The impact of sex-linked dwarf gene on hormonal reproductive profiles and biochemical traits in Iraqi dwarf roosters

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Abstract. The current experiment was aimed to explore the influencing of the sex-linked dwarf gene on some fertility hormones and biochemical profile in normal local and dwarf roosters. Thirty normal local and dwarf roosters at age 28 weeks were housed at opened system for 6 weeks. At end of 6th week, blood samples collected from all roosters and centrifuged to obtained sera for measuring the concentrations of Intersitial cell stimulating hormone 'ICSH', Follicle stimulating hormone 'FSH' and testosterone hormone, total protein, albumen, globulin, glutamic oxaloacetic transaminase 'GOT', Alkaline phosphatase 'ALP', and glutamic pyruvic transaminase 'GPT'. The statistical analysis documented significant (P<0.05) decline in FSH and testosterone hormone in dwarf group roosters compared with normal local roosters. As well as, the level of total protein and globulin registered significant decline (P<0.05) in dwarf group roosters in comparison with normal local group roosters. On the other hand, the level of hepatic enzymes, GOT, GPT and ALK, recorded a significant (P<0.05) elevation in dwarf group roosters when compared with normal local group roosters. Concluded, that the sex-linked dwarf gene could be affected on hormonal fecundity profile and some biochemical traits in dwarf roosters.

1. Introduction
During the past years, egg production and avian meat from layers and broilers in trade flocks has augmented gradually as a result of genetic selection in breeding flocks of avian breeding companies and exploiting that for improving trade crossbred offspring [1]. It must be preserved that, the recent breeding techniques for trade poultry focused on specific manufacture lines, resulting from intense collection of huge populations and little breeds with a genetically uniformity of the features under selection [2].

Poultry manufacture has been recognized as one method of gaining adequacy for providing proteins of animal source in the diet the Iraq, local chickens raised on backyard and village systems [3]. Small body and hardness of local chicken could help to adapt with the tropical environment and resistance to diseases [4,5]. Some article investigated the impact of main genes like frizzle, dwarfism, naked neck and slow feathering on performance, immunity, fertility and hatchability in chicken [6,7].

The biochemical profiles concentrate on blood chemical compositions and utilized in nutrition and genetic studies for avian like Japanese quail [8], chickens [9], bronze turkey [10], guinea fowl [11] and pigeon [12]. The blood traits help to identify of meat quality, specific genetic avian pathologies that
necessary for researches development in comparative poultry pathology and immunology [13,14]. Several studies on broiler chicks [15], Cobb broilers [16-19], laying hens [20-23] and local chicken [24] revealed that biochemical traits of chickens are interrelated with several aspects such as nutrition, gender, rearing temperature, stress situations and stocking density [24].

Because little information about dw gene effective on male fecundity and general health, this research was designed to investigate that influencing on hormonal reproductive profiles, total proteins and hepatic enzymes in local and dwarf roosters,

2. Materials and methods
Thirty dwarf and normal local roosters (aged 26 weeks) housed at animal field in Agriculture college-Kerbala University. They housed in opened system, they fed with diet has energy 2880 Kcal and protein level 17.6. Water provided as free.

After 6 weeks, blood was collected in tubes without anticoagulant and centrifuged at 5000 rpm for ten min for obtaining serum. The sera was kept in dry vials at -20 °C until using for determining concentrations of Follicle stimulating hormone, FSH, Interstitial cell stimulating hormone, ICSH, and testosterone hormone by ELISA test. The ELISA procedure for hormonal analyse in serum according to the manufacturer's guidelines (Wuhan Fine Technology). As well as, serum total protein and albumin concentrations were assayed by using [25] methodology, then concentration of globulin (g/100ml) was determining by: Globulin concentration = total protein concentration - Albumin concentration.

Serum level of glutamic oxaloacetic transaminase, GOT, glutamic pyruvic transaminase, GPT, and Alkaline phoshatase, ALP, were assayed according to [26].

2.1. Statistical analysis
The current data of all parameters were tested by complete random design (C.R.D). Significant changes between groups tested by L.S.D test at probability level 0.05 [27].

3. Results and discussion
The results of dw gen effects on some reproductive hormones were demonstrated in table 1. There were a significant lowering (P<0.05) in FSH and testosterone hormone concentrations in dwarf roosters comparing with local roosters. While ICSH percentage was not recorded significant differences (P>0.05) when compared between two roosters groups. That variations in hormonal profiles might be due to influence of dwarf gene on specific hormones that altered the level of fecundity hormones, several investigators proposed decreasing IGF-I level and low GH receptors 'GHR' had caused valuable effects on male fecundity [28,29], causing inhibition and/ or blocking the major processes that occurred in dwarf gonad's roosters like steroidogenesis, apoptosis and proliferation due to reduction of GH and IGF-1 action because it regarded as a potent factors for differentiating and growing processes in testes because that receptors located also in sertoli and leydig cells could be affected on primary spermatocytes which is important in normal steroidogenesis process [30]. As well as, IGF-I inhibition could depress gonadotropin releasing hormone 'GnRH' expression and releasing subsequently influencing on gonadotropin hormones production from adenohypophysis [31,32] which had influenced on spermatogenesis and testosterone secretion from sertoli and leydig cells, respectively [33,34] that may be explained the decline of serum gonadotropins hormones concentration in dwarf roosters in current results.

Besides, the indirect role of thyroids hormones might be caused changing on the fecundity hormones, because thyroids hormones in dwarf rooster was low normally that reflected on reproductive features, as reported by [35] who investigated that thyroid hormones could induce ICSH activity by feedback mechanism in castrated finch. Additionally, the decline the level of thyroids hormones could increase FSH and ICSH level, subsequently, that could be affected on spermatogenesis and testosterone level.
Table 1. Effect of genotype on fecundity hormones in dwarf and normal local roosters

| Parameters | FSH (miu/ml) | ICSH (miu/ml) | Testosterone hormone (ng/ml) |
|------------|--------------|---------------|------------------------------|
| Species    | Normal local roosters | 2.98 ± 0.03 A | 2.63 ± 0.07 A | 2.005 ± 0.04 A |
|            | Dwarf roosters     | 2.19 ± 0.04 B | 2.15 ± 0.03 A | 1.54 ± 0.03 B |

*Data denote to mean ± SE

*The dissimilar letters in the same column are significant differences at P<0.05

Table 2 illustrates the values results of serum total proteins (mg/ml) concentration in normal and local dwarf roosters. A significant elevation in total protein and globulin concentration were observed in normal local roosters as compared with dwarf roosters group. On other hand, non-significant changes were noted in means of albumin concentration (P>0.05) when compared between two roosters groups. The results obtained from the current research for serum total protein and globulin agreement with those finding by [36] who suggested that the utilization of metabolites from diet varied in birds depending on sex, breed, genetic factors and environment conditions, that reflected on the level of serum total protein and globulin concentrations, this affected on general immunity of bird, that might be explained the tolerance of bird to harsh conditions. As well as, the changes in current results might be attributed to high liver efficiency for protein synthesis in normal local due to variation in genotype of bird [15; 37]. The current finding same as the results of [38] who noted high concentration of serum total protein in normal local chicken when compared with another breed.

Table 2. Effect of genotype on some Biochemical parameters in dwarf and normal local roosters

| Parameters | Total protein (g/100ml) | Albumen (g/100ml) | Globulin (g/100ml) |
|------------|------------------------|------------------|-------------------|
| Species    | Normal local roosters  | 6.86 ± 0.03 A    | 3.20 ± 0.16 A     | 3.66 ± 0.13 A     |
|            | Dwarf roosters         | 5.37 ± 0.05 B    | 3.12 ± 0.15 A     | 2.37 ± 0.07 B     |

*Data denote to mean ± SE

*The dissimilar letters in the same column are significant differences at P<0.05

Table 3 showed the impact of genotype on liver enzymes of normal local and dwarf roosters. the statistical analysis referred to significant increasing (P<0.05) in mean values of ALP, GPT and GOT concentrations in dwarf roosters group comparing to value of normal local group. The ALP, GOT and GPT regarded as a biomarker indicator for liver functions, many articles suggested that there were a relationship between genetic and environmental factors that could play a major role in pathogenesis and phenotypic creation [39,40]. Furthermore, the hepatic functions could be affected genetically according to breeds like dwarf, layer leghorns and local chickens as reported by [41] who believed that the elevated levels of GOT, ALP and GPT might be for high hepatic capacity for fat deposition in dwarf chicken compared with local and layer line because the gene expression of hepatic enzyme varied according to inherited breed [42,43].

Table 3. Impact of genotype on hepatic enzymes percentage in normal and dwarf roosters

| Parameters | GOT (IU/mol) | GPT (IU/mol) | ALP (IU/mol) |
|------------|--------------|--------------|--------------|
| Species    | Normal local roosters | 63.53 ± 0.83 B | 6.0002 ± 0.18 B | 226.33 ± 1.53 B |
|            | Dwarf roosters     | 77.37 ± 0.70 A | 7.332 ± 0.25 A  | 248.08 ± 0.66 A  |

*Data denote mean ± SE

*The dissimilar letters in the same column are significant differences at P<0.05
4. Conclusions
The results accomplished from current experiment proved that the sex-linked dwarf gene influenced on general health of bird by affected on fecundity hormones and some biochemical characters like hepatic enzymes, total protein and globulin that influenced on immunity of bird subsequent pathological resistance. In future, some experiments necessary to determine dw gene actions on female reproductive gene expression.

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