

Effect of Season and Semen-Extender Ratio on Fertility of Artificially Inseminated Turkey in Chitwan, Nepal

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ABSTRACT

The study was carried out to investigate the effect of season and semen extender ratio on fertility of artificially inseminated turkey from farms of Chitwan district of Nepal. Trials were conducted using various dilutions of semen in Turkey. The dilutions were made with skim milk powder- 1:1(A), 1:2(B), 2:3(C) and 3:4 (D). 32 turkeys were artificially inseminated in 4 days interval for 3 months. The dose of insemination was 0.03 ml and was done at 6:00 p.m. Trails were done in winter and spring seasons to know the seasonal variation on fertility rate. It was found that hens in treatment A has high fertility rate than others. Similarly, treatment D has higher fertility rate than that of treatment B and C. However, non significant differences in fertility were observed among various treatments in our study. The fertility rate was found higher on spring season than winter. However, non-significant differences were observed on seasonal variation. Similarly, seasonal effect on fertility rate of various semen extender ratios was also carried out. It is observed that in dilution A, B and C the fertility rate is higher on spring season but in treatment D fertility rate is higher on winter. However there are no significant differences on fertility rate of semen extender ratio due to seasonal variation. The present study provide evidence that turkey inseminated with 1:1 and 3:4 semen dilutions provided more fertile eggs comparable with those 1:2 and 2:3 and fertility rate was higher in spring than in winter.

INTRODUCTION

Turkey, a large poultry bird, is fast gaining popularity among peasant farmers in the country to the extent that they are produced throughout the year for commercial purpose. All over the world Turkey is produced by

breeders due to its body size, conformation and edible meat yield. Reproductive traits like its oviparous nature and low to medium fertility have not prevented a reasonable rate of improvement under natural condition even in developing countries (Esminger, 1977).

Artificial insemination in turkey began in 1930 when Beltsville based researchers William Burrow and Joseph Quinn in 1937 reported ground breaking methods for semen collection and Artificial Insemination (AI) for poultry. The artificial insemination in turkey has continued to flourish and this has aided turkey farms since large number of poultry can be gotten through artificial insemination. Its use in turkey breeding is wide spread due to the development of heavy, broad breasted bird with a conformation which makes natural mating difficult. As a result, it has become the only method for economic poultry production and some 95% of this success results from an artificial insemination breeding program (Marire, 2011). Low fertility in turkeys, due to unsuccessful mating caused by large body size of the tom and reduced libido is a serious and costly problem in the production of hatching turkey eggs (Merck pub., 2008). The use of artificial insemination in turkey can be enhanced with the improvement of diluents and breeding on appropriate season. As very small amount of semen is ejaculated at a time i.e. 0.2 to 0.5 ml so, appropriate diluents make it possible to increase its volume thereby enabling the spread of semen over many more turkeys. Important too is the decrease in ratio of toms from 1 to 10 with natural mating to 1 to 30 with

Artificial Insemination (Tara, 1998). In past, some researchers have successfully employed various diluents for turkey semen like ringers lactate, sodium phosphate buffer, egg yolk, egg white, milk and tyrode solutions. Diluent or extender refers to the aqueous solution used to increase the volume of the ejaculate to a level appropriate for making multiple inseminations (Salisbury *et al.*, 1978; Foote, 1980). Undiluted semen dies or loses its fertilizing capacity in about 4-6 hours at room temperature. Its life may be slightly prolonged by slow cooling to 100C (Gadea, 2003). Dilution reduces the number of spermatozoa per ml of semen. Munro (1938) found a decline in sperm numbers with increasing dilution, but the decline is only appreciated when the dose of insemination contained less than the minimum number of spermatozoa required for optimum fertility (Brown *et al.*, 1970; LLinskii *et al.*, 1975). Loss of fertility following excessive dilution of semen could result by inseminating chickens weekly with semen diluted 1:4. Sexton (1986) reported that fertility of stored turkey semen diluted 1:2 was lower than that of semen diluted 1:1 and 2:1. The present study is aimed at facilitating effective large scale production of turkeys by artificial insemination to improve the low per capita protein intake in the country boost

the economic viability of turkey farming. Though turkey farming is flourishing also in Nepal, there has been problematic as female turkeys get injured due to tearing of skin down to muscles by heavy males during mating. This study was conducted to know the fertility rate of different ratios of milk skim powder as diluents and the seasonal effect on fertility of laying turkey in Nepal.

