

Evaluation of Some Productive and Reproductive - Related Hormones in Egyptian Male Buffalo Calves as Affected by *Lactobacillus acidophilus* Inoculation

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EIGHTEEN growing egyptian male buffalo calves at 2.5-3.0 month of age and 100-150 kg initial body weight were used to study the effect of *Lactobacillus acidophilus* inoculation on some productive and reproductive - related hormones such as serum total thyroxine (T₄), triiodothyronine (T₃) and testosterone. Animals were divided into three groups a) The first group received 35 ml. of *L.acidophilus* inoculum, b) Second group received 70 ml of such inoculum and c) Was control group. *Lactobacillus* population of the culture had approximately 2×10^{11} viable cells / ml. This inocula was offered via stomach tubes once weekly for an expirmental period of 16 months. All animals were fed on a ration consistiny of 25% hay and 75% concentrate mixture . Blood samples were obtained at 2-months intervals.

Serum T₄ levels were elevated as a result of inoculation. The first group showed significant increases from the 8th up to the 16th month, while the second higher level showed significant increases at 12 and 16 months of inoculation. *L. acidophilus* inoculation also led to significant elevation of serum T₃ at all intervals especially by its first level. Serum testosterone level was increased gradually in all groups as a function of age progress. However, both treated groups had higher levels than the control at all intervals.

The present results indicate that *L. acidophilus* inoculation had an accelerating effect on the time of onset of puberty, where inoculated animals reached puberty 2-3 months faster than the controls.

Key words: Buffalo, malcealves, hormones, lactobaecilus inoculation

Several reports can be found in the literature concerning the influence of lactic acid-producing bacteria on poultry (Larousse, 1970), chicks (tortuero, 1973), turkeys (Francis *et al.*, 1978), Bobwhite quails (Miles *et al.*, 1981) and pigs (pollmann *et al.*, 1980). Our previous studies on Egyptian buffalo calves (Hussein, 1986) and on chicken performance (Hussein and El-Ashry, 1989) had revealed the profelactive effect of lactobacillus concentrate addition on body gain and feed efficiency.

Little information had been reported concerning the effect of *L. acidophilus* inoculation on productive and reproductive-related hormones such as thyrozine (T_4), triiodothyronine (T_3) and testosterone. The present study was thus conducted to shed some light on such effect of *L. acidophilus* inoculation on Egyptian male buffalo calves.

Material and Methods

Eighteen growing Egyptian male buffalo calves at 2.5 - 3.0 months of age and 100 - 150 kg body weight were used in this study. Animals were divided into three groups of 6 calves each. Ration consisted of 25% berseem hay and 75% concentrate mixture. Nutritional plane was made according to Tommi allowances (1963) to support gain of about 800 g/day up to 350 kg live body weight, then the plane was recalculated to suit average daily gain of about 1000 g/day with the same roughage / concentrate ratio.

An inoculum was used from a commercial acidophilus (strain DDs-1) which was isolated originally from milk products. The lactobacillus population of the culture had approximately 2×10^{11} viable cells / ml. This inoculum was offered through stomach tube once weekly two levels of such inoculum were used thirty - five and 70 ml from the inoculum representing approximately 70×10^{11} and 140×10^{11} viable cells were offered to the first and the second treated groups respectively, while the third group was used as control. The frozen acidophilus culture was thawed in distilled water for 1 hour prior to inoculation.

The experiment lasted for 16 months. Blood samples were obtained from the jugular vein at 2-month intervals. Sera were collected and kept frozen at -20° until used for assay. Radioimmunoassay techniques were applied for the estimation of serum total T_4 (Premachandra and Ibrahim, 1976), T_3 (Chopra *et al.*, 1972) and testosterone (WHO, 1978).

Statistical analysis was done using un-paired "t" test according to Steel & Torrie (1965).

Results

The present study revealed that serum total thyroxine (T_4) was elevated by the two levels of *L. acidophilus* inoculation compared with the control group (Table 1). The first level caused significant increases at 8 ($P < 0.001$), 10 ($P < 0.05$), 12, 14 and 16 months ($P < 0.001$) of inoculation. The higher level of inoculation showed less effect with significant increases at 12 ($P < 0.05$) and 16 months ($P < 0.001$) of inoculation.

Serum level of T_3 were highly affected by *L. acidophilus* inoculation. such treatment caused significant increases in T_3 levels at most intervals. T_3 range in the control group was 85.0 - 106.5 ng / 100 ml, while its range was 110.4 - 139.4 and 104.6 - 125.4 ng / 100 ml in first and second levels of inoculation respectively (Table 1).

L. acidophilus inoculation also raised serum levels of testosterone especially by the lower level of inoculation (Table 1).

Discussion

The present study revealed that thyroid function as assessed by serum T_4 and T_3 was enhanced by two levels of *L. acidophilus* inoculation especially by the low level. Such inoculation elevated serum T_4 and T_3 levels almost at all time intervals. Such an effect may be due to a stimulative effect of *L. acidophilus* on thyroid function leading to an increase in T_4 and T_3 levels. The present results are in agreement with data reported by Mourad *et al.* (1981) on Egyptian water buffalo heifers.

The present study showed the normal oscillatory pattern of testosterone secretion with age progress in the un-inoculated animals. These results are in close agreement with those reported by Staigmiller *et al.* (1985) on Hereford bull calves, Rawlings *et al.* (1978) on beef bull calves and Hussein (1986) on Egyptian buffalo calves. The present investigation revealed that *L. acidophilus* inoculation led to an increase in serum testosterone level in all inoculated animals at all time intervals.

