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BLOOD BIOCHEMICAL AND SEMEN QUALITY PROFILE IN TRANSGENIC LOCAL CHICKENS

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ABSTRACT

The present study was carried out to introduce foreign DNA from pituitary gland of broiler breeder chickens (BB-DNA) or Japanese quails (JQ-DNA) individually into the embryonic cell of Gimmizah chickens, in order to determine the effect of transformed chicken embryos with foreign DNA on blood hematology and biochemical traits, as well as semen characteristics. The results revealed that :

1- There was no significant (P<0.05) effect of foreign DNA source or level on all blood picture (Hb, RBCs and WBCs) except PCV%. Both BB-DNA and JQ-DNA significantly increased PCV compared to the control group (31.75 vs. 32.17).

2- The BB-DNA significantly increased serum total protein (5.4 g/dl) and globulin (3.5 g/dl) compared to JQ-DNA and the control group. Serum albumin of the control group was significantly higher than those of JQ-DNA and BB-DNA origin.

3 - Serum glucose of JQ-DNA chicks was significantly lower than those of BB-DNA and the control group. Serum cholesterol level of JQ-DNA chicks was significantly lower than those of BB-DNA and the control group.

4- The BB-DNA significantly increased ejaculated volume of trangenic cocks (0.37 ml) compared to those of JQ-DNA (0.26 ml) and the control group (0.23 ml). Sperm concentration and live sperm of JQ-DNA cocks was significantly higher than those of BB-DNA and the control group.

5- Abnormal sperm percentage of JQ-DNA was significantly lower than BB-DNA and the control group, respectively. The 4 µg of JQ-DNA significantly decreased dead sperm compared to 1 µg and 2 µg, respectively.

***In conclusion*, Sperm concentration and live sperm were significantly increased due to production of genetically transformed cocks from BB- and JQ- sources. There was an increase in the globulin and total proteins concentration of transgenic chicks compared to control group.**

Key words : Blood , Biochemical, Semen , Transgenic , Native chicks.

INTRODUCTION

The application of the molecular basis of many genetic traits to the global industry through transgenic technology holds considerable promise for improving the profitability and quality of commercial poultry stocks and for the development of novel uses for different classes poultry (Petitte *et al*.,1990). Therfore, a number of different approaches have been developed for avian trasgenesis (Sang, 1994) including the use of replication competent and replication – defective retoviral vectors, direct injection of DNA into the cytoplasm of the germinal discs, and transfection of blastodermal cells or primordial germ cells (Murray *et al*., 1999).

Micro-injection of DNA may have several advantages that were reported by several workers. Ahamed (1999) found that injection of incubated Montazah eggs at the third day of incubation by DNA of pituitary gland from either broiler chikens or turky at 1, 2 and 4 ug dose/ egg, represented a good technique by which transgenic chickens can be produced with adequate percentages. He added that introducing of foreign DNA in early stage of incubation had different expressions on protein synthesis in chikens produced under the same enironmental conditions. Tag (2001) injected DNA either from Muscovy ducks or Fayoumi chickens into White Leghorn and Norfa embryo cells. She found that the chromosomal changes in transfused embryos with foreign DNA were higher than control treatment.

El – Naggar (2002) studied the introduction of functional genes from bacteria (*Streptococcus agalactia*) or adrenal gland from nacked

neck chickens, through its fragmented purified DNA into embryonic cell of japanese quail (*Coturnix Coturnix japonica*). This results revealed the superiority of transgenic quail chicks specially under heat stress conditions. Abd El-Hamid *et al*. (2003) postulated that it would be possible to obtain trnasgenic chickens producing low cholesterol eggs through the injection of fertile eggs with 10 and 20 ug *Yarrowi lipolytica* DNA/egg. Also it might be beneficial to reduce the cholesterol concentration in serum and lipid meat content whithout any detectable pathological changes and damage in liver tissues. Therefore, the present study was carried out to introduce foreign DNA from pituitary gland of broiler breeder chickens or Japanese quails individually into the embryonic cell of Gimmizah eggs, in order to determine the effect of transgensis on blood hematology, biochemical traits, and semen characteristics.

MATERIALS AND METHODS

The experimental work of this research was carried out in Animal and Poultry Production Department, Faculty of Agriculture, Damanhour branch, Alexandria University, throughout the period from 2003 to 2005.

