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Gamma ray effects as oxidant stress on several physiological cases of an adult chickens

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Abstract: The aims of this work to find the biophysical effects of gamma ray as oxidation stress on reproductive system of adult chickens. From this work we used cocks chicken at 36-58 weeks of age and found the value of semen volume in (ml/brid/ejac), semen concentration in (Million cells /ml.) and total sperm (million cells/ejaculation) the value of semen volume, semen concentration and total sperm significant increase with increased the age of cocks chicken and considered as control group .Also we found the value of them at irradiation with low dose of gamma ray (33,42, and 75 mGy/h) as chronic dose at 8 h/day for 40 days which significant decrease with increase low dose gradually. The decrease ratio of semen volume with irradiation doses about 5-14% and in semen concentration about 5-12 % for three chronic low doses compared with control group.
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الخلاصة

Introduction:

In the broiler industry, the fertility is feature of main interest, firstly because of its impact on chick edition . Negatives correlation between development and fertility is feature, chiefly in normally mated flocks [1]. For development or growth the selection alone over several generations is possible to produce in downgrade in fertility or in ability of males to mate actively [2]. Thus, agreement selection should be purposed at producing features however, main tainting reproductive stress [3].

In poultry fertility is classically consideration as freelance feature either of the female or male , while genetic or non genetic promotes rooting from male and female drive egg fertilization and embryo growth [4]. For the single egg the fertility is also a job of genotype of the embryo to which original donate. Accordingly both paternal and maternal motifs should be calculated with each other when testing fertility .

Parameters effecting on fertility which arise from the male contain some sperm quality features likes sperm metabolism, semen concentration sperm motility and the percentage of abnormal or head sperm cells [5]. Manner parameters involve the males capacity to altemate mate with the hens ability which may be impacted with leg problems [4] in the happing of ownerless growth . Features of sperm quality are considered to be evenly heritable [6],while behavioral properties always have a decrease heritability [7].

The U.S. Army invoked the FDA for salvage of raw bacon, loaded in vacuo and sterilized of irradiation (45 to 56 kGy at 5 C^{o}) ; salvage for this yield was favored in February 1963. In 1968 the FDA revoked the consent of irradiated packaged bacon assizes , starting that a closely analysis of all tendered data cleared significant against impacts in animals fed irradiated food, and that main defect found in the design as well as conclusions of several tests [8,9,10].Decrease percentage of surviving weaned young in rat fed a diet involving bacon irradiated by 55,8 k Gy dose had a percentage decrease in 28.7% in surviving weaned young as compared with non – irradiated diet [8,9,11].

The FDA and the national Research Council of the National Academy of Sciences collaborated with army scientists to promote new yields for magnificently extended animals feeding irradiated studies beef, pork, and chicken [12,13,9]. The location effects of ionizing electromagnetic radiation, until at cryogenic temperature, on the content of the water –soluble vitamins niacin , thiamin. Riboflavin and pyridoxine in meats is well documented [14,15,16,17].

Materials and Methods

The native chickens at weekly period of age 36-54 weeks chosen from local market .eighty healthy Thai

native cocks were distributed randomly into 4 groups of 20 cocks of each group . The chickens were ranching in the cages with free access to feed and water and exposure to the light for 15 hours per day . Collected semen of each group was obtained only twice a week by nean of the usual abdominal technique. Mean value of the two ejaculation inter the week of each group was considered as the average combined semen volume of the group from which the average semen volume brid/ ejaculation at that age level was calculated. The overall number of sperm /ejaculation was obtained by multiplying the semen concentration value with the average semen volume/brid/ejaculation.

Americium- 241 Properties:

Americium (^{241}Am) has energy 59.5 keV and the activity of radiation 50x10-6 Ci with exposure constant or gamma constant Γ= 0.013 R . m/h .Ci . Half life of these source equal 432 years and add to that the radiation source emit alpha particle pass through the grid of it with a few centimeter [18] .

Work System :

The system is made of ^{241}Am source of generating gamma radiation on the cocks chickens with 33, 42 and 75 (m Gy/h) . The irradiation of gamma a chive with 8 hours exposure daily for 40 days as in (figure 1) . The portable gigger counter was used to determine the radiation dose using in this job with R/h and covert to mGy/h . The detector has another uses such as the radiation dose of X-ray . Alpha, Beta released from the other environment as a type of radiation addition to gamma ray.

Experimental design:

1- All groups contain 80 cocks 20 cocks in 4 cages for each group and 4 cocks for each age in each cage .

2. First group contain 20 cocks given only food and water without irradiation (control) for 40 days

3- 2nd group contain given food and water and irradiated with low dose of gamma ray at 33 m Gy/h at 8h/day at 8h/day for 40 days

4- 3rd group given food and water and irradiated with dose of gamma ray at 42 m Gy/h at 8h/day for 40 days .

5- 4th group given food and water and also irradiated with gamma ray dose at 75 mGy/h at 8h/day for 40 days.

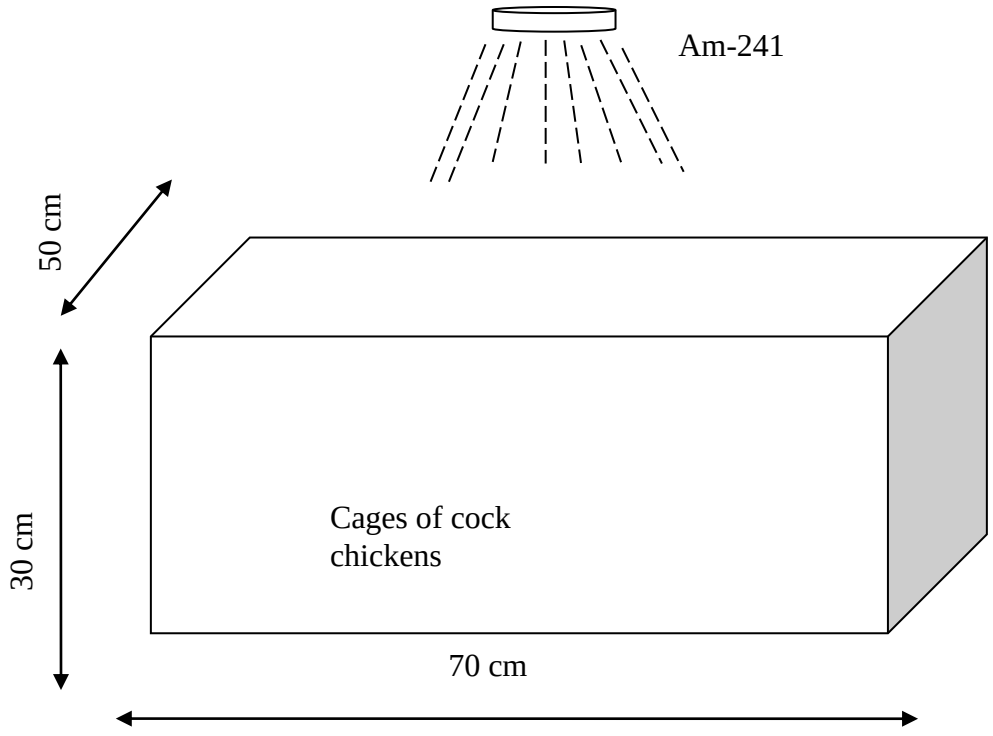

Fig 1 : set up of experimental

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Statistical analysis

In this experimental the completely randomized design (CRD) was used . All values obtained were analyzed with means of analysis of variance and the differences between means were compared by the method of Duncan's new multiple range test (Snedecor and Cochran,1980) [19].

Results :

All results of present work shown in the tables .

Table 1: semen concentration without irradiation (control) of cocks aged 36- 54 weeks for 40 days

age of Cock (weeks)	volume of Semen (ml/brid/ejac)	concentration of Semen Million cells/ml.)	Total sperm (million cells/ ejaculation)
36	0.37*bc±0.023	7005.5 cd±0.43	2592.03bc± 0..32
40	0.41a±0.044	7702.81bc±0.23	3158.15ab±0.21
44	0.40b±0.033	7876.90b±0.24	3150.76ab±0.31
48	0.40b±00.41	8012.23ab±0.12	3204.89 a±0.32
54	0.30c±0.034	8212.8a±0.31	2463.84bc±0.63

Table 2: semen concentration of cocks irradiated with gamma ray at dose tare 33 m Gy/h at 8 h/day day for 40 days

age of Cock (weeks)	volume of Semen (ml/brid/ejac)	concentration of Semen Million cells/ml.)	Total sperm (million cells/ ejaculation)
36	0.33c±0.021	6655.22bc±0.32	2196.22b±0.23
40	0.39a±0.03	7316.9ab±0.21	2853.59a±0.32
44	0.38b±0.042	7482.2ab±0.22	2843.23±0.22
48	0.38b±0.054	7611a.4±0.34	2892.33a±0.11
54	0.28cd±0.048	7802.16a±0.42	2184.60b±0.52

Table 3: semen concentration of cocks irradiated with gamma ray at dose tare 42 m Gy/h at 8h/day for 40 days

Age of Cock (weeks)	volume of Semen (ml/brid/ejac)	concentration of Semen Million cells/ml.)	Total sperm (million cells/ ejaculation)
36	0.32c±0.04	6304.5c±0.42	2017.44bc±0.62
40	0.36±a0.032	6932.07b±0.24	2495.5ab±0.55
44	0.35b±0.34	7088.4b±0.34	2480.94ab±0.42
48	0.35b±0.12	7210.8ab±0.33	2523.78a±0,53
54	0,27cd±0.56	7390.8a±0.55	1995.51cd±0.62

Table 4: semen concentration of cocks irradiated with gamma ray at dose tare 75b mGy/h at 8 h/day for 30 days

Age of Cock (weeks)	volume of Semen (ml/brid/ejac)	concentration of Semen Million cells/ml.)	Total sperm (million cells/ ejaculation)
36	0.32bc±0.032	6164.4d± 0.44	1972.48bcd±0.54
40	0.35a±0.54	6777.76cd±0.32	2372.21a±0.55
44	0.34ab±0.56	6931.67c±0.55	2356.76a±0.60
46	0.33b±0.64	7050.56ab±0.64	2326.68a±0.40
52	0.26c±0.66	7226.56a±0.66	1878.90cd±0.71

* mean ± S.D ** p=0.05 ***n=20 ****T=80

*mean and dstandared division in all tables are reported **Level of significant ($p<0.05$) as a,b,c,d between groups ***Nimber of animals in each group **** Total number of animals are used

Discussion:

From the table (1) we found the value of semen volume (ml/brid/ejac) , semen concentration (Million cells/ml) and total sperm (million cells/ejaculation) where significant increased obtained with increased the age of cocks in weeks. From the tables(2,3 and4) we found the effect of low dose of gamma ray with along time of irradiation as chronic dose with (33, 42 and 75 mGy/h) at 8h/day for 40 days . The value of semen volume , semen concentration and total sperm significant decreased ratio with increased the dose of irradiation gradually compared with control group (without irradiation).. the ratio of decreased of semen volume about (5-14%) and decreased ratio of semen concentration (5-12%).

The present work agree with the [20] which was study the comparison between gamma irradiation and plasma technology to improve the safety of cold sliced chicken . The results illustrate that gamma irradiation and plasma treatment had no real effect on the chemical composition of sliced chicken and the effects of these treatments on the microbial load are reduced the counts of total bacteria, psychrophilic bacteria, total molds and yeasts count.

Our results agree with [21] which was noticed that the effect of gamma ray emitted from Co-60 on the embryos development and also on the eggs of chicken and found the twelve abnormal embryos from eggs did not hatch been described . Also agree with [22] which found the gamma radiation effect on some blood factors of chickens as significant decrease in RBC,WBC,Hb andPCV with increase in irradiation time at 333 MBg/kg. Another study [23] was found the assessment in vivo of gamma ray and electron beam irradiation plus a commercial toxin binder as an anti-aflatoxin B1 in chicken model .

Conclusion

We found from this search the low dose of gamma ray as chronic dose for long time as 40 days impact on the physiological properties of sperm of cocks chicken , therefore the bulding of poultry must be far from the area or position of laborites of atomic or nuclear energy or radioactive materials store even at low dose of energy because of the pollutions can be produced in this chickens.

References

[1]. .Chambers JR: Genetics of growth and meat production in chickens. In Poultry breeding and genetics Volume 22. Edited by: Crawford RD. Elselvier Development in Animal and Veterinary Science series; 1990:599-644.

[2]. Brillard JP: Natural mating in broiler breeders: Present and future concerns. World Poult Sci J 2004, 60:439-445.

[3]. Decuypere E, Bruggeman V, Barbato GF, Buyse J: Growth and reproduction problems associated with selection for increased broiler meat production. In Poultry Genetics, Breeding and Biotechnology Edited by: Muir WM, Aggrey SE. Wallingford, UK: CABI; 2003:13-28.

