Pakistan J. Agric. Res. Vol. 12 No. 3, 1991

FERTILITY OF HENS AS AFFECTED BY THE TIME OF INSEMINATION

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ABSTRACT: The study was conducted to identify the best time of manual insemination in the afternoon of solar day using RIR hens. The insemination was done hourly from 1400h to 1800h. It was observed that artificial insemination carried out from 1400h to 1600h exhibited higher fertility rate as compared to the later or the natural mating. The phenomenon may be attributed to oviductal events associated with mechanism of oviposition.

Key Words: Chicken; Artificial Insemination; Natural Mating; Fertility; Time of Insemination; Pakistan.

INTRODUCTION

Time of insemination is one of the many important factors which determine fertility of eggs (Lake and Stewart, 1978; Lake, 1983; Mian et al., 1989a,b). The fertility rate in both natural and artificial insemination is reported to be higher in hens inseminated in the afternoon (Moore and Byerly, 1942; Malmstrom, 1943; Parker, 1945; Parker and Arscott, 1965; Johnston and Parker, 1970). The presence of a hard-shelled egg in the uterus at the time of insemination significantly reduced fertility (Wyne et al., 1959; Bornstein et al., 1960; Christensen and Johnston, 1975). The majority of eggs are laid within eight hours from the beginning of the "subjective dawn", which implies that under natural conditions the oviduct of hens is clear of eggs after 1400h (Bhatti, 1987).

This experiment was conducted to test the effect of artificial insemination carried out at different timings in the afternoon with an aim to investigate consistency of the response.

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MATERIALS AND METHODS

The present study was carried out at Poultry Research Institute, Rawalpindi, during December 1983 - February 1984. The shed (24m L x 7.5m W x 3m H) was fitted with trapnest cages, which were arranged in three rows, and each row had three tiers of cages (45cm L x 23cm W x 42cm H) on either side of the row. Water was supplied through nipples, and each tier had a common feed trough fitted in the front. Servicing was done twice during the week.

Two hundred and forty, 40-week old Rhode Island Red (RIR) pullets were used in this study. The pullets were reared on 14 h light; 10h darkness schedule, from week 2 to 20 of age. Later, incremental light stimuli were added @ 30 min per fortnight, till 16 h of continuous light at week 28 of age. This lighting schedule was continued till the conclusion of the experiment, the lighted period being 0600h to 2200 h.

The pullets were randomly divided into five groups of 48 birds each, and these groups were each assigned at random to one of the five treatments A, B, C, D and F. The control group F, put on natural mating at will was maintained on

the floor, while 192 experimental birds belonging to the remaining four treatment groups were transferred to cages two weeks before the commencement of the experiment. Treatments A, B, C and D denote insemination times 1400h - 1500h, 1500h - 1600h, 1600h - 1700h and 1700h - 1800h, respectively which were conducted twice every week. Undiluted semen (0.05ml) milked from 20 RIR cocks selected for this purpose was used. In control group (treatment F), a male to female ratio of 1:8 was maintained for natural mating.

Hatching eggs were collected thrice daily, and were marked accordingly. The eggs were stored in the egg room at 15°C for a maximum of seven days prior to setting in the incubator. Ninety eggs per replicate group were randomly selected and set in the incubator at week's interval. The eggs were candled on the day 19 of incubation. Chicks were hatched on the day 22. Three consecutive hatches were taken, and were designated as trials I, II and III, respectively. Number of fertile and infertile eggs were recorded as response to the treatments.

Data for each parameter comprised percentage of total eggs per replicate set in the incubator. The data on fertility were subjected to analysis of variance in accordance with the completely randomized design used. Standard error of treatment means was also computed to test the significance of individual treatment differences (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Fertility data revealed no significant difference among the five treatments in trial I. In trial II, the birds in treatments A and B produced significantly more fertile eggs ($P < 0.05$) when compared with control (natural mating) and with treatment D (Table 1). The birds in treatment C gave intermediate results, showing no significant difference from any of the other groups. Responses obtained in trial III were similar to those obtained in trial II, except that differences between treatments A, B and F disappeared.

When data from all three trials were pooled, similar response was observed as in trial III. The birds which exhibited higher fertility rate (treatment A and B) produced fewer infertile eggs. The lower

Table 1. Effect of time of insemination on fertility of RIR hens maintained at Poultry Research Institute, Rawalpindi during December 1983-February 1984

Treatment	Average fertility of eggs (%)			Overall average
	Trial I	Trial II	Trial III	Fertility (%)
A	91.6	93.8 a	92.2 a	92.6 a
B	88.4	95.6 a	92.2 a	92.1 a
C	87.8	91.1	80.6	86.5
D	91.1	74.6 b	77.2 b	80.9 b
F	88.9	86.6 b	89.6 a	88.4 a
Standard error	2.28	1.57	3.32	2.92

Means followed by the same letter within each column do not differ significantly at 5% level of probability.

fertility response in treatment D (inseminated between 1700h and 1800h) may be attributed to the possibility of presence of hard shell egg in the uterus (shell gland portion of oviduct). It is known that within 15-30 min of laying egg, next ripe ovum is shed from the ovary which ultimately reaches shell gland after about 5 h (Fraps, 1955; Bhatti, 1988). This implied that the hens of the flock which laid egg in the early morning hours were having another egg in their shell gland at insemination time. This calls for direct observation through manual palpation in similar future experimentation. The results are, however, in line with those of Giesen et al. (1980) and Lake (1983).

This study provided evidence that artificial insemination performed between 1400h and 1600h produced better fertility results as compared to later inseminations. The data indicated that consistent responses were not obtained for different times of insemination used in this experiment. The observation may be explained in the light of the fact that oviposition inducing factors associated with last oviposition of the day (Bhatti, 1988) facilitate transportation of spermatozoa to the upper portion of the oviduct, i.e. infundibulum, where fertilization takes place. As the time elapses after last oviposition, the effect of such physiological factors is presumably minimised for non-release of oviposition associated ovum from the ovary.

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