L. acidophilus inoculation lead to increase lactic acid production. This acid is absorbed as it is or after fermentation in the rumen to an end-product such as propionate which readily absorbed and metabolized. The increase in propionate production leads to the increase in cholesterol, the precursor of testosterone, and consequently to the elevation of serum testosterone. Such explanation was reported by Abe *et al.* (1981).

The present study reveals the beneficial role of *L. acidophilus* inoculation on productive and reproductive - related hormones which indicate that inoculation of *L. acidophilus*, especially by the rate of 35 ml / weekly, has an accelerating effect on calves to reach puberty and to efficient utilization of feed.

TABLE 1. Serum levels of total thyroxine, triiodothyronine and testosterone in the control and different inoculated animals at various time intervals.

| Group | Time Intervals (Months) | | | | | | | |
|-------------------------------------|-------------------------|----------------|----------------|---------------|--------------|-----------------|-----------------|----------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 |
| A. Serum Total Thyroxine (ug / dl) | | | | | | | | |
| Control | 3.70±0.23 | 3.95±0.07 | 4.17±0.09 | 4.53±0.13 | 5.06±0.13 | 4.98±0.14 | 4.96±0.13 | 4.78±0.18 |
| First inoculation level. | 3.82±0.21 | 3.87±0.23 | 4.41±0.36 | 5.52±0.14*** | 5.75±0.19* | 6.42±0.11*** | 6.60±0.11*** | 6.13±0.11*** |
| Second inoculation level | 3.69±0.14 | 3.92±0.17 | 4.33±0.15 | 5.08±0.35 | 5.38±0.25 | 5.63±0.22* | 4.43±0.21 | 5.95±0.22*** |
| B. Serum Triiodothyronine (ng / dl) | | | | | | | | |
| Control | 85.02±2.67 | 93.30±3.82 | 92.46±3.23 | 101.10±5.51 | 106.52±3.55 | 96.42±3.13 | 94.77±2.20 | 96.40±2.37 |
| First inoculation level. | 122.26±4.36 *** | 114.42±3.63 ** | 110.38±4.22 ** | 116.27±3.00 * | 121.82±4.19* | 131.48±2.81 *** | 134.20±3.52 *** | 139.40±3.76*** |
| Second inoculation level. | 114.43±2.99 *** | 109.87±2.01 ** | 104.55±2.50 * | 106.30±2.42 | 108.96±2.04 | 114.43±2.99 ** | 119.52±1.74*** | 125.36±3.50*** |
| C. Serum Testosterone (ng / ml) | | | | | | | | |
| Control | 0.59±0.03 | 0.75±0.05 | 0.79±0.06 | 1.22±0.13 | 1.03±0.06 | 1.06±0.04 | 0.56±0.04 | 0.99±0.04 |
| First inoculation level | 0.59±0.05 | 0.91±0.02* | 1.45±0.15** | 1.46±0.15 | 1.91±0.19** | 1.87±0.23** | 1.49±0.07*** | 1.68±0.12*** |
| Second inoculation level | 0.67±0.06 | 0.75±0.04 | 1.13±0.13* | 1.66±0.15 | 1.20±0.23 | 1.39±0.11* | 1.21±0.12*** | 1.55±0.13** |

All values are presented as Mean ± S.E.

* P < .05

** P < .01

*** P < .001

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تقدير بعض الهرمونات المتعلقة بالإنتاج والتناسل في ذكور عجول الجاموس المصري تحت تأثير إدخال بكتريا حمض اللاكتيك

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اجرى هذا البحث لدراسة تأثير إدخال بكتريا حمض اللاكتيك الى معدة ذكور عجول الجاموس المصري النامية على بعض الهرمونات المتعلقة بالإنتاج (مثل هرموني الغدة الدرقية ثلاثى ورباعي اليود) وبالتناسل (مثل الهرمون الذكري) ولهذا استخدم في هذا البحث ١٨ عجلا ناميا قسموا عشوائيا الى ٣ مجموعات بالتساوي الأولى تم إدخال ٣٥ سم من المحلول البكتيرى والثانية تم إدخال ٧٠ سم من المحلول البكتيرى والثالثة للمقارنة . وكان المحلول البكتيرى يحتوى على ٢ X ١١٠ خلية حية وتم إدخال المحلول البكتيرى باستخدام الأنابيب المعدنية مرة أسبوعيا وأخذت عينات دم مرة كل شهرين تقريبا لتقدير ت^٣، ت^٤ والهرمون الذكري.

أدى إدخال المحلول البكتيرى الى زيادة مستويات هرموني الغدة الدرقية معنويا عن مجموعة المقارنة وبالتسبة للهرمون الذكري فقد زاد نتيجة تقدم الحيوانات فى العمر إلا أن المعاملة ببكتريا حمض اللاكتيك أسرعت من وصول الحيوانات - وخاصة بالمستوى الأول - إلى البلوغ عن حيوانات المقارنة مما تدل على أن استخدام بكتريا حمض اللاكتيك الحية وإدخالها الى معدة ذكور عجول الجاموس المصري كان له تأثيرا مفيدا بالنسبة لخصوبة وتناسل الجاموس المصري.

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