

FERTILITY OF BROILER MALES AND FEMALES AT VARIOUS AGES BY USING ARTIFICIAL INSEMINATION .

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ABSTRACT

The study was conducted to determine the effects of the age of male and female and the interaction between them on fertility of broiler breeder flock , using Hubbard flex flock which consists of (12) males and (40) females at 44-47 weeks of age(mature birds) and same numbers at 65-68 weeks of age(aged birds) .Artificial insemination were used in mating within same age group and between various age groups using 0.05 ml. of undiluted semen or 0.1 ml. diluted semen with Lake diluent . pooled semen were used for each age and 1:2 dilution rate . Eggs were collected during the period 2-8 days after insemination and set in the incubator for seven days before broken to examine the embryonic development and determination fertility of various treatments ,Results indicated that there were no significant differences in fertility among age groups included in the experiment , while there were significant interaction effect between male \times female ages on fertility . There were no significant differences in fertility between diluted and undiluted semen .

INTRODUCTION

Broiler industry in Iraq depends on importing either hatching eggs or broiler breeder chicks at parents level to enable hatcheries to supply farmers with commercial day-old chicks .Fertility of breeder flocks represent an economically important trait because the cost of the hatching egg about 27-31 cent in Iraq and 19-20 cent in USA (USAID,2006) . This cost includes feed for parent bird , space in the incubator and labor. Every infertile egg costs just as much as a fertile egg , so the increase in fertility mean more chicks produced and less economically loss in broiler industry .

Although , fertility considered a trait of the two parents and it may define as the interaction of male and female gametes to produce a viable zygote (Crittenden *et al.*,1957 ; Gowe *etal.*,1993) but the male has more effect on flock fertility because each male mates many females , so the males must be selected carefully for this trait .

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Hocking and Bernard (1997) reported that it is difficult to separate the effect of age of one sex on fertility free of the effects of age of the other sex in naturally mated flocks and the artificial insemination may be useful for this purpose .

In general, reproductive ability of male in natural mating decline with advancing age (Zakaria *et al.*,2005 ; Clark and Sarakoon , 1967) and many studies suggested that this decline in fertility is due to lack of mating desire or successful copulation (Hofacre,2002 ; Wilson *et al.*, 1979) while others concluded that the decline in fertility is likely to be the result of management failures particularly in controlling of male body weight and the fertility was not affected by the age of the male or female during period extended 27-57 weeks of age with natural mating (Hocking and Bernard,2000) or a result of changes in seminal traits with age progress (AL-Daraji and Hassan , 2006) , some papers suggested that using artificial insemination can be overcome the decline of fertility due to the progress in age and the aged males selected for semen production could be used in the artificial insemination program for multiple production cycles (Renden and Pierson , 1982) and many researches found that no significant differences between artificial insemination(AI) and natural mating in young flock and can maximize the utilization of broiler breeder males with AI .

There are many simple diluents can be used for holding and storing fowl semen for short time up to 16h at 37 to 40 C , and these diluents will be useful for breeding by artificial insemination in tropic countries where ambient temperatures are high particularly under field conditions (Lake , 1989).

The objective of this study was to determine the performance of broiler breeder males in various ages by using Lake diluent (Lake ,1960) and artificial insemination.

MATERIALS AND METHODS

The experiment was conducted in the Al-Mouaffak Agricultural Limited Company –Poultry farm in Diyala governorate –Iraq , using Hubbard flex broiler breeder flock which consists of (12) males and (40) females at 65-68 week of age (aged birds) and (12) males and (40) females at 44-48 week of age (mature birds) , Semen were collected from the males by massage technique described by (Gabriel , 1957) as pooled samples and diluted as 1 : 2 dilution rate with Lake diluent (Lake , 1960) .The hens inseminated weekly with 0.05 ml. of undiluted semen or 0.1 ml. diluted semen, the eggs collected during the period 2-8 days after insemination and labeled according to their source, then incubated for seven days before they broken to examine the embryonic development and to determine the fertility , this procedure replicated four times .

The raw data transformed to $\text{arc sin}\sqrt{\%}$ before analysis as a factorial experiment $2 \times 2 \times 2$ for male age , female age and diluted or undiluted semen factors respectively with Randomized Complete Block Design , the significant between means detected by Duncan test , the analysis performed by SAS program (SAS , 1985) .

RESULTS

Fertility for male and female treatments are presented in Table 1. The main effect of age of the males and females indicated that there was no significant effect on fertility at the age range included in the experiment , but the variation between fertility of females at different ages were higher than variation in fertility of male groups .

Table 1. *Fertility of male and female at mature and aged birds .*

| Sexes | Fertility (%) | |
|--------|---------------|--------------|
| | Ages (week) | |
| | 44-47 | 65-68 |
| Male | 79.69 ± 2.33 | 80.52 ± 2.55 |
| Female | 77.12 ± 3.63 | 83.10 ± 4.23 |

The effect of the interaction of male × female ages on fertility were presented in Table 2 . The cross between aged males (65-68 weeks of age) and mature females (44-47 weeks of age) resulted a significant reduction in fertility (73.35 %) while there were no significant differences in fertility among other crosses .

Table 2. *Effect of interaction between male and female ages on fertility .*

| Fertility | | | |
|----------------------|-------|------------------------|-----------------------|
| | | Male ages (week) | |
| | | 44-47 | 65-68 |
| Female ages (week) | 44-47 | 80.88 ± 3.23 <i>ab</i> | 73.35 ± 3.25 <i>b</i> |
| | 65-68 | 78.50 ± 3.63 <i>ab</i> | 87.68 ± 4.23 <i>a</i> |

Means with different superscripts differ significantly from each other at ($P < 0.05$) .

Fertility result from undiluted and diluted semen at different ages given in Table 3 . There were no significant differences in fertility of diluted and undiluted semen at the ages included in this study , but the result appear decline in fertility of diluted semen in mature age flock (74.86 %) , while there were improving in fertility of diluted semen of old flock (82.86 %) .

Table 3. *Effect of diluted and undiluted semen on fertility at various ages .*

| Flock age (week) | Fertility (%) | |
|--------------------|---------------|-----------------|
| | diluted semen | undiluted semen |
| 44- 47 | 74.86 ± 2.35 | 81.96 ± 3.24 |
| 65- 68 | 82.86 ± 3.54 | 80.75 ± 3.33 |

DISCUSSION

The lack of significance between fertility that result from groups in Table 1, may be due to the used of artificial insemination which overcome the problems that appear with natural mating , and the large standard errors refer to the large standard deviations of the data that caused no significant due to age , and this situation may be result due to the variation in semen quality with advanced age(Wilson *et al.*, 1979) . The significant interaction ($P < 0.05$) of male × female ages which caused the decline in fertility that result of old male × mature female cross explain the potential of use young males with old females to improve fertility by spiking practice in natural mating (Hofacre,2002), but the reverse practice cannot be use with old male.

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نسبة الخصوبة لذكور و إناث قطيع التربية لفروج اللحم بأعمار مختلفة باستخدام التلقيح الاصطناعي .

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الخلاصة

أجريت هذه الدراسة لتحديد تأثير العمر لكل من الذكور و الإناث في قطيع التربية لفروج اللحم و التداخل بينهما على نسبة الخصوبة في القطيع ، استخدم في التجربة قطيع هابرديتألف من (١٢) ديكاً و (٤٠) دجاجة للفترة ٤٤ – ٤٧ أسبوع من العمر (طيور ناضجة) و عدد مشابه للفترة ٦٥ – ٦٨ أسبوع من العمر (طيور كبيرة العمر) ، استخدم في التجربة تقنية التلقيح الاصطناعي لإجراء التلقيحات بين الأفراد ضمن المجموعة الواحدة بنفس العمر أو بين الأفراد من أعمار مختلفة وباستخدام ٠,٠٥ مل من المنى غير المخفف أو ٠,١ مل من المنى المخفف مع مخفف Lake ، تم استخدام عينة مشتركة من المنى لكل مجموعة عمرية و خففت بعدل تخفيف ١ : ٢ ، جرى جمع البيض للفترة ٢ – ٨ يوم بعد التلقيح الاصطناعي حيث ادخل إلى الحاضنة لفترة سبعة أيام قبل تكسيره لفحص التطور الجنيني و تحديد نسبة الخصوبة لمختلف المعاملات . أشارت النتائج عدم وجود فروقات معنوية في نسبة الخصوبة بين المجاميع التي شملتها التجربة ، بينما لوحظ إن هناك تداخل معنوي $P < ٠,٠٥$ بين عمر الديك × عمر الدجاج في تأثيرها على نسبة الخصوبة ، كما لم يلاحظ وجود فروقات معنوية في نسبة الخصوبة بين المنى المخفف و المنى غير المخفف .