METHODOLOGY

The study was conducted on Haraiya turkey farm at Chitwan district of Nepal in 2017 A.D. Ten months old laying turkeys were taken for study purpose. There were 32 turkeys and a white as well as a black tom of age 9 months were used to take out semen. This artificial insemination on turkey was applied for the first time in Nepal. These females were separated in different cage without any tom for about three months. The toms were isolated from other hens a day before insemination. All those turkey were given proper feed, cure as well as time for grazing in the field. Collection of semen from Toms were done by massaging and stimulating their sex organ and collected by tuberculin syringe on glass beaker. Then skimmed milk was prepared as diluents by adding two spoons of water in one spoon of skim milk powder. Then semen and diluents

were mixed on beaker and taken it in tuberculin syringe and inseminated to all turkey equally i.e. 0.03 ml.

It is then used different trails i.e. dilution ratio, 1:1, 1:2, 2:3 and 3:4 on different days. The inseminations were repeated every 4 days. From the day after insemination it is started collecting eggs from inseminated turkeys thrice a day, marking each egg it is started to keep them for hatching in hatchery. Every day, up to 3 months from 2017/01/11 to 2017/04/02 i.e. from winter to spring it is kept on recording the number of marked fertile eggs from hatchery. As different dilutions were done on different day accordingly, the fertility rates of different dilutions were recorded.

RESULTS AND DISCUSSION

The result indicates that there is high fertility rate of artificially inseminated turkeys in spring than in winter season. However, there are no such significant differences found as shown in Table 1. It was found that hens in treatment A has high fertility rate than others. Similarly, treatment D has higher fertility rate than treatment B and C. However, non significant differences in fertility were observed among various treatments in our study. Similarly, seasonal effects on fertility rate of various semen extender ratios were found. It is observed that in dilution A, B and C the fertility rate

is higher in spring season but in treatment D fertility rate was higher on winter. However, there are no significant differences on

fertility rate of semen extender ratio due to seasonal variation.

Table 1: Fertility with respect to season and extender ratio

Factors	AI Success Rate or Fertility (%)
Season	
Winter	76.80
Spring	78.51
Significance	NS
Semen: Extender Ratio	
1:1	81.81
1:2	76.65
2:3	76.41
3:4	78.14
Significance	NS
Semen: Extender Ratio X Season	
1:1 X Winter	79.41
1:1 X Spring	85.00
1:2 X Winter	76.77
1:2 X Spring	76.50
2:3 X Winter	74.20
2:3 X Spring	79.37
3:4 X Winter	79.50
3:4 X Spring	76.32
Significance	NS

