

Scientific Report

Artificial insemination practice in British United Turkeys: a report in Iran

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Summary

No domestic availability to breeder turkey stocks and turkey hatching eggs prompted the present experiment that aimed to evaluate the feasibility of a conventional artificial insemination (AI) procedure in British United Turkey (BUT) for the first time in Iran. Broiler turkeys were restrictedly fed, grown for 46 weeks, and used for the current study (10 turkey toms and 24 turkey hens in total). After a 3 week period of habituating the toms to abdominal massage, the pooled semen was used for insemination after the dilution in sterilized and homogenized low-fat milk (at the ratio of 1 to 6). The hens were inseminated (14:00 h) and hatching eggs were collected (n = 148). All the eggs were broken open to assess the fertility rate. Although being lower than the conventional average fertility rate noticed for breeder turkeys in the production manuals (91%), a fertility rate of 61.5% was obtained. The present report provided a preliminary data on the feasibility of the conventional procedure used in chickens to artificially inseminate the turkey, using low-fat milk as a simple available extender. The present findings might also be promising to the future establishment of turkey breeder enterprise in Iran.

Key words: Artificial insemination, Turkey, Fertility, Iran

Introduction

Artificial insemination (AI) has not been eligibly exploited in poultry industry due to the sensitivity of avian spermatozoa to freezing and thawing process (Wishart, 1985). Therefore, fresh liquid avian semen is conventionally used for AI. Despite exploitation of AI chickens (Etches, 1996), a well-developed pectoral muscle in turkeys, has prevented turkey toms to mate naturally (Etches, 1996), making AI a necessity.

To our knowledge, turkey production industry is limited to broiler turkey and there is no turkey breeder farm in Iran. Therefore, the producers have to obtain the day-old

chicks externally. Interests, however, are increasing in using turkey meat, giving the turkey breeder enterprise a critical contribution in future. This, in turn, would make AI an essential practice in turkey breeding. Therefore, the present study was conducted to examine the feasibility of a conventional AI procedure in turkey production for the first time in Iran to introduce a method as easy to perform as possible for turkey breeders.

Materials and Methods

Experimental birds

Broiler turkeys were obtained comer-

cially (British United Turkey; Aviagen Turkey Ltd., Cheshire, UK), restrictedly fed (07:00 h), grown for 46 weeks, and used for AI practice (10 turkey toms and 24 turkey hens totally). The birds were housed separately (sex-based) in floor pens, had free access to fresh water, and fed on a conventional ration (Table 1) according to NRC (1994) at the Animal Research Station of Shiraz University (Shiraz, Iran) under a 15 h light: 9 h dark photoperiod.

Table 1: Dietary ingredients and composition of the rations fed to turkeys

| Ingredient (%) | Tom | Hen |
|--------------------------------|-------|-------|
| Corn | 80.36 | 77.12 |
| Soybean meal | 10.16 | 14.55 |
| Oyster | 7.71 | 5.66 |
| Dicalcium phosphate | 0.71 | 1.15 |
| Salt | 0.26 | 0.52 |
| Vitamin premix ¹ | 0.40 | 0.40 |
| Mineral premix ² | 0.40 | 0.40 |
| Lysine | 0.00 | 0.11 |
| Methionine | 0.00 | 0.09 |
| Composition | | |
| Metabolizable energy (kcal/kg) | 2900 | 2900 |
| Crude protein (%) | 12.00 | 14.00 |
| Calcium (%) | 0.50 | 2.25 |
| Phosphorus (%) | 0.25 | 0.35 |

¹ Supplied per kg diet: vitamin A, 15,000 IU; vitamin E, 30 mg; vitamin K₃, 4 mg; vitamin D₃, 3,000 IU; riboflavin, 7.5 mg; pyridoxine, 5.5 mg; vitamin B₁₂, 25 µg; biotin, 50 µg; niacin, 50 mg; calcium pantothenate, 18 mg, and folic acid, 1.5 mg. ² Supplied per kg diet: Fe (FeSO₄.H₂O), 90 mg; Mn (MnSO₄.H₂O), 90 mg; Zn (ZnO), 67.3 mg; Cu (CuSO₄.5H₂O), 10.9 mg, and Se (Na₂SeO₃), 0.18 mg

Semen collection

At 48 weeks of age, the toms were habituated (3 week) for semen collection (Akhlaghi and Zamiri, 2007). If right-handed, the massager halted the bird on the left leg so that the tom's tarsi lay between the technician's legs. Concurrent to dorsal massaging by the left hand, the abdomen was powerfully pressed towards the cavity by the right hand. The broad abdominal cavity made pressing the abdomen a necessity compared to breeder roosters. It normally takes a two-fold or longer time to habituate the toms, compared to the usual 10-d-long habituating period in cockerels (Etches, 1996).

Artificial insemination and fertility

Diluting the semen with sterilized and homogenized low-fat (1%) milk, as an extender, at the proportion of 1 to 6, was appropriate to inseminate the hens with a number of 200×10^6 spermatozoa per 0.2 mL insemination volume (Akhlaghi *et al.*, 2012). The diluents as well as all containers used in the present study were maintained at 30°C, using a water bath to prevent cold shock in spermatozoa. The toms were abdominally massaged, the semen samples were pooled and diluted with extender, and the hens were inseminated by a needle-free tuberculin syringe. At insemination, the hens were inseminated at a depth of 4 cm into the left side of cloaca on days 1 and 2, followed by a weekly practice onwards. Two days following the first insemination, the eggs (n = 148) were macroscopically evaluated to assay the fertility rate for a 14-d-long period. If a blastoderm was found, then the egg was considered as fertile; however, in infertile eggs a blastodisc was identified.

Results and Discussion

The present report addressed the feasibility of AI in turkey hen. Although, being lower than the average reported in commercial manuals (91%, Aviagen Group, 2011), AI of the hens resulted in a fertility rate of 61.5% (91 fertile eggs out of 148 eggs). The current study was aimed to introduce an easy to perform insemination procedure at the field condition. As using a diluent containing the detailed ingredients of the conventional diluents was not intended, an easy to access one, the low-fat milk, was used.

There is a good body of literature on introducing the optimum diluents for semen in poultry (Sexton, 1987; Thurston *et al.*, 1994), which might be used in future; however, establishing an efficient insemination practice would be a prerequisite for local turkey production. The lack of a domestic commercial turkey breeder farm in Iran might be partly due to the necessity for AI practice to produce fertile eggs. This might appear an ambiguous non-well-founded practice for potential producers. The present study,

however, suggests that the current practice might be easily implemented, using a simple, low cost, and easy to access diluent (low-fat milk). Efforts on improving the procedure or substituting the low-fat milk by more complicated diluents to approach higher levels of fertility rate would be quite invaluable. Once regarded, examining the efficacy of different diluents and various *in vitro* storing periods might be of considerable interest. Promising findings of the current report would encourage the turkey producers to initialize establishing the turkey breeder enterprise, thereby providing sustainable resources of turkey hatching eggs; however, training skillful technicians for such a practice must not be ruled out.

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