EFFECT OF PULSED ELECTRO MAGNETIC FIELD (PEMF) EXPOSURE OF CHICKEN HATCHING EGGS ON HATCHABILITY PERFORMANCE

C. Pandian[1], A.V. Omprakash, R.Richard Churchil, A.Sundaresan and M. Babu

Institute of Poultry Production and Management
TANUVAS, Chennai- 51, India

Received : 01.02.2013 Accepted : 06.09.2013

ABSTRACT

The above study was conducted to analyze the hatchability performance of broiler breeder hatching eggs at Institute of Poultry Production and Management, Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai – 51. A total of 4436 broiler breeder hatching eggs with 12 settings were divided in to two equal groups of each 2218 as treatment and control. The treatment group hatching eggs were exposed to PEMF at 1 Hz frequency with 1500 nT intensity for 18 hours at 18^0C and 80 percent relative humidity. The control eggs were stored at the same temperature and humidity but kept unexposed to the PEMF. After bringing into room temperature for one hour, the eggs were incubated under optimum temperature and humidity in setter and hatcher. The hatchability performance showed no significant difference between treatment and control groups. Percent hatchability to total and fertile egg set for treatment group were 76.09 and 90.36 and that of control were 73.89 and 89.59 respectively. There were no significant differences observed for mean per cent embryonic mortality, mean per cent dead in germ and dead in shell between treatment and control group. The results of this study provide enough indication from the experiment, that it is imperative to conduct a few more trials using a different combination of frequency, intensity and dose duration to get better hatchability performance.

Key words :

INTRODUCTION

Interaction of Pulsed Electro Magnetic Field (PEMF) with life processes has attracted the attention of biologists in recent years, specially, from the point of view of their implication in space sciences. It is known that under certain conditions static or DC magnetic fields do interact with certain life processes both on long-term and short-term exposures. In recent years, several studies have been reported on the effects of PEMF on the life processes of the organism (Narayan *et al*., 1984) to a point

*Corresponding author E-mail : chinnaduraipandian75@gmail.com

where it has now generated considerable interest. However few attempts have been made to assess the effects of PEMF exposure on crop yield, productivity and seed viability (MIM, 2002). The use of very low electromagnetic fields has been proved useful in laboratory treatment of a wide range of therapeutic situations like fractures, irregular bone cracks, migraine and repair of degenerated nerves (Hulme *et al.,* 2002). The present study is a part of a series of on-going investigations on the poultry birds being attempted to determine the effect of low frequency and ultra –low intensity PEMF exposure on hatchability performance. It is possible that exposure of broiler eggs to PMEF of optimum frequency, intensity and duration may have beneficial effects. If any increase in the hatchability performance is observed after exposing to PEMF, the same will promise a major thrust to the poultry industry.

MATERIALS AND METHODS

This study was conducted to analyze the hatchability performance of broiler breeder hatching eggs at Institute of Poultry Production and Management, Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai-51. A total of 4436 broiler breeder hatching eggs with 12 settings were divided in to two equal groups of each 2218 as treatment and control. The treatment group hatchings eggs were exposed to PEMF at 1Hz frequency with 1500 nT intensity for 18 hours at 18^{o}C and 80 per cent relative humidity. The frequency of fluctuating electromagnetic fields around power transmission cable is 50 Hz, whereas the varying frequency of pulse electromagnetic fields approaches human and animal physiology frequency of 1Hz, or is a static magnetic field, hence the trials has been initiated with above combination (MIM, 2012). The control eggs were stored at the same temperature and humidity but kept unexposed to the PEMF. After bringing into room temperature, the eggs were incubated under optimum temperature and humidity. The eggs were transferred on 18th day to hatcher and chicks were pulled out on 21stday. Unhatched eggs were break-opened to get infertile and embryonic mortality data. The percent hatchability on total and fertile eggs set and embryonic mortality were worked out. The data were statistically analyzed using t-test.

