Effect of Drinking Natural Sea Saline Water on Growth Performance, Some Blood Parameters and Carcass Traits on New Zealand White Rabbits

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Abstract: This experiment was carried out to study the effect of drinking natural sea saline water on growth performance and some blood parameters of growing New Zealand White (NZW) rabbits reared under Saudi Arabia conditions. The obtained results indicated that the final body weight, live body gain daily feed intake, feed conversion, water intake, plasma total protein, albumin, globulin, total lipids, cholesterol and urea-N were decreased ($p<0.05$&$0.01$) significantly with drinking growing rabbits natural sea water. Also, the carcass weight, dressing % and prime cuts % were decreased, while the rectal temperature and respiration rate were insignificantly affected by the using natural sea saline water up to 20% / litter well water.

Key words: salinity, rabbits, growth performance, blood parameters

1. Introduction:

Water is the most important nutrient for livestock. It is second to oxygen as immediately essential for life. The quality and quantity of drinking water may affect feed consumption and animal health since low quality water normally results in reduced water and feed consumption in livestock, especially rabbits. Moreover, water salinity is the major factor determining the suitability of particular water source for livestock. Certain salts and gases in solution make water more palatable, if not present in excess, while various salts may reduce water palatability and may be toxic at high levels (Cheeke, 1987; Ray, 1989, Willis, 1991 and Sandford, 1996).

In the desert areas depend on underground water for drinking of animals reared in farms erected in these desert lands. Several trials have been conducted to study the effect of utilizing natural saline water on different animals (Andersen and Stothers, 1978 with pigs, Kamel et al., 1984 with goats, Ahmed et al., J985 and 1989 with sheep, Challies et al., 1987 with cattle, and Balnave & Yoselewitz, 1988 with poultry). However, rabbits received a little attention in this respect although it is considered as a useful contribution to the meat supply in developing countries, which suffer from animal protein shortage. In Egypt, Ayyat et al. (1991) and Moustafa et al. (2004) studied this aspect on rabbits using saline water.

Therefore, the present experiment was carried out to study the effect of drinking natural saline well-water on growth performance, some blood parameters and the carcass traits of New Zealand White rabbits under heat stress conditions in desert areas.

2. Materials and Methods:

A total of hundred weaning male New Zealand White (NZW) rabbits at 35 days of age and nearly equal average initial live body weight were used in the present study. Rabbits were picked up from the Experimental Animal Unit of King Fahd Medical Research Center, King Abdul Aziz University, Jeddah, Saudi Arabia. They were housed in groups of 5 per plastic cage, maintained under standard laboratory conditions (temperature 22±1°C, 12:12 h light: dark cycle) and offered balanced standard diet (The animals were feed basal diet consisted of 28% alfalfa hay, 18% barley, 18% soybean meal(44%), 25% wheat bran, 6% yellow corn, 3 % molasses, 1.1% limestone, 0.3% sodium chloride, 0.6 % vitamin and mineral premix. The basal diet contained of 18.18 % crude protein, 13.43% crude fiber, 2.29% ether extract, 2656.00 digestible energy(kcal/kg).)

The experimental groups were:

Group 1 (control drinking well water)
Group 2 (drinking well water 95% + Sea water 5%)
Group 3 (drinking well water 90% + Sea water 10%)
Group 4 (drinking well water 85% + Sea water 15%)
Group 5 (drinking well water 80% + Sea water 20%)

Live body weight was recorded individually for each rabbit at 5, 9 and 13 weeks of the age, then weight gain was calculated. Feed intake was determined precisely and calculated as gram per rabbit per day. Unused feed from each cage was collected daily, weighed and taken into consideration for calculation of feed intake. Feed conversion was also estimated (g feed / g gain). Daily water intake was recorded individually for each rabbit during the experimental period. The rectal temperature and
The obtained data were statistically analyzed by using completely randomize design according to Snedecor and Cochran (1982) by the following model: 
\[ X_{ij} = \mu + T_i + e_{ij} \]
where, \( \mu \) = general mean, \( T_i \) = fixed effect of the treatments(1,.....,8) and \( e_{ij} \) = random error. The differences between experimental groups were separated by Duncan’s multiple range test (Duncan, 1955).

