COMPARATIVE STUDIES ON SOME PRODUCTIVE CAPABILITIES AMONG IMPORTED, ENDOGENOUS AND NATIVE RABBIT BREEDS UNDER EGYPTIAN ENVIRONMENTAL CONDITIONS

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Abstract

This study was aimed to evaluate some productive capabilities of growing different breeds of rabbits; New Zealand White (NZW), V-line; Baladi Black (BB) and Gabali breeds under Egyptian conditions. Four hundred weaned rabbits (one month age) of both sexes were used. Breed had significant effects on growing traits. The (NZW) rabbits showed the highest (P≤0.05) initial and body weight at 60 days. Also V-line and (BB) groups showed significantly higher daily weight gain than both Gabali and NZW rabbits. The (NZW) and V-line breeds showed higher significantly daily feed intake (P≤0.05) than both BB and Gabali breeds. Whereas, (BB) rabbits showed the highest (P≤0.05) feed efficiency (0.375). Dressing percentage and all internal organs weight were significantly affected by breeds. A significant difference between breeds for carcass weight, V-Line scored the highest (1168.2 gm). For dressing percentage, V-Line observed the highest records (62.71 %), meanwhile the other breeds observed the same manner. Significant maximum values (P≤0.05) were recorded for all internal organs weight of growing V-Line rabbits. Baladi Black, (NZW) and Gabali breeds were significantly descendedly ranked after that. Blood picture and serum constitute observed that (BB) and Gabali had significantly (P≤0.05) higher values than both imported NZW and V-line except total protein and globulin traits, where the native Gabali rabbits recorded a significant maximum score at all (7.01 and 2.4 mg %), respectively.

Key words: Breed, rabbits, growth, Blood constitute

INTRODUCTION

Rabbit meat consumption in Egypt is still quite low. However, there is an increasing concern with healthiness of diet, rabbit meat shows high nutritional quality, wholesome, tasty with appreciable juiciness and tenderness. It contains a high amount of protein and low amounts of fat and cholesterol. (Lebas *et al*, 1986 and Das and Bujarbarua, 2005). In addition, a relatively high content of polyunsaturated fatty acids. (Ouhayoun, 1992). The rabbit industry in Egypt has not reached a high level of organization yet. Through the last few decades, Egyptian industry has shown interest in using some exotic rabbits, such as V-line and New-Zeland strains for increasing rabbit meat production.

Rabbit has a quite high dressing percentage when compared to ruminants, ranging between 50 - 65% (Lebas *et al*, 1986; Roiron *et al* 1992). Genetics are important factors of high impact on rabbit carcass and meat quality (Moura *et al.*, 2001). Feed efficiency is one of the most commercially important traits because post-weaning feeding accounts for around 40 % of total cost (Armero and Blasco, 1992). Efficiency of meat production can be improved by firstly applying diversity of rabbit breeds through characterization. Other possibilities to reduce production costs by using of high performance stock. Also the use of healthy stock is an important factor to achieve a more economical and constant production level for the rabbit breeder. Enzymes activity reflect

animal's health and activities, where they accelerate animal's metabolism, growth and production.

The first purpose of this study is to draw a comparative study between indigenous versus acclimatized rabbits in Egypt, including growth performance. The second purpose was to determine the meat productivity potential of the local breed and the possibility of its use in the rabbit industry.

MATERIAL AND METHODS

The present study was carried out in an Industrial Rabbitry (capacity 1800 mothers), near El-Nobariah city, El-Beherah Province, Egypt, during the period from November, 2009 till April, 2010. The experiment was lasted five months and it was carried out during growing phase on 400 weaned rabbits (aged one month) of three breeds and a line (50 of each males and females in each group of each of New-Zealand White (NZW), V-Line, Baladi Black (BB) and Gabali breeds. The experiment was planned to evaluate some parameters indicated growth performance, dressing percentage, internal organs weight, blood picture and some blood serum constitute. The averages of daily feed intake, daily weight gain and feed efficiency and conversion values of growing rabbits were calculated and recorded weekly. At marketing age (60 days), 8 growing rabbits from each experimental group were randomly taken for slaughter test after being fasted for 12 hours (Abd El-Monem, 1995). After complete bleeding, the carcass, spleen, kidneys, liver, hurt and lungs were weighed. Dressing percentages were the quotient of carcass weight values divided by corresponding pre slaughter (live body).