Equipment

The Controlled Magnetic Field (CMF) enclosure was used to generate the pulsed electromagnetic fields. The CMF enclosure consists of coil system formed by a cubic lattice consisting of 5 square loops each of them is of 120cm on the side, all of them are connected in "series –aiding" configuration mounted co-planar and co-axial. The spacing between the loops and the variable numbers of turns of wire in each loop are pre-determined so as to obtain the largest volume of most uniform (or homogeneous) magnetic fields for a given physical dimension. The coil assemblies, designed and fabricated at Madras Institute of Magnetobiology are carefully calibrated using high precision magnetometers and current measuring devices in the magnetic standardization lab of the institute.

RESULTS AND DISCUSSION

The mean percent hatchability on total and fertile egg set and embryonic mortality are presented in Table.1

Hatchability performance (%)

The hatchability performance showed no significant difference between treatment and control groups. Percent hatchability to total and fertile egg set for treatment group were 76.09 and 90.36 and that of control were 73.89 and 89.59 respectively. Mean per cent hatchability on both total and fertile egg set observed in our study were similar with Thanaseelan *et al.* (2000), who reported an average total hatchability of 80 per cent in control and 81 per cent in treatment group and a fertile hatchability of 85.10 per cent in control and 86.17 per cent in treatment groups when the eggs were exposed in electromagnetic fields for 2 hours per day for 3 days.

Embryonic mortality (%)

There were no significant differences observed for mean per cent embryonic mortality, mean per cent dead in germ and dead in shell between treatment and control group. This finding on embryonic mortality percentages was similar with Thanaseelan *et al* (2000), who reported a maximum embryonic mortality of 12.5 per cent in control and 14.58 per cent in treatment groups and observed no significant difference between treatment and control groups.

CONCLUSSION

It can be concluded from the above study that the hatching eggs exposed to PEMF at 1 Hz frequency with 1500 nT intensity for 18 hours did not show any significant effect on hatchability percentage. The results of this study provide enough indication that it is imperative to conduct a few more trials using a different combination of frequency, intensity and dose duration to get better hatchability performance.

REFERENCES

Hulme, J., Robinson,V., De Bie, R., Wells, G. and Judd, M. (2002) Electromagnetic fields for treatment of osteoarthritis, Cochrane Library, Oxford Update Software,PP:3.

MIM (2002) Madras Institute of Magnetobiology, Scientific and Industrial research organization (SIRO). A Perspective of Present and Future; Information bulletin .pp-4 Web site:WWW.geocities.com/mimbm2001

Narayan, P.V.S., Subrahmanyam, S., Satyanarayana, M., Rajeshwari, K. and Srinivasan, T.M. (1984) Effect of Pulsed Magnetic Fields on Biological systems. *Current Science,* **53**:18

Thanaseelan, V., Prabakaran, R., Vijayalakshmi, M. and Sanker Narayan, P.V. (2000) Preliminary Studies on the effect of pulsed magnetic field on hatchability of Japanese quail and chicken eggs-A pilot trial. Indian Poultry Science Association Conference 2000 conducted by TANUVAS, at Chennai, on 12-14 October 2000.

Table: **1**
Effect of pulsed electromagnetic fields on hatchability performance of broiler breeder hatching eggs during pre incubation storage. (Mean±SE)

S.No	Parameters	Treatment (n=12)	Control (n=12)	t-Value	P-Value
1	Fertility^{NS}	84.17± 1.246	82.38±1.66	1.75	0.107
2	Hatchability to totaleggs set^{NS}	76.09± 1.56	73.89±2.06	1.42	0.1846
3	Hatchability to fertile eggs set ^{NS}	90.36± 1.02	89.59± 1.17	0.51	0.6195
4	Total embryonic mortality^{NS}	8.69± 0.72	10.17 ± 1.20	1.04	0.3219
5	Dead in germ^{NS}	3.84±0.35	5.46± 1.40	1.18	0.263
6	Dead in shell^{NS}	4.84±0.59	4.71± 0.83	0.25	0.810

NS-Not significant (P<0.05)