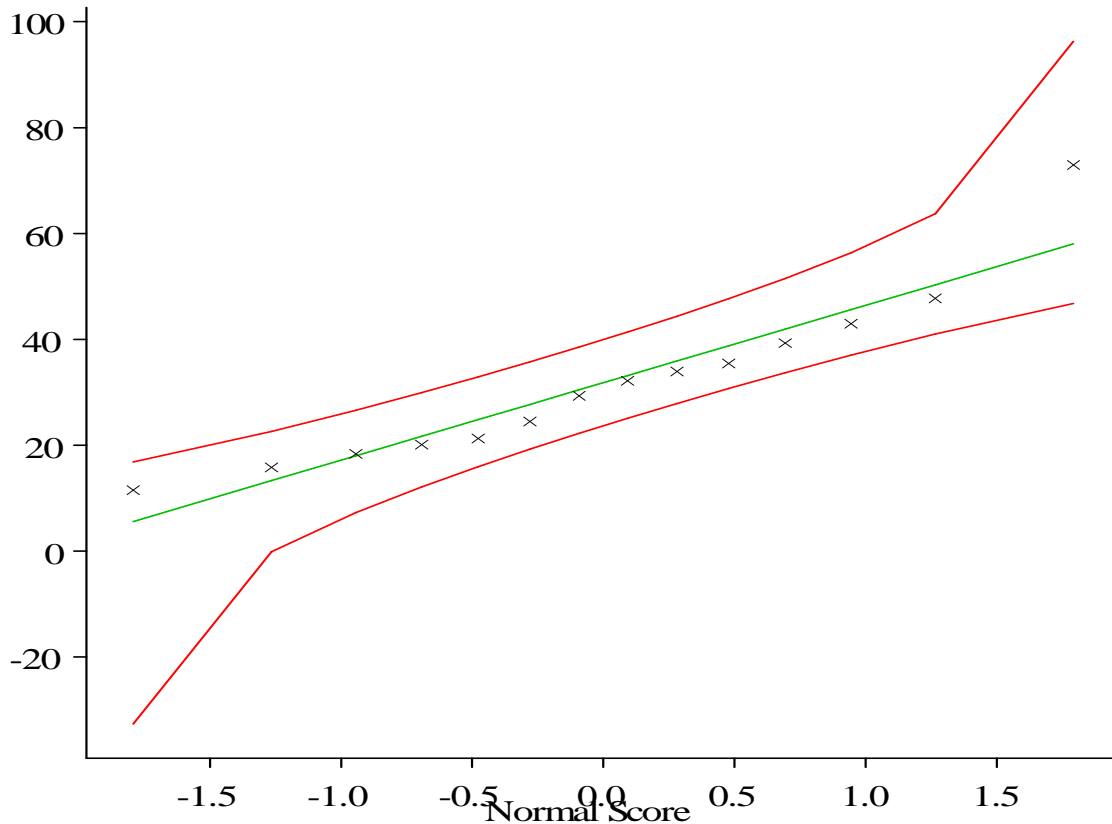


Figure 1: Normal Q-Q Plot for laying % (+95% Confidence Limits)

The similar result also observed by the Hocking and Bernared (1997), Christensen (2001) as well as Surai and Wishart (1996). Augustine (2011) also found that the diluents of ratio 1:1 has higher fertility rate than other diluents ratio and there is high fertility rate in spring season than winter. Also, there is no significant differences in fertility rate were found among various dilutions (Augustine, 2011). Obvious advantages of semen extension have generated interest in finding dilution rates for semen of avian species. Donogue and Wishart (2000) advanced that the ability to obtain fertility results similar to natural

mating was dependent on the rate of dilution. Sexton (1979) stated that high fertility could be obtained by inseminating chickens weekly with semen diluted at 1:4. Dilution levels of 1:5, 1:10 and 1:20 exhibited marked reduction in fertility compared with 1:2 and 1:3 and not even an increase in semen dosage for 0.1 to 0.2 ml improved fertility in chickens at the 1:10 and 1:20 level because tom sperm concentration is higher than that of the rooster. Omprakash *et al.* (1992) reported that when semen was diluted 1:3 there was an increase in the percentage of abnormal spermatozoa due to dilution effect.

As a whole from Table 1 it can be said that semen extender ratio A (1:1) on spring season has higher fertility rate than any other.

CONCLUSION

Obvious advantages of semen extension have generated interest in finding dilution rates for semen of avian species. It was found that hens in dilution 1:1 has high fertility rate than others. Similarly, dilution 3:4 has higher fertility rate than that of dilution 1:2 and dilution 2:3. The fertility rate was found higher on spring season than winter. It is observed that the seasonal effect on fertility rate in dilution 1:1, 1:2 and 2:3 the fertility rate is higher on spring season but in treatment 3:4 fertility rate is higher on winter. However there are no significant differences on fertility rate of semen extender ratio due to seasonal variation.

Hence, the present study provide evidence that turkey inseminated with 1:1 and 3:4 semen dilutions provided more fertile eggs comparable with those 1:2 and 2:3 and fertility rate was higher in spring than in winter.

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