[4]. Brillard JP: Practical aspects of fertility in poultry. World Poult Sci J 2003, 59:441-446.

[5]. Wilson HR, Piesco NP, Miller ER, Nesbeth WG: Prediction of the fertility potential of broiler breeder males. World Poult Sci J 1979, 35:95-118.

[6]. Ansah GA, Segura JC, Buckland RB: Semen production, sperm quality, and their heritabilities as influenced by selection for fertility of frozen-thawed semen in the chicken. Poult Sci 1985, 64:1801-1803.

[7]. Siegel PB: Genetics of behavior: Selection for mating ability in chickens. Genetics 1965, 52:1269-1277

[8]. Anonymous. 1968. Radiation and radiation sources. Food additives intended for use in processing of .canned bacon; Proposed revocation. Federal Register. 33:12055.

[9]. Raica, N., Jr., and R. W. Baker. 1972. The wholesomeness testing of radappertized, enzyme-inactivated beef. Proc. Symp. Radiation Preservation of Food, IAEA, Bombay, India. November 13-17. IAEA, Vienna, Austria, pp. 703-714.

[10]. Spiher, A. T. 1968. Food irradiation: An FDA report. FDA Papers, October.

[11]. Takeguchi, C. A. 1981. Irradiated foods - criteria for deregulation. FDA By-Lines 11(4):206-210.

[12]. Advisory Board on Military Personnel Supplies. 1975. ABMPS report no. 66, interm report, Task Group on Feeding Study Protocols, Committee on Food Irradiation, National Research Council. National Academy of Sciences, Washington, DC.

[13]. Baker, R. W., and H. K. Chandler. 1975. Animal feeding study protocol for irradiation sterilized test foods, U.S. Army Medical Research and Development Command, Washington, DC. Available: National Technical Information Service, Springfield, VA. PB84-186998.

[14]. Alexander, H. D., E. J. Day, H. E. Sauberlich, and W. D. Salmon. 1956. Radiation effects on water soluble vitamins in raw beef. Feder. Proc. 15:921-923.

[15]. Johnson, B. C , and V. C. Metta. 1956. Effect of irradiation sterilization on nutritive value of protein and energy of food. Feder. Proc. 15:907-909.

[16]. Josephson, E. S. 1983. Radappertization of meat, poultry, finfish, shellfish, and special diets, pp. 231-251. In E. S. Josephson and M. S. Peterson (eds.), Preservation of food by ionizing radiation, Vol. 3. CRC Press, Inc., Boca Raton, FL

[17]. Richardson, L. R., J. L. Martin, and S. Hart. 1958. The activity of certain water-soluble vitamins after exposure to gamma radiation in dry mixtures and in solutions. J. Nutr. 65:409-418.

[18]. IRSN Institute De Radioprotection Et De SORETE NUCLEAR ,.Principle emissions de I americium-241 . 2012. www.irsn.org. .pp.1-10.

[19]. Snecdecor, G. W. and W.G. Cochran. 1980.

[20]. Ahmed A. Aly and G.M.El-Aragi . Comparison between gamma irradiation and plasma technology to improve the safety of cold sliced chicken. Home Economic Department, Faculty of Specific Education, Benha University, Egypt. Plasma Physics and Nuclear Fusion Department, Nuclear Research Center, AEA, PO 13759 Cairo, Egypt. Accepted 31 October,

[21]. Sandvik Öystein . 1960. The effect of chronic radiation on the hatchabilty of chicken eggs . Institute of Animals breeding and Genetics , AGRICULTURAL COLLEGE OF NORWAY , VOLLEBEKK.

[22]. Simpraga M. , Tisljar M. Grabarevic, Vilic M.. and Kraljevic P. (2006). Clinical picture, haematological parameters and pathomorphological findings in fatting chickens after application of alethal quantity of 32P .VETERINARSKI ARHIV 76(6). 507-519.

[23]. Hasanpour S. Rahimi S. Makki O. F., Shahhosseini G. and Klireza A. 2017. In vivo assessment of gamma rays, electron –beam irradiation plus a commercial toxin binder (Milbond –TX) as an anti-aflatoxin B1 in chicken model . Iranian journal of Toxicology . Volume 12 . No 2 . March –April 2018.

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