The present study was conducted as an attempt to introduce functional pituitary gland genes through its fragmented DNA (Davison,1959), either from Japanese quails or Hubbard broiler breeders into embryonic cells of Gimmizah local strain of chickens. The effects of these treatments on the semen characteristics and blood parameter traits were investigated.

Isolation and purification of DNA:

High molecular weight DNA was extracted from the pituitary glands of Japans quails (JQ) and broiler breeders (BB) according to the method of Sambrok *et al.* (1989) with some modifications according to Abdel-Fattah (1995) and Abdel- Hamid *et al.* (2002). The DNA concentration was estimated from the optical density (O.D) reading of U-V-Spectrophotometer at wave length of 260 nm (1.0 O.D. = 50 µg DNA / ml of the solution) according to Charles (1970). Generally, the DNA purity was determined by using the ratio of 260

nm /280 nm. The reading values being 1.6 to 2.0, indicate that DNA solution is well purified from protein (Charles, 1970), DNA was stored till use at –20 ^{o}C.

Egg treatments :

Six-hundred fertile eggs of Gimmizah chicken strain were used in this study. All eggs were incubated at 37.8^{o}C in forced draft Incubator. At the 3rd day (72 hours) of incubation, the fertile eggs were assigned randomly into different groups according to the source of foreign DNA as fallowing :-

1- Quails DNA groups : Eggs were injected with 1,2 and 4 µg quail DNA / egg extracted from pituitary gland.

2- Broiler breeders DNA groups : Eggs were injected with 1 and 2 µg broiler breeders DNA / egg extracted from pituitary gland.

3- Control groups: There were three types of control groups:

a- Eggs without any treatment

b- Eggs drilled and sealed with paraffin without any injection to detect any possible effect of the drilling technique.

c- Eggs drilled and injected with Tris EDTA buffer solution by the same volume**.**

Flock Husbandry :

Hatched chicks were wing banded at hatch as to the corresponding DNA treatment and brooded in floor brooders. The starting temperature was 34 ^{o}C for the first week, then decreased at 2 ^{o}C every week. Chicks were fed a starting diet of 21% protein and 2700 kcal/kg, till 8 wk of age. Pullets and cocks were fed a grower diet of 18% protein and 2700 kcal/kg, from 8-21 wk of age and an adult diet of 17% protein and 2800 kcal/kg, from 21 to the end of the experiment. Feed and water were provided *ad libitum* to all chicks.

I- Hematological parameters

At 12 weeks of age, heparinated blood samples were taken randomly from the wing – vein from 5 birds from each treated group at 9.0 am before access to feed and water. Samples of both serum and plasma were used for determination of hematological and biochemical parameters. Serum and plasma were obtained by centrifugation of

blood at 3000 (rpm) for 20 minutes and were stored at –20 ^{o}C for later analysis.

Hemoglobin concentration was determined by the cyanomethemoglobein method (Eilers, 1967). **Hematocrit values:** Blood samples were centrifuged for 20 minutes at 4000 (rpm), then Hematocrit values were measured by reading the packed cell volume on a special graduated hematocrit measurements**. Red blood cell (RBC) and White blood (WBC) counts** were counted on an Ao bright line hemocytometer using a light microscope according to the method of Britton (1963) and Seiverd (1964).

II - Biochemical parameters

Total plasma glucose concentration was measured by the method of Trinder (1969). Serum Total protein was measured by the Biuret method as described by Armstrong and Carr (1964). Albumin concentration was determined according to the method of Domuas *et al.* (1977). Globulin concentration was estimated by subtraction of albumin concentration from serum total protein value according to Coles (1974). Total serum cholesterol was determined according to the method of Watson (1960).

III - Semen Quality:

At six month of age, semen was collected weekly from each cock by the massage method, squeezing the capulatary organs to obtain semen as described by Lake (1971) and Lake and Stewart (1978). Soon after semen was collected, each ejaculate was examined for the following semen characteristics:

1- The ejaculated volume was measured to the nearest 0.1ml, using the graduated collecting tube.

2- Sperm concentration was measured by Thoms-Zeis heymocytometer for counting the sperms per milliliter.

3- Number of sperm per ejaculate/10^{9}

4- Percentages of live, abnormalities and dead sperms:

The stained slides by eosine and nigrosin were used to calculate the total percentages of live, abnormalities and dead sperms in the samples.

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IX- Statistical Analysis :

Data for the present study were subjected to factorial analysis of variance (Snedcor and Cochran, 1980) using different DNA sources, levels of injection, and sex as main factors. Numbers of preliminary analyses were done using the least squares procedures and the type III method being described by the Statistical Analysis System (SAS, 2002). Significance of the effects were tested appropriate F statistics.Testing the significance between the 3 control groups was done for all dependent variables using the following model:

$$Y_{ij} = \mu + C_i + e_{ij}$$

Where

Y_{ij} = The J^{th} observation in the I^{th} control class,

μ = Overall mean,

C_i = Fixed effect of the I^{th} control class,

e_{ij}= Random error,

However, no significant effect ($P>0.05$) was detected between them for most of the studied traits under investigation. Therefore, they were all pooled for comparison against different DNA sources on the whole average.

$$Y_{ijkl} = \mu + S_i + l_{ij} + X_{ijk} + e_{ijkl}$$

Where

Y_{ijkl} = the L^{th} observation in the K^{th} sex of the j^{th} level in the i^{th} DNA source,

μ = Overall mean,

S_i = Effect of the i^{th} DNA source,

L_{ij} = Effect of the J^{th} level in the i^{th} DNA source,

X_{ijk} = Effect of the K^{th} sex within the j^{th} level within the i^{th} DNA source, and e_{ijkl} = Random error.

The sex was deleted from the model when data on both sexes were not available.

RESULTS AND DISCUSSIONS

Blood hematology :

Results listed in (Table 1) showed the effect of introducing foreign DNA of different sources and levels into chicken embryos at

the 3rd day of incubation on the blood picture namely packed cell volume percentage (PCV%), hemoglobin concentration (Hb), red blood corpuscles (RBCs×10^6) and white blood corpuscle (WBCs×10^3).There was no significant (P<0.05) effect of foreign DNA source or level on all blood picture (Hb, RBCs and WBCs) except PCV% .

PCV:

Introducing, either JQ- DNA or BB- DNA significantly (P<0.05) increased PCV% on the average transgenic chicks with 35.1-36.9% more than control group (32.17 & 31.75 vs. 23.5%), respectively.

However, increasing DNA level to 2 µg of BB-DNA significantly (P<0.05) increased PCV% with 9.5% more than the 1 µg (36.5 vs. 27%). On the contrary , chicks having JQ- DNA at different levels did not show any change (P<0.05) in PCV%.

The value of the control group was less than those reported by Elnaggar et al. (2001) (30.49-36.73%), also with averages of PCV reported by Atta (2002) (24.1- 35.7%) at the 4th wks of age, and transgenec Bandara chicks (Abd El-Aziz, 2006). The later author noted approximately equal values of PCV% of either bursa-DNA and control groups (34.8 and 34.9%, respectively) while that of thymus-DNA had the lowest average (34.4 %).

Hb:

Averages of Hb followed the same trend of PCV% where BB-DNA had higher Hb (10.83 %) compared to both of JQ-DNA and control groups.

Hb% ranged from 9.67 for low level of BB-DNA and control group, to 12.0 for the high levels of the same source. The results of the control group were less than the range of estimates found by El-Naggar et al. (2001), but were higher than those of Atta (2002) (6.46 and 8.99 g/100 ml blood at 4 wks of age). Non significant effect of transgenesis on Bandara chicks was also found by Abd El-Aziz (2006).

RBC:

Also, BB-DNA group had higher average -but not significantly- of RBC's (4.01x 106) than both JQ-DNA and control groups (3.91

and 3.60 x106, respectively. The average value of Gimmizah control group were within the range reported by by Hamdy et al. (2003) who reported higher estimates of RBCs (3.2-5.4 X106/mm3 and 3.5- 5.7 X106/mm3) at the wk 6th and 7th, respectively. As for the transgenic group, Abd El-Aziz (2006), also, reported no significant effects of treatments on this trait, and recorded higher averages compared the results reported herein while RBC,s of bursa-DNA of JQ group was (4.31X103) and thymus-DNA was (4.26X103).

WBC:

The results presented in Table 1 showed that both JQ- and BB-DNA groups had more WBC's counts, but not significantly (22.72 and 22.4101X106, respectively), than chicks of the control group. These findings were within the range found by Hamdy et al. (2003) (14.9 to 23.6 X103/mm3) and (18.7 to 25.4 X103/mm3) at the wk 6th and 7th wk, respectively, concerning average of control group. As for the transgenic group, Abd El-Aziz (2006) noted that both bursa and thymus JQ-DNA chicks had less WBC's (23.8X103) compared to that of control chicks (26.5X103), while thymus-cell group had significantly the highest count of WBC's (33.3X103) compared to the other treatments.

Blood parameters :

1- Serum proteins :

The mean values of serum globulin, albumin, and total protein of different DNA treatments and levels are shown in (Table 2). The results showed significant differences among the different DNA sources for all the previously mentioned traits, but only significant differences due to BB- DNA level for albumin concentration were found.

Transgenic chicks of either sources (JQ-DNA or BB- DNA) had a lower ($P<0.05$) albumin concentration (1.7 & 1.8 g/ml), respectively, than the control group (2.1 g/ml). On the other hand, BB-DNA injection to embryonated eggs, significantly increased both total protein (5.4 g/ml) and globulin (3.5 g/ml) of adult transgenic chicks than those of JQ- DNA source (3.1 and 4.8 g/ml), respectively, compared to the control group (2.4 and 4.5 glml). Increasing the

broiler DNA level (2 µg) significantly increased serum albumin concentration (2.0 g/ml) than the 1 µg level (1.g/ml).

Neither JQ- nor BB-DNA levels affected serum total protein (Table 2). It could be concluded that BB-DNA significantly increased serum total protein and globulin compared to both JQ-DNA and control groups. However, JQ-DNA group had significantly higher values than the control group.

Generally, the values of serum proteins obtained in this experiment were closer to those recoded by Ahmed (1999) while working on Montazah transgenic chicks and Abd El Aziz (2006) on Bandarah strain, but lower than the corresponding values in New Hampshire Red chicks (Brandt *et al*., 1951), and broiler chicks (El-Hindawy *et al*., 1997) and El-Eraky and El-Sadawy, 1997). In addition, the increased globulin and total proteins of transgenic chicks over control group would be due to increased response of growth hormone of birds subjected to foreign DNA which stimulates overall DNA, RNA, and protein synthesis in the animal body (Grodsky, 1977).

2- Serum total albumin and Globulin:

The averages of serum total albumin for different treatments groups were 1.93 and 2.06 g/100ml for both DNA injected and control groups. These averages were nearly equal to those recorded by Ahmed (1999) but less than those reported by Abd El-Aziz (2006) concerning bursa- , thymus-DNA and control groups (4.23, 2.65 and 4.33 g/100ml, respectively). Moreover, level by source interaction for different types (DNA vs. cells) for both serum total albumin and globulin concentration were not significant. Total albumin decreased as DNA level increased to either 2 or 4 µg with no significant differences and the same trend was found concerning bursa DNA groups while globulin concentration increased as thymus-DNA level increased.

Glucose and cholesterol :

The mean values of serum glucose, and cholesterol of different DNA treatments and levels injected are presented in (Table 2). The results showed significant differences among all traits for the two

trails. Injected JQ-DNA significantly (P<0.05) decreased glucose level in serum (159.1 mg/100ml) compared to both BB-DNA sources (176.3 mg/100ml) and the control group (191.3 mg/100ml). Concerning cholesterol concentration, there was no significant difference between the overall means of either JQ or BB- DNA sources , however, significant differences were found between control group and both treatment groups (Table 2). Although there was a significant effect of DNA level on both glucose and cholesterol concentrations, no specific trend would be driven concerning the increase or decrease of JQ or BB- DNA levels on the two traits. Serum glucose level of group injected with 4 µg JQ-DNA, was significantly lower (139.9 mg/100ml) than 1 µg (147.6 mg/100ml) and 2 µg (189.9 mg/100ml). On the other hand, the 2 µg BB-DNA level decreased glucose level by 21.3% compared to the 1 µg level. Different findings were noticed for cholesterol level than those of serum glucose. The 1 µg BB-DNA level significantly decreased serum cholesterol level (95.9 mg/100ml) more than the 2 µg level (110.7 mg/100ml), but increasing level of JQ-DNA increased plasma cholesterol with no significant differences between the 2 µg and 4 µg DNA levels.

Generally, the mean values of serum glucose and cholesterol obtained in the present study were closer with those recorded by Ahmed (1999) for transgenic Montazah chicks (121.04 – 122.44 mg/100ml), but lower than those for White Leghorn chicks at the same age (Tapper and Kare, 1960) and broiler chicks (El-Eraky and El-Sadawy, 1997). Moreover, Abd El Aziz (2006) estimates where higher compared to the results reported in this study, significant increase for serum cholesterol was only found between transgenic groups of either DNA sources (bursa or thymus) compared to control one (31.9 and 24.9%), however, there was a significant decrease in serum cholesterol due to increasing DNA level (4µg vs. 1 and 2 µg) 118.03 vs. 144.99 and 132.43mg/100ml, respectively. The considerable variation among previous investigations would be related to the differences in DNA source, strain, determination method, or physiological status.

Semen characteristics :

The least squares means and standard errors for different semen characteristics (volume, concentration, number of sperm/ejaculated,

sperm live, abnormal and dead percentages) of transgenic cocks subjected of different DNA sources and levels, are presented in Table 3. It was noticed that BB- DNA significantly (P<0.05) increased the semen volume (0.37cm) and the number of sperm/ejaculated (0.42 $x10^9$) of transgenic cocks on the whole average, more than JQ- DNA (0.28 and 0.33 $x10^9$) and control groups (0.23 and 0.22 $x10^9$), while JQ-DNA significantly increased sperm concentration (1.2 $x10^9$) compared to those of BB- DNA and control group (1.15 $x10^9$ and 0.95 $x10^9$), respectively.

Although, transgenic cocks having JQ-DNA ejaculated lower semen volume and lower number of sperm/ejaculated than those of BB-DNA ones, they were significantly higher than the control group, and their semen contained the least abnormal (7.56 %) and dead sperm percentages (5.30 %), as well as showed the higher live percentages (87.1%) than both BB- DNA (9.21, 5.60 and 85.2%) and control cocks (9.76, 7.20 and 83.1%) of the aforementioned traits, respectively.

Abd El-Aziz (2006) showed insignificant effects of source, type and level of treatments on semen characters except that of percentage of live and dead sperms which were affected by type of treatments. Also, she found closer range of semen volume were found (from 0.06 ml for bur-DNA (1µg/egg) group to 0.48 ml being realized by bur-DNA, 2 µg/egg) while control group had medium value (0.20 ml). In addition, transgenic Bandara cocks subjected to thy-DNA had significantly (p<0.05) higher values (55 %) than the control group.

Moreover, advantageously increasing DNA level of JQ- origin significantly (P<0.05) increased sperm live percentages by (1.76 & 4.73%) of transgenic cocks and decreased both abnormal and dead sperms percentages (Table 3), and those of BB- origin increased (P<0.05) semen volume by (60.9 %) and decreased (P<0.05) percentages of dead sperms by (22.2 %). On the contrary, high level of BB-DNA decreased semen concentration (13.0%) and sperm live percentage (2.42%), with no marked (P>0.05) effect on sperm abnormality percentages. Un-explainable increasing JQ-DNA level decreased sperm abnormality percentages (20.2 & 40.0%) with no significant effect on dead sperm%, semen volume and concentration and number of sperm per ejaculate.

Abd El-Aziz (2006) found that maximum average of sperm concentration was $0.93x10^9$ sperm/ml for thy-DNA (4µl/egg) and maximum average of number per ejaculate was $3.46x10^8$ sperms/ejaculate for bur-DNA (2 µg) while control group averages were 0.56X109 sperm/ml and $1.12x10^8$ sperms/ejaculate for the two traits, respectively

In conclusion, sperm concentration and live sperm were significantly increased due to producing genetically modified cocks from BB- and JQ- by injection as little as 1 µg DNA. In addition, BB-DNA significantly increased ejaculate volume especially at 2 µg DNA compared to JQ- and control groups. Moreover, not only 2 µg BB-DNA increased ejaculate volume but also sperm motility, an effect which was associated with higher semen volume, and sperm abnormalities, as well as lower sperm mortality and semen concentration. There is a little information available in literature on the effect of transgenesis on semen quality (characteristics). However observed genetic polymorphism may be due to variation between different transgenic cocks having different DNA sources of levels.

The semen characteristics values (volume, concentration, abnormal and dead sperm) reported here for Gimmizah control group (0.23, 0.95 x 10^9, 9.76 and 7.20) were lower than the corresponding values recorded by Hanafi (2001) (0.21, 1.55 x 10^9, 8.8 and 24.2) except that the volumes ejaculated were higher than Hanafi (2001). Also El-Sahn (2002) found the higher semen volume (0.32 x 10^9) and concentration (2.1 x 10^9) but lower in abnormality (7.17 x 10^9) and dead sperm % (6.85 x 10^9) sperm, than the coresponding values, reported here.

While results in this study showed that genetically modified cocks with JQ-DNA origin increased percentage of live sperms (87.10%) than those of BB origin (85.24%) and control group (83.10%), higher estimates were reported by Abd El- Aziz (2006) were her results were in range of (65.00 to 95.88%) for thymus and bur-DNA at 2 µl/egg, while the control group had high average of live sperm (92.39%).

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Table (1): Least-squares means ± standard errors (SE) for blood hematology of transgenic chickens as affected by different sources and levels of DNA.

DNA		PCV %	Hb	RBC (10^6)	WBC (10^3)
Source	**Level µg**				
J.Q.	1	30.5 ±2.88 [a]	10.17±1.04 [a]	3.85 ± 0.46 [a]	22.33 ± 0.84 [a]
	2	33.0 ± 2.90 [a]	11.0 0 ± 1.04 [a]	4.10 ± 0.48 [a]	23.83 ± 0.83 [a]
	4	33.0 ± 2.90 [a]	10.17 ± 1.04 [a]	3.78 ± 0.43 [a]	22.00 ± 0.84 [a]
Overall mean		**32.17 ±1.66[A]**	**10.44 ± 0.60[A]**	**3.91 ± 0.23[A]**	**22.72 ± 0.48 [A]**
B.B.	1	27.0 ± 2.88 [b]	9.67 ± 1.04 [a]	3.60 ± 0.36 [a]	21.83 ± 0.84 [a]
	2	36.5 ± 2.90 [a]	12.0 ± 1.04 [a]	4.45 ± 0.32[a]	23.0 0 ± 0.83[a]
Over all mean		**31.75 ±2.04[A]**	**10.83 ± 0.73[A]**	**4.01 ± 0.28[A]**	**22.41 ± 0.060[A]**
Control over all mean		**23.5 ± 2.88 [B]**	**9.67 ± 1.04[A]**	**3.60 ± 0.40[A]**	**22.17 ± 0.84[A]**

a-d different litters within DNA source and between different levels are significant($p<.05$).

A-B different litters between over all means are significant ($p<.05$).

J.Q. = Japanese Quail. B.B. = Broiler Breeder

Table (2): Least-squares means ± standard errors (SE) for some blood chemical constituents of transgenic chickens as affected by different sources and levels of DNA.

DNA		Total protein (g/100ml)	Globulin (g/100ml)	Albumin (g/100ml)	Glucose (mg/100ml)	Cholesterol (mg/100 ml)
Source	Level µg					
J.Q	1	4.9±0.10[a]	3.2±0.12[a]	1.7±0.12[a]	147.6±2.5[b]	84.9±3.8[b]
	2	4.7±0.11[a]	2.9±0.11[a]	1.8±0.10[a]	189.9±2.6[a]	107.9±3.9[a]
	4	4.9±0.10[a]	3.2±0.10[a]	1.7±0.11[a]	139.9±2.6[c]	103.2±3.7[a]
Overall mean		**4.8±0.1[B]**	**3.1±0.11[B]**	**1.7±0.11[A]**	**159.1±1.5[C]**	**98.7±2.3[B]**
B.B	1	5.2±0.21[a]	3.5±0.12[a]	1.7±0.12[b]	197.3±2.7[a]	95.9±4.2[b]
	2	5.6±0.20[a]	3.5±0.11[a]	2.0±0.11[a]	155.3±2.8[b]	110.7±4.3[a]
Overall mean		**5.4±0.1[A]**	**3.5±0.11[A]**	**1.8±0.1[A]**	**176.3±1.9[B]**	**103.3±2.9[B]**
Control overall mean		**4.5±0.1[C]**	**2.4±0.1[C]**	**2.1±0.1[B]**	**191.3±1.7[A]**	**118.3±2.5[A]**

a-d different litters within DNA source and between different levels are significant($p<.05$).

A-C different litters between over all means are significant ($p<.05$).

J.Q. = Japanese Quail. B.B. = Broiler Breeder

Table (3): Least-squares means ± standard errors (SE) for semen characteristic of transgenic chickens as affected by different sources and levels of DNA.

DNA		Volume (cm)	Concentration (10^9)	Number of sperm per ejaculated (10^9)	Live %	Abnormal %	Dead %
Source	Level µg						
J.Q.	1	0.25±0.20[a]	1.20±0.01 [a]	0.30±0.02 [a]	85.18±0.24[c]	9.45±0.18 [a]	5.37±0.11[a]
	2	0.30±0.21[a]	1.20±0.01 [a]	0.35±0.03 [a]	86.71±0.21[b]	7.54±0.18 [b]	5.76±0.16[a]
	4	0.27±.022[a]	1.20±0.01 [a]	0.33±0.02 [a]	89.41±0.22[a]	5.67±0.20 [c]	4.90±0.14[b]
Overall mean		**0.28±0.013[B]**	**1.20±0.06 [A]**	**0.33±0.01 [B]**	**87.1±0.14[A]**	**7.56±0.011[B]**	**5.30±0.10[B]**
B.B.	1	0.34±0.021[b]	1.23±0.03 [a]	0.41±0.03 [a]	86.23±0.24[a]	8.86±0.18 [a]	4.91±0.16[b]
	2	0.41±0.021[a]	1.07±0.02 [b]	0.44±0.02 [a]	84.14±0.24 [b]	9.56±0.20 [b]	6.30±0.16[a]
Overall mean		**0.37±0.015[A]**	**1.15±0.008[B]**	**0.42±0.02 [A]**	**85.24±0.17[B]**	**9.21±0.13 [A]**	**5.60±0.11[B]**
Control overall mean		**0.23±0.022[B]**	**0.95±0.01[C]**	**0.22±0.03 [C]**	**83.1±0.24 [C]**	**9.76±0.19 [A]**	**7.20±0.16[A]**

a-d different litters within DNA source and between different levels are significant($p<.05$).
A-C different litters between over all means are significant ($p<.05$).
J.Q. = Japanese Quail. B.B. = Broiler Breeder

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الملخص العربي

صفات الدم البيوكيميائية وجودة السائل المنوي في الدجاج المحلي المحور وراثيا

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أجريت هذه الدراسة بقسم الإنتاج الحيواني والدا جنى - كلية الزراعة - فرع دمنهور - جامعة الإسكندرية خلال الفترة من عام 2003 حتى 2005 وذلك لدراسة تأثير الحقن بالمادة الوراثية DNAالمعزولة من الغدة النخامية من السمان الياباني أو أمهات كتاكيت اللحم في البيض المخصب لسلالة الجميزة المحلية عند عمر 72 ساعة من بداية التفريخ وتأثيرها على بعض صفات الدم الطبيعية (عد كرات الدم الحمراء والبيضاء وحجم كرات الدم الحمراء وتركيز الهيموجلوبين فى الدم) و الكيموحيوية(البروتين الكلي ونسبة الألبيومين والجلوبيولين والجلوكوز والكوليسترول) و صفات السائل المنوي للذكور خلال فترة النمو(عند عمر 12 أسبوع) .

و كانت أهم النتائج ما يلي :

بعض صفات الدم الطبيعية و البيوكيميائية:

1- أدي الحقن بالمادة الوراثية لأي من أمهات كتاكيت اللحم أو السمان الياباني إلي زيادة معنوية في قيمة PCV بمعدل35.1و36.9 % علي التوالي مقارنة بالمجموعة المقارنة.
2- أدي الحقن بالمادة الوراثية لأمهات كتاكيت اللحم إلي زيادة نسبة البروتين الكلى فى السيرم بمعدل12.5و20 % على الترتيب مقارنة بالمادة الوراثية للسمان والمجموعة المقارنة. أيضاً المادة الوراثية لأمهات كتاكيت اللحم ادت إلي زيادة معنوية في نسبة الجلوبيولين فى السيرم مقارنة بالمادة الوراثية للسمان والمجموعة المقارنة بمعدل 12.9و45.8% على التوالى.
3- أدي الحقن بالمادة الوراثية للسمان اليابانى إلي خفض معنوي في نسبة الجلوكوز فى السيرم مقارنة بكل من المادة الوراثية لأمهات كتاكيت اللحم والمجموعة المقارنة.
4- أدي الحقن بمستوى 4 ميكروجرام من المادة الوراثية للسمان اليابانى إلي خفض معنوي في نسبة الجلوكوز فى السيرم بمعدل5.2و26.3 % على الترتيب مقارنة بمستوى 1 ميكروجرام ومستوى 2 ميكروجرام.
5- أدي الحقن بمستوى 2 ميكروجرام من المادة الوراثية لأمهات كتاكيت اللحم الى خفض معنوي في نسبة الجلوكوز بالسيرم بمعدل21.3 % مقارنة بمستوى 1 ميكروجرام.
6- أدي الحقن بالمادة الوراثية للسمان الياباني إلي خفض معنوي في تركيز الكوليسترول فى السيرم بمعدل4.5و16.6 % علي التوالي مقارنة بالمادة الوراثية لأمهات كتاكيت اللحم والمجموعة المقارنة.

7- أدي الحقن بالمادة الوراثية لأي من أمهات كتاكيت اللحم أو السمان الياباني إلي زيادة معنوية في قيمة PCV بمعدل35.1و36.9 % علي التوالي مقارنة بالمجموعة المقارنة.

بعض صفات السائل المنوى:

1- أدي الحقن بالمادة الوراثية لأمهات كتاكيت اللحم إلي زيادة معنوية في حجم القذفه بمعدل32.1و60.8 % على الترتيب مقارنة بالمادة الوراثية للسمان الياباني والمجموعة المقارنة. ادى أيضاً الحقن بمستوى 2 ميكروجرام من المادة الوراثية لأمهات كتاكيت اللحم إلي زيادة معنوية في حجم القذفه بمعدل 20.6% مقارنة بمستوى 1 ميكروجرام.

2- أدي الحقن بالمادة الوراثية للسمان الياباني إلي زيادة معنوية في تركيز الحيوانات المنوية لكل مل مقارنة بالمادة الوراثية لأمهات كتاكيت اللحم والمجموعة المقارنة وأدي كذلك الحقن بمستوى 1 ميكرجرام من المادة الوراثية لأمهات كتاكيت اللحم إلي زيادة معنوية في تركيز الحيوانات المنوية مقارنة بمستوى 2 ميكرجرام كذلك ادى الحقن بالمادة الوراثية لامهات كتاكيت اللحم الى زيادة معنوية فى عدد الحيوانات المنوية لكل قذفة مقارنة بالمادة الوراثية للسمان اليابانى و امهات كتاكيت اللحم.

3- أدي الحقن بالمادة الوراثية للسمان الياباني إلي زيادة معنوية في نسبة للحيوانات المنوية الحية بمعدل2.2و4.8 % على الترتيب مقارنة بالمادة الوراثية لأمهات كتاكيت اللحم والمجموعة المقارنة.

4- أدي الحقن بالمادة الوراثية للسمان الياباني إلي خفض معنوي في نسبة الحيوانات المنوية المشوهة مقارنة بالمادة الوراثية لأمهات كتاكيت اللحم والمجموعة المقارنة.

5- أدي الحقن بمستوى 4 ميكروجرام من المادة الوراثية للسمان الياباني إلي خفض معنوي في نسبة الحيوانات المنوية المشوهة بمعدل1.87و3.78 % علي التوالي مقارنة بمستوى 2 ميكروجرام وبمستوى 1 ميكروجرام.

6- أدي الحقن بمستوى 4 ميكروجرام من المادة الوراثية للسمان الياباني إلي خفض معنوي في نسبة الحيوانات المنوية الميتة بمعدل 8.7و14.9 % علي التوالي مقارنة بمستوى 1 و 2 ميكروجرام.

من هذة الدراسة يمكن استخلاص أن استخدام طريقة نقل المادة الوراثية المستخلصة من الغدة النخامية للسمان الياباني او لامهات دجاج اللحم أدت إلي تحسين الصفات االفسيولوجية وصفات السائل المنوى لسلالة الجميزة موضع الدراسة مما يتيح الفرصة من استخدامها كوسيلة فعالة لتحسين المقدرة التناسلية والفسيولوجية في السلالات المحلية.