Blood samples of growing rabbits were collected during slaughter of 8 rabbits within each experimental group at the end of fattening period (60 days age). Blood samples were collected into dry clean centrifuge tubes. Blood serum was separated by centrifugation at 3000 rpm. Using centrifugal machine for 20 minutes and kept in a deep freezer at (-20^0C) until biochemical analysis. Non-coagulated blood was obtained after collection for estimating blood pictures. Red and white blood cells were counted according to Hepler (1966) and Hawkey and Dennett (1989). Hemoglobin concentration and Hematocrite percentage were measured according to Wintrobe (1965) and Tietz (1982). Total protein level was estimated according to Armstrong and Corri (1960). Albumin level was estimated according to Doumas *et. al.* (1971). Globulin level values were obtained by subtracting the values of albumin from the corresponding values of total protein. Albumin/ globulin ratios were calculated by dividing albumin values on corresponding globulin values. The activities of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were estimated according to Reitman and Frankel (1957).

Statistical analyses: Data were subjected to analysis of variance according to Snedecor and Cochran (1982) using the General Linear Model Program of SAS (2001). Data were analyzed using the following linear model:

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

Where: Y_{ij}= Observation on i^{th} breed, μ = Overall mean; B_i= Effect of i^{th} genetic group (i= 1 to 4) and e_{ij}= random error.

Percentage values were transformed to Arc. Sin values to approximate normal distribution before being statistically analyzed. Duncan's new multiple range tests was used to test the significance of the differences between means (Duncan, 1955).

RESULTS AND DISCUSSIONS

Summary statistics for growth performance traits are shown in Table 2. V-line was Weaning and slaughter weights (BW32 and BW60) and ADG were low compared with other results from the same lines (Feki et al., 1996), probably because this experiment was mainly in the hottest months of the Spanish climate (from May to September). It is known that high temperatures can negatively affect growth (Marai et al., 2002). Individual ADG of the young rabbits from all genetic groups was 40 g/d (from 691 g of BW32 to 1,810 g of BW60). There were no health problems observed throughout the experiment, and the

mortality rate was similar to that expected on a commercialfarm (2.5%).

Results as shown in (table 3) for pre-slaughter body weight, carcass, dressing percentage were significantly affected by genotype. Growing V-line rabbits realized significantly ($P \leq 0.05$) the highest score for these traits followed by the native Baladi Black. Pre-slaughter weight is considered to be one of the most important factor affecting carcass traits in rabbits (Ortiz *et. al.,* 2001). (Maertens and Groote, 1992 and Szendro *et al.,* 1995) confirm the importance of pre-slaughter body weight on carcass traits. Other traits such as dressing percentage, spleen, kidneys, liver, heart and lungs as given in (Table 3) showed breed differences ($P<0.05$) in the proportions of main internal organs between breeds. The same results were obtained by (Lebas e*t. al.,* 1986; Ortiz and Rubio, 2001). Contrary, as stated by (Rao *et. al.,* 1978; Parigi-Bini *et. al*., 1992) differences between groups become smaller in higher body weight categories. Also (Cobos *et. al.,* 1995; Hulit *et al.*, 1994) found no significant differences among the dressing percentages of different breeds if the animal reached the same final weight. **Hematological and Biochemical parameters:** Many researchers observed the effect of genetic makeup on hematological and biochemical status of rabbits (Chiericato *et.al*., 1985, Cazabon *et. al*., 2000). The obtained results here showed that genotype affected significantly ($P\leq0.005$) hematological and biochemical parameters as shown in (table 3). Growing native rabbits from both Baladi Black and Gabali showed significantly ($P\leq0.005$) higher values for almost hematological and biochemical traits than both imported ones (New-Zealand White and V-Line). These results may be due to the high adaptation of the native rabbits to the Egyptian conditions as observed by Meshreky *et al*. (2005). Among the native breeds, Gabali breed exhibits a significant ($P\leq0.005$) higher value of RBCs (6.61×10^6 /mm^3) compared with (6.36×10^6 /mm^3) for the Baladi Black growing rabbits. Within exotic breeds, the V-line scored significantly higher Ht % (36.47) as shown in (Table 3) as a result of an increase in RBCs count by about (1.05×10^6 /mm^3) than New-Zealand White rabbits. The same trend was also observed for the globulin value trait, where the native Gabali recorded a significant highest globulin level at all and also 14% extra globulin level more than Baladi Black one. Within imported breeds, V-Line rabbits showed a significant higher score for total protein level by about (0.34 m gm/ 100ml) higher than New-Zealand White rabbits as a result of possessing ($P\leq0.005$) higher globulin level (1.70 m gm/ 100ml) compared to (1.48 m gm/ 100ml) globulin level for New-Zealand White rabbits. Generally, serum total protein level is a general indication of immune status (White *et al.,* 2002). Lymphatic tissues are responsible about globulin formation (Jones and Bark, 1979). Also the results of Ismail *et al.* (2002) revealed that globulin can be taken as a good indicator of immunity response. As shown in (table 3), the albumin level was significantly higher in both Gabali and Black Baladi breeds than both V-line and New-Zealand White ones. Albumin level reflects liver function (Azoz and El-Kholy, 2005), where, the liver is the site of albumin synthesis (El-Harairy *et al,*. 2003; Sleem *et. al.,2007*). This finding suggested that metabolic rate may be higher in native rabbits and such results may give evidence that native breeds are more able to metabolize protein. The decrease in Alb/Glo ratio is a good indicator for increase of immunoglobulin Ismail *et al.* (2002). Native breeds scored significant ($P\leq0.005$) lower Alb/Glo ratio 2.00 and 1.92 for (Gabali and Black Baladi), respectively compared with 2.28 and 2.53 for V-line and New-Zealand White, respectively.

On the other hand, enzymes profile reflect animal's health and activities (Chiericato et.al., 2000), where they accelerate animal's metabolism, growth and production. Genetic variations affect also enzymes level significantly as shown in (table 3). The obtained results refer to a significant superiority of native Gabali for both aspartate aminotransferase (38.11) and alanine aminotransferase (23.15) production followed by the Baladi Black, V-line and New-Zealand White rabbits consecutively.

Table 2) Some parameters indicated growth performance of growing New-Zealand White; V. Line; Baladi Black and Gabali rabbits (Means ± SE).

Items	Rabbit breeds			
	NZW	V. Line	BB	Gabali
Initial body weight (gm)	689.4±42.9 ^{bc}	749.6 ± 45.3 ^{a}	674.3 ± 41.7 ^{c}	618.2 ± 43.4 ^{d}
Daily weight gain (gm)	32.4 ± 1.8 ^{b}	36.9 ± 1.9 ^{a}	35.7 ±1.7 ^{a}	31.7 ± 1.2 ^{b}
Daily feed intake (gm)	100.8 ± 4.4 ^{a}	102.9 ± 4.1 ^{a}	95.3 ± 3.9 ^{b}	96.6 ± 4.5 ^{b}
Feed Efficiency	0.321 ± 0.002 ^{d}	0.359± 0.005 ^{b}	0.375 ± 0.004 ^{a}	0.328 ± 0.003 ^{c}
Final body weight at 60 days (gm)	1661.4 ± 72.3 ^{c}	1856.6 ± 78.6 ^{a}	1745.3 ± 74.4 ^{b}	1569.2 ± 75.7 ^{d}

Means within the same row (a, b, c& d) bearing different letter superscripts are significantly (P ≤ 0.05)

Table 3) Dressing percentage and internal organs weight of growing New-Zealand White; V. Line; Baladi Black and Gabali rabbits (Means ± SE).

Items	Rabbit breeds			
	NZW	V. Line	BB	Gabali
Alive pre-slaughter body weight (gm)	1670.3± 61.2 ^{c}	1862.8 ± 58.9 ^{a}	1752.7 ± 65.3 ^{b}	1574.6± 62.7 ^{d}
Carcass weight	982.8± 27.9 ^{c}	1168.2± 41.3 ^{a}	1011.7± 37.5 ^{b}	912.3 ± 24.4 ^{d}
Dressing percentage (%)	58.84 ± 3.7 ^{b}	62.71 ± 3.9 ^{a}	57.72 ± 3.3 ^{b}	57.94 ± 2.8 ^{b}
Spleen weight:				
Absolute (gm)	1.36 ± 0.04 ^{c}	1.97± 0.12 ^{a}	1.48 ± 0.08 ^{b}	1.29 ± 0.07 ^{c}
Relative (%)	0.08 ±0.001 ^{bc}	0.11± 0.001 ^{a}	0.08 ±0.001 ^{b}	0.08± 0.001 ^{c}
Kidneys weight:				
Absolute (gm)	11.27 ± 0.9 ^{c}	13.72±0.8 ^{a}	12.58 ± 1.0 ^{b}	10.14 ± 0.7 ^{d}
Relative (%)	0.67 ±0.01 ^{c}	0.74 ± 0.01 ^{a}	0.72±0.01 ^{b}	0.64± 0.02 ^{d}
Liver weight:				
Absolute (gm)	41.29 ± 2.9 ^{c}	52.74± 3.9 ^{a}	47.31 ± 2.8 ^{b}	36.46 ± 3.2 ^{d}
Relative (%)	2.47 ±0.07 ^{c}	2.83 ± 0.06 ^{a}	2.70 ±0.05 ^{b}	2.32 ± 0.05 ^{d}
Heart weight:				
Absolute (gm)	6.87 ± 0.07 ^{c}	7.31± 0.03 ^{a}	7.12 ± 0.02 ^{b}	6.52 ± 0.08 ^{d}
Relative (%)	0.41±0.01 ^{bc}	0.39± 0.01 ^{a}	0.41 ±0.01 ^{b}	0.41 ± 0.01 ^{c}
Lungs weight:				
Absolute (gm)	8.22 ± 0.05 ^{c}	9.81± 0.04 ^{a}	9.37 ± 0.06 ^{b}	7.83 ± 0.09 ^{d}
Relative (%)	0.49 ±0.02 ^{b}	0.53± 0.01 ^{a}	0.53±0.02 ^{a}	0.50± 0.02 ^{b}

Means within the same row (a, b, c& d) bearing different letter superscripts are significantly different (P ≤ 0.05).

Table 4. Blood picture and some blood serum constitute of growing New-Zealand White; V. Line; Baladi Black and Gabali rabbits (Means ± SE).

Items	Rabbit breeds				
	NZW	V. Line	BB	Gabali	Normal range
Red blood cells ($N \times 10^6$ /mm^3)	5.27 ± 0.19 ^{c}	6.32±0.27 ^{bc}	6.36±0.26 ^{b}	6.61±0.21 ^{a}	5.3-6.8
White blood cells ($N \times 10^3$ /mm^3)	6.06± 0.73 ^{b}	6.39±0.84 ^{b}	7.46± 0.99 ^{a}	8.07±0.93 ^{a}	5.1-9.7
Hemoglobin (gm/ dL)	9.37±0.81 ^{b}	9.98±0.63 ^{b}	11.74±1.00 ^{a}	12.83±1.09 ^{a}	9.8-14.0
Hematocrite (%)	33.21±2.1 ^{c}	36.47±2.6 ^{b}	40.17± 2.9 ^{a}	42.51±2.7 ^{a}	34.0–43.0
Total protein (m gm/ 100ml)	5.23± 0.14 ^{d}	5.57±0.12 ^{c}	6.79±0.21 ^{b}	7.01±0.17 ^{a}	5.0-7.5
Albumin (m gm/ 100ml)	3.75± 0.14 ^{b}	3.87±0.21 ^{b}	4.53± 0.21 ^{a}	4.61±0.28 ^{a}	2.7-5.0
Globulin (m gm/ 100ml)	1.48 ± 0.07 ^{d}	1.70 ±0.08 ^{c}	2.26 ± 0.08 ^{b}	2.40±0.09 ^{a}	1.5-2.7
Albumin/ globulin ratio	2.53 ± 0.31 ^{a}	2.28 ±0.29 ^{a}	2.00± 0.22 ^{b}	1.92±0.23 ^{b}	0.8 -2.65
AST (U/ L)	30.14±1.27 ^{d}	32.19±1.64 ^{c}	34.72±2.05 ^{b}	38.11±2.34 ^{a}	20.7-42.9
ALT (U/ L)	17.15±1.94 ^{d}	19.26±1.86 ^{c}	20.27±2.11 ^{bc}	23.15±2.09 ^{a}	12.0-25.0

Means within the same row (a, b, c& d) bearing different letter superscripts are significantly different (P ≤ 0.05)

CONCLUSIONS

The results showed that superiority of NZW and V-line rabbits for body weight at 60 wk than both BB and Gabali breeds. Whereas, (BB) rabbits showed the highest ($P \leq 0.05$) feed efficiency (0.375). For dressing percentage, V-Line observed the highest records (62.71 %), meanwhile the other breeds observed the same manner. Baladi Black, (NZW) and Gabali breeds were significantly descendedly ranked after that. They also had better degree of carcass weight. In developing countries, the quality of meat produced per animal is very important. Therefore, it seems beneficial for rabbit producers in Egypt to use …..for a real contribution of our genetic potential in rabbit meat production

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