3. Results and Discussion

Water requirements of domestic rabbits are relatively high. Rabbits can lose nearly all the fat and more than half the protein from their bodies and still remain alive, but a loss of one tenth of the water of the body will result in death. Furthermore, rabbits can live for a relatively long time without solid food, but lack of water produces a very quick harmful effects (Sandford, 1996).

1-Growth performance:

The data in Table 4 indicated that plasma total protein, albumin, globulin, total lipids, cholesterol and urea-N in rabbits drinking sea water were significantly (\( p<0.05 \) & 0.01) lower than the animals drinking fresh water. These results were similar to those obtained by Marai et al., 2001, Ellefson & Garaway, 1982; Abdel-Samee & El-Masry, 1992 and Pond et al., 1995. At the same time, the level of total protein in the blood of experimented rabbits was significantly decreased with drinking natural saline water. This result may related to the fact that water is held bach to the body fluids to dilute out the retained salts, resulting in dilution of blood proteins and so, decreases its concentration level (Tietz, 1982; Ayyat et al., 1991 and Suckow & Douglas, 1997).

5- Slaughter performance

Carcass weight, Dressing % and Prime cuts % were decreased (\( p<0.01 \), 0.05) significantly by
drinking sea water, when compared with the control group (Tables 5). This results agree with Ahmed et al. (1989) using sheep; Ayyat et al. (1991), Abdel-Samee & El-Masry (1992) and Moustafa, et al. (2004) using rabbits. The decrease in carcass weight in rabbits that drank sea water may be due to depression in final live body weight.

Table 1. Body weight and gain weight (0-8 weeks; ±SE) of growing NZW male rabbits as affected by period of the year and using natural sea water.

<table>
<thead>
<tr>
<th>Items</th>
<th>W0</th>
<th>W4</th>
<th>W8</th>
<th>G0-4</th>
<th>G4-8</th>
<th>G0-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (0% Sea water)</td>
<td>610.0±6.3</td>
<td>1211.6±7.4</td>
<td>1548.5±11.6</td>
<td>21.5±0.9</td>
<td>12.0±0.7</td>
<td>16.8±0.5</td>
</tr>
<tr>
<td>Control + 5% Sea water</td>
<td>608.9±6.9</td>
<td>1106.8±5.9</td>
<td>1429.0±12.1</td>
<td>17.8±0.6</td>
<td>11.5±0.9</td>
<td>14.6±0.5</td>
</tr>
<tr>
<td>Control +10% Sea water</td>
<td>611.9±8.4</td>
<td>1061.5±9.1</td>
<td>1376.5±11.7</td>
<td>16.1±0.7</td>
<td>11.3±0.8</td>
<td>13.7±0.9</td>
</tr>
<tr>
<td>Control +15% Sea water</td>
<td>610.5±6.7</td>
<td>1002.8±10.2</td>
<td>1235.1±10.1</td>
<td>14.0±0.9</td>
<td>8.3±0.5</td>
<td>11.2±0.9</td>
</tr>
<tr>
<td>Control +20% Sea water</td>
<td>609.1±8.1</td>
<td>939.6±11.4</td>
<td>1113.1±13.9</td>
<td>11.8±0.6</td>
<td>6.2±0.3</td>
<td>9.0±0.8</td>
</tr>
<tr>
<td>Significance</td>
<td>N.S</td>
<td>**</td>
<td>**</td>
<td>*</td>
<td>**</td>
<td>**</td>
</tr>
</tbody>
</table>

Means bearing different letters in the same column within each classification, differ significantly \((P<0.05)\). ** = \( P<0.001 \), * = \( P<0.01 \), * = \( P<0.05 \) and N.S. = Not significant.

Table 2. Feed intake, feed conversion, water intake, rectum temperature and respiration rate of growing NZW rabbits as affected by using natural sea water.

