Vet.Med.J.,Giza. Vol.41,No.3.(1993):119-124.

A COMPARATIVE STUDY ON THE EFFECT OF TWO TYPES OF GROWTH PROMOTING IMPLANTS ON THE PERFORMANCE TRAITS OF BUFFALO CALVES

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Received: 12 / 1 /1994

SUMMARY

The effect of two types of anabolic implants (Ralgro and Synovex-S) on the performance traits and the metabolic profile of male buffalo calves averaging 248.75 ± 2.5 kg. was studied in a 90-day experiment. The calves were fed on a basal ration composed of concentrates and roughages. Ralgro and Synovex-S implantation increased significantly ($P < 0.5$) the total body gain, average daily gain and feed/gain ratio in implanted calves. Gain and relative gain of the Synovex-S implanted group showed significant ($P < 0.05$) increase at each time phase of the experiment compared to the control and showed insignificant increase over the Ralgro-implanted group. No significant difference was found regarding blood calcium, albumin, RBCs and WBCs due to implantation. Total lipids and cholesterol values showed significant ($P < 0.05$) increase by implantation and reached the maximum at 60 days compared to the control. Ralgro and Synovex-S groups demonstrated significant ($P < 0.05$) increase in haemoglobin value at 60 d post-implantation.

Total serum protein and globulin values showed significant ($P < 0.05$) increase at 60 and 90 d post-implantation in Ralgro and Synovex-S implated calves, respectively . The growth promoting implants, Ralgro and Synovex-S could be successfully used in improving body gain and feed utilization of buffalo calves raised for beef production in Egypt.

INTRODUCTION

With the rapid expansion of world population, the demand for edible protein now exceeds the supply and the gap may further widen. Animal's meat provides a valuable and palatable source of protein, but unfortunately the conversion of plant protein into animal protein is not a very efficient process. The scientific efforts to improve such efficiency supports the application of the anabolic agents that are effective and safe from the public health standpoint. Ralgro containing the active ingredient zeranol and Synovex-S containing a combination of naturally occurring steroid hormaones are growth promoting implants approved by Food and Drug Administration (FDA) for beef production. Zeranol which is a non-hormonal anabolic agent derived from secondary metabolite of a mold produced on corn, has been used for improving body gain and feed efficiency in beef steers (Borger et al., 1973; Contreras et al., 1984; Lemieux et al., 1988; Loy et al., