previous breeding experience with significant effect on incubated egg, nestling brooding and growth rate.

Key words: Parental Care · Incubation · Brooding · Egyptian Baladi Pigeon

INTRODUCTION

The hobbyist reared the pigeon as food like chicken, duck and quail because the pigeon meat is delicious, usually prepared at restaurant or café. The consumer from intermediate until high-classed status because the price of pigeon meat is expensive [1]. Pigeons are widely used as experimental models in biomedical research and have also been raised for meat production. Commercial squab (young pigeon) production has existed in North America since the early1900s [2, 3]. Unlike other poultry species, Pigeons form pair bonds to breed and hatchlings must be brooded and fed by their parents until the market age of 4 weeks [2]. A pair of pigeons can raise about 15 squabs per year Crop milk is a secretion from the lining of the crop of parent birds that is regurgitated to young birds. It is found among all pigeons and doves where it is referred to as pigeon milk. Crop milk is also produced by flamingos and some penguins [4, 5]. Pigeon's milk begins to be produced a couple of days before the eggs are due to hatch. The parents may cease to eat at this point in order to be able to provide the squabs (baby pigeons and doves) with milk uncontaminated by seeds, which the very young squabs would be unable to digest. The baby squabs are fed on pure crop milk for the first week or so of life. After this the parents begin to introduce a proportion of adult food [6].

MATERIALS AND METHODS

Material

Experimental Animals: 50 pairs of Egyptian baladi pigeon was observed from June and July 2015 at private farm, Meni El kameh and El Sharkia governorate. (25♀ and 25♂) pigeon with varying age and levels of previous breeding experience. The variety of food grains, cooked food and water regularly nearby nesting area of bird. Precautions are taken not to disturb birds, eggs, chicks and nesting site. The nestlings were naked, blind, helpless and wholly dependent on its parent's i.e. altricial type. During this period, the female continuously brood the nestlings. The newborn nestling's measure 4.5cm in length with dark gray skin, closed eyes, gray color blunt beak and body covered with patches of creamy white down filaments. The baby squabs are fed on pure crop milk for the first week or so of life. After this the parents begin to introduce a proportion of adult food, softened by spending time in the moist conditions of the adult crop, into the mix fed to the squabs, until by the end of the second week they are being fed entirely on softened adult food [6].

Methods

Experiment1: *Determination effect of setting hours on egg hatchability*

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10 pairs of Egyptian baladi pigeon divided into control group (n=5) ♂ incubate egg during day light and♀ over night and experimental group (2) (n=5) which ♀ incubate egg day light and ♂ during over night

Experiment2: *Determination effect of pigeon parent sex on egg hatchability and growth rate of nestling*

20 pairs of Egyptian baladi pigeon divided into equal groups, 10 pairs used during incubation, (n=5) pairs control group (1) both parent ♀ and ♂ incubate egg, group (2) (n=5♂) incubate egg only and group (3) (n=5♀) incubate egg only.10 pairs used during brooding period, (n=5) pairs control group (1) both parent ♀ and ♂ brood care nestling, group (2) (n=5♂) brood care nestling only and group (3) (n=5♀) brood care nestling only

Experiment3: *Determination the effect of both parent pigeon previous reproductive experience during incubation at nest on egg hatchability and brooding care of nestling*

20 pairs of Egyptian baladi pigeon divided into 4 group, (n=5) pairs control group (1) both parent with previous breeding experience, group (2) (n=5) pairs newly breed ♂ and previous breeding experience ♀, group (3) (n=5) pairs newly breed ♂ and previous breeding experience ♂ and group (4) (n=5) pairs both parent ♀ and ♂ newly breed.

Female built the nest using grass sticks, stiff wood sticks and few plastic wires. The two bright white eggs are measured about 3cm in length and 2cm in breadth. After 18 days of incubation the eggs are hatched he nestlings are altricial type, measuring 4.5cm length. The chicks are inserting their beak in the mouth of parent for pigeon milk. The nests were cleaned periodically for maintaining good body condition of bird. Birds were clinically examined to check the body condition [8].

Behavioural Observation: Egyptian baladi pigeon behaviour were recorded during incubation and brooding peroid by using focal sample technique [9], for each pair with intervals (12 minutes) by 1 hours daily, visually by using(a note book for recording behaviour, a stop watch, multipurpose counter and a video camera).The following behaviour were recorded [10]:

Frequency leaving nest for stretching their wings, eating, drinking, turning eggs, bathing nest checks for states of eggs and candling for eggs at 5th day and 10th day of incubation [11].

Fertile Egg: At 5th day see as a net work of small red veins at 10 th day darkness (chick) covering most of inside of eggs

Infertile Eggs: Dead embryo with clear egg appear thin blood ring will be visible within the eggs

Nestling Growth Rate: Nestling's weights were obtained weekly only when the nestlings were not being brooded during the day to prevent desertion by parents and avoid disturbance to nestlings might cause pre mature fledging [10].

Statistical Analysis: Data obtained from this investigation were analyzed statistically using F-test [12]. Means in the same raw followed by different letters were significantly different and the highest value was represented by the letter (a).

RESULTS AND DISCUSSION

Concerning the effect of both parent pigeon setting hours during incubation period at nest on egg hatchability as shown in Table (1) showed that no significant effect of frequency of leaving nest for stretching their wings, eating, drinking, turning eggs, bathing and nest checks for states of eggs. These results may be due to both parent pigeon share the responsibility of setting hours during incubation period at nest [10].

Regarding the influence the effect of both parent pigeon sex during incubation period at nest on egg hatchability, results in Table (2) showed that a significant decrease in Frequency of turning eggs, Fertile eggs at 5th 10 th day of incubation in gps (2 and 3), while mean cracked and Infertile eggs with a significant increase in gps (2 and 3). These results may be due to one parent only for incubation not enough because with improper incubation due to lack of proper temperature and humidity for eggs will lead to decrease hatched eggs. So once incubation has begun, both parent pigeon not leave nest for a brief periods of time up to 15-30 minutes to avoid embryos to be die, one parent only leaving nest for stretching their wings take a break to eating and drinking lead to loss warming of eggs, turning eggs for allows the embryos to develop properly, bathing for humidity and moisten eggs with damp bellies after bathing so one parent only with increase percentage of infertile eggs and early embryonic death. This result agreed with Mike *et al*. [10].

Table 1: Behavioral observations (mean values±SE) in pairs of Egyptian baladi pigeon for the effect of both parent pigeon setting hours during incubation period at nest on egg hatchability

	Group		
Behavioral observations	Group1	Group2	P value
Frequency of leaving nest for stretching their wings	5.40±0.33 a	4.60±0.52 a	N.S
Frequency of leaving nest for eating	9.90±0.43 a	10.10±0.52 a	N.S
Frequency of leaving nest for drinking	4.10±0.45 a	4.60±0.47 a	N.S
Frequency of turning eggs	3.80±0.41 a	3.60±0.76 a	N.S
Frequency of bathing	8.40±0.56 a	8.80±0.35 a	N.S
Frequency of nest checks for states of eggs	3.00±0.47 a	3.30±0.42 a	N.S
Egg hatchability	7.43±0.37 a	6.30±0.23 a	N.S

Group1 control group (n=5) ♂ incubate egg day light and ♀over night and experimental group (2) (n=5) which ♀ incubate egg during day light and ♂ over night

Means at the same raw followed by different letters were significantly different and the highest value was represented with the letter a. NS: Non significant changes. *:Significant at 0.05 probability. **: Highly significant at 0.01probability.

Table 2: (Mean values±SE) in pairs of Egyptian baladi pigeon for the effect of both parent pigeon sex during incubation period at nest on egg hatchability

	Groups			
Behavioral observations	Group1	Group2	Group3	P value
Frequency of turning eggs	9.50±0.34 a	2 2.10±0.31 c	4 4.50±0.34 b	**
Number of cracked eggs	0.40±0.16 c	3.30±0.55 a	1.80±0.35 b	*
Fertile eggs at 5th day of incubation	8.60±0.40 a	2.70±0.33c	5.40±0.33 b	**
Fertile eggs at 10 day th of incubation	8.60±0.30 a	0.70±0.26c	2.90±0.37 b	**
Infertile eggs	0.30±0.15 c	8.00±0.42a	4.40±0.26 b	**
Egg hatchability	8.40±0.24 a	2.50±0.11 c	4.20±0.14 b	**

Control group (1) (n=5) pairs both parent i ♀ and ♂ incubate egg, group (2) (n=5♂) incubate egg only and group (3) (n=5♀) incubate egg only.

Means at the same raw followed by different letters were significantly different and the highest value was represented with the letter a. NS: Non significant changes. *: Significant at 0.05 probability. **: Highly significant at 0.01probability.

Table 3: (Mean values±SE) in pairs of Egyptian baladi pigeon for the effect of both parent pigeon sex during brooding period on nestling growth rate

	Groups			
Behavioral observations	Group1	Group2	Group3	P value
Body weight on 1 st week(g)	124.10±1.02 a	94.70±2.25 c	108.00±1.80 b	**
Body weight on 2nd week(g)	239.90±10.15 a	188.70±2.39 b	198.60±4.03 b	**
Body weight on 3rd week(g)	272.40±2.43 a	223.80±1.94 c	249.00±1.47 b	**
Body weight on 4tht week(g)	304.80±3.44 a	263.60±1.49 c	280.20±1.86 b	**
Weaning weight(g)	336.30±2.40 a	260.20±0.91 c	294.90±1.86 b	**
Mortality rate	0.40±0.22 b	1.10±0.49 a	0.90±0.34 b	*

10 pairs used during brooding peroid, (n=5) pairs control group (1) both parent ♀ and ♂ brood care nestling, group (2) (n=5♂) brood care nestling only and group (3) (n=5♀) brood care nestling only

Means at the same raw followed by different letters were significantly different and the highest value was represented with the letter a. NS: Non significant changes. *:Significant at 0.05 probability. **: Highly significant at 0.01probability

Concerning effect of both parent pigeon sex during brooding period on nestling growth rate results in Table (3) showed that a significant decrease in mean body weight on1 st,2 nd, 3 rd and 4tht week (g)and weaning weight(g) in gps (2 and 3). While there was a significant increase in gp (2). These results may be due to one parent only for brooding not enough because one parent not have willing spent all time with them and have a many time to leave the nest for drinking, eating, stretching their wings and other behaviour, which effect on the amount of crop milk received for squabs, decrease in body weight, decrease in growth rate and increase mortality rate of nestling due to little parental care by mother or father only, because after pigeon eggs are hatched, Both parent pigeon (mother and father) take alternating turns in brooding and feeding their young until weaning, which pigeon milk begins to produced a couple of days before eggs hatched and cease to eat seeds to provide squabs with glandular crop milk un contaminated by seeds, which squabs unable to digest for 1 st week, then introduced some adult food moisted in adult crop by spending a time in the crop until weaning of squabs. This result agreed with Darwati *et al*. [13].

Studying the effect of both parent pigeon previous breeding experience during incubation period at nest on egg hatchability as shown in Table (4) showed significant

Table 4: Behavioral observations (mean values±SE) in pairs of Egyptian baladi pigeon for the effect of both parent pigeon previous breeding experience during incubation period at nest on egg hatchability

	Groups				
Behavioral observations	Group1	Group2	Group3	Grou4	P value
leaving eggs for stretching their wings	2.60±0.37 d	4.70±0.94 c	6.40±0.42 b	8.40±0.42 a	**
leaving nest for eating	3.80±0.41 c	3.80±0.41 c	7.00±0.42 b	11.10±0.37 a	*
leaving nest for drinking	2.50±0.34 c	4.30±0.30 b	5.50±0.50 b	10.20±0.59 a	*
Number of turning eggs	10.90±0.56 a	3.50±0.34 b	2.10±0.31 c	1.60±0.30 c	*
number of bathing	12.70±2.26 a	4.30±0.94 b	2.00±1.15 c	1.10±0.56 c	*
number of nest checks for states of eggs	7.60±0.33 a	2.70±0.36 b	1.20±0.29 c	0.50±0.16 c	*
Egg hatchability	9.60±0.41 a	4.50±0.30 b	2.22±0.20 c	1.00±0.17 d	**

Control group (1) (n=5) pairs both parent with previous breeding experience, group (2) (n=5) pairs newly breed ♂ and previous breeding experience ♀, group (3) (n=5) pairs newly breed ♀ and previous breeding experience ♂ and group (4) (n=5) pairs both parent ♀ and ♂ newly breed

Means at the same raw followed by different letters were significantly different and the highest value was represented with the letter a. NS: Non significant changes. *: Significant at 0.05 probability. **: Highly significant at 0.01probability..

Table 5: (Mean values±SE) in pairs of Egyptian baladi pigeon for the effect of both parent pigeon previous breeding experience during incubation period at nest on egg hatchability

	Groups				
Behavioral observations	Group1	Group2	Group3	Group4	P value
Frequency of turning eggs	10.90±0.56 a	3.50±0.34 b	2.10±0.31 c	1.60±0.30 c	*
number of cracked eggs	0.50±0.22 c	0.70±0.21 bc	1.40±0.30 b	3.90±0.34 a	*
Fertile eggs at 5th day of incubation	12.9±0.43 a	6.10±0.37 b	4.10±0.37 c	2.40±0.33 d	**
Fertile eggs at 10 th day of incubation	11.90±0.43 a	5.10±0.27b	2.70±0.94 c	1.30±0.48 d	**
Infertile eggs	0.70±0.26 c	1.50±0.26 c	5.00±0.44 b	7.30±0.42 a	*
Egg hatchability	11.9±0.45 a	7.11±0.31 b	4.22±0.17 c	2.60±0.31 d	**

Control group (1) (n=5) pairs both parent with previous breeding experience, group (2) (n=5) pairs newly breed ♂ and previous breeding experience ♀, group (3) (n=5) pairs newly breed ♀ and previous breeding experience ♂ and group (4) (n=5) pairs both parent ♀ and ♂ newly breed

Means at the same raw followed by different letters were significantly different and the highest value was represented with the letter a. NS: Non significant changes. *: Significant at 0.05 probability. **: Highly significant at 0.01probability.

increase in gps (2, 3 and 4) in frequency of leaving eggs for stretching their wings and drinking and gps (3 and 4) in frequency of leaving eggs for eating, But their were significant decrease of turning eggs, bathing and nest checks for states of eggs. These results refer to the newly breeding pigeon do not understand all of necessary that must occur for incubation of eggs for successful hatching and obtaining larger number of fertilized eggs, high percentage of hatchability and decreasing percentage of clear egg with dead embryo. This result agreed with Nene [14].

Regarding the influence of both parent pigeon previous breeding experience during incubation period at nest on egg hatchability, results in Table (5) showed that a significant decrease in mean in Frequency of turning eggs, Fertile eggs at 5th 10 day th day of incubation in gps (2, 3 and 4), while mean cracked and Infertile eggs with a significant increase in gps (3 and 4) and no significant between gps (1and 2). These results may be due to newly breed pigeon with improper incubation (lack of proper temperature and/ or humidity) by leaving nest for many times with careless turning eggs, warming eggs, make cracked for eggs by toes, embryonic death and increase percentage of infertile egg. This result agreed with Patil and Shende [7] and Michel and Moore [15].

Illustrating the effect of both parent pigeon previous breeding experience during brooding period on nestling growth rate as shown in Table (6) showed significant decrease in mean body weight on1 st, 2nd, 3rdand 4th week (g) in gps (2,3 and 4).But there were a significant increase in mortality rate in gps (2,3 and 4) These results may be due to successful parnters with previous breeding experience were coordinated in their contributions to nestling care by dividing time of the day in partitioning time allotted to parental care in form of synchrony between parents by giving crop milk and moisted seeds crop inside the mouth of squabs, which help increase body weight (g) and decrease mortality rate, conversely less successful parents with newly breeding exhibited disproportionate contributions to squabs and there was no evidence of synchrony or coordination in the timing of care given to squabs and in several case, both parent

Table 6: Behavioral observations (mean values±SE) in pairs of Egyptian baladi pigeon for the effect of both parent pigeon previous breeding experience during brooding period on nestling growth rate

	Groups				
Behavioral observations	Group1	Group2	Group3	Group4	P value
Body weight on 1 st week (g)	128.30±1.97 a	109.80±2.38 b	87.60±1.59 c	69.50±1.20 d	**
Body weight on 2nd week (g)	255.40±12.71 a	192.00±10.46 b	183.70±6.18 c	143.10±2.17 d	**
Body weight on 3rd week (g)	273.00±1.98 a	240.60±4.67 b	229.00±2.60 b	191.10±19.30 c	*
Body weight on 4tht week (g)	311.50±3.62 a	272.00±3.72 b	227.00±22.7 c	229.10±4.32 c	*
Weaning weight(g)	337.90±3.20 a	310.90±4.27 b	267.10±3.28 c	245.00±14.39 d	**
Mortality rate	0.20±0.13 d	1.10±0.17 c	3.50±0.34 b	6.60±0.37 a	**

Control group (1) (n=5) pairs both parent with previous breeding experience, group (2) (n=5) pairs newly breed ♂ and previous breeding experience ♀, group (3) (n=5) pairs newly breed ♀ and previous breeding experience ♂ and group (4) (n=5) pairs both parent ♀ and ♂ newly breed

Means at the same raw followed by different letters were significantly different and the highest value was represented with the letter a. NS: Non significant changes. *: Significant at 0.05 probability. **: Highly significant at 0.01probability.

pigeon newly breed were frequently absent simultaneously from brood, which affect on body weight and increase mortality rate of squabs. This result agreed with Burger [16] and Ralph[17] and Tomasz and Barkowska [18].

It could concluded that both parent pigeon setting hours with no effect on egg hatchability, while both parent pigeon sex and previous breeding experience with significant effect on incubated egg, nestling brooding and growth rate. So recommended that parental care in form of synchrony between male and female pigeon during incubation and brooding for Laid a greater number of fertilized egg, high percentage of hatchability, decreasing percentage of clear egg with dead embryo and increase growth rate of nestling.

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