<table>
<thead>
<tr>
<th>Items</th>
<th>Feed intake (g/day)</th>
<th>Feed conversion (g feed intake / g gain)</th>
<th>Water intake (ml/day)</th>
<th>Rectum temperature (RT)</th>
<th>Respiration rate (RR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (0% Sea water)</td>
<td>79.1±4.9</td>
<td>4.7±0.04</td>
<td>151.7±6.1</td>
<td>39.6±0.08</td>
<td>102±1.83</td>
</tr>
<tr>
<td>Control + 5% Sea water</td>
<td>71.8±5.1</td>
<td>4.9±0.08</td>
<td>118.1±6.5</td>
<td>39.4±0.08</td>
<td>100±2.00</td>
</tr>
<tr>
<td>Control +10% Sea water</td>
<td>68.7±6.0</td>
<td>5.1±0.09</td>
<td>103.6±8.3</td>
<td>39.5±0.09</td>
<td>99±2.10</td>
</tr>
<tr>
<td>Control +15% Sea water</td>
<td>60.7±7.0</td>
<td>5.4±0.07</td>
<td>99.0±7.9</td>
<td>39.6±0.08</td>
<td>105±1.88</td>
</tr>
<tr>
<td>Control +20% Sea water</td>
<td>52.9±5.9</td>
<td>5.9±0.06</td>
<td>82.1±6.5</td>
<td>39.7±0.05</td>
<td>101±1.99</td>
</tr>
<tr>
<td>Significance</td>
<td>*</td>
<td>**</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

Means bearing different letters in the same column within each classification, differ significantly \((P<0.05)\). ** = \( P<0.01 \), * = \( P<0.05 \) and N = Not significant.

Table 3. Blood parameters (±SE) of growing NZW rabbits as affected by period of the year, feeding system and Nigella sativa seeds dietary supplementation.

<table>
<thead>
<tr>
<th>Items</th>
<th>Total protein (g/100ml)</th>
<th>Albumin (g/100ml)</th>
<th>Globulin (g/100ml)</th>
<th>Total lipids (mg/100ml)</th>
<th>Total cholesterol (mg/100ml)</th>
<th>Urea (mg/100ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (0% Sea water)</td>
<td>7.3±0.3</td>
<td>4.1±0.7</td>
<td>3.2±0.3</td>
<td>671.9±52.5</td>
<td>180.8±30.1</td>
<td>20.4±2.4</td>
</tr>
<tr>
<td>Control + 5% Sea water</td>
<td>7.2±0.1</td>
<td>4.3±0.5</td>
<td>2.9±0.5</td>
<td>680.5±49.2</td>
<td>178.6±34.2</td>
<td>19.9±2.9</td>
</tr>
<tr>
<td>Control +10% Sea water</td>
<td>6.8±0.2</td>
<td>3.9±0.6</td>
<td>2.9±0.4</td>
<td>665.8±59.1</td>
<td>174.1±31.8</td>
<td>19.8±3.2</td>
</tr>
<tr>
<td>Control +15% Sea water</td>
<td>6.9±0.4</td>
<td>4.0±0.5</td>
<td>2.9±0.3</td>
<td>675.4±32.2</td>
<td>199.9±37.1</td>
<td>17.9±5.0</td>
</tr>
<tr>
<td>Control +20% Sea water</td>
<td>6.7±0.5</td>
<td>4.4±0.3</td>
<td>2.3±0.3</td>
<td>692.1±41.6</td>
<td>193.4±28.6</td>
<td>18.7±4.2</td>
</tr>
<tr>
<td>Significance</td>
<td>NS</td>
<td>NS</td>
<td>*</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

Means bearing different letters in the same column within each classification, differ significantly \((P<0.05)\). ** = \( P<0.01 \), * = \( P<0.05 \) and N = Not significant.

Table 4. Carcass traits of growing NZW rabbits as affected by period of the year, feeding system and Nigella sativa seeds dietary supplementation.

<table>
<thead>
<tr>
<th>Items</th>
<th>Carcass weight (g)</th>
<th>Carcass weight (%)</th>
<th>Dressing (%)</th>
<th>Prime cuts (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (0% Sea water)</td>
<td>1032.6</td>
<td>100</td>
<td>66.7</td>
<td>59.1</td>
</tr>
<tr>
<td>Control + 5% Sea water</td>
<td>900.1</td>
<td>87.2</td>
<td>62.9</td>
<td>52.9</td>
</tr>
<tr>
<td>Control +10% Sea water</td>
<td>812.2</td>
<td>78.7</td>
<td>59.0</td>
<td>48.7</td>
</tr>
<tr>
<td>Control +15% Sea water</td>
<td>708.1</td>
<td>68.6</td>
<td>57.3</td>
<td>47.5</td>
</tr>
<tr>
<td>Control +20% Sea water</td>
<td>583.2</td>
<td>56.5</td>
<td>52.4</td>
<td>45.2</td>
</tr>
</tbody>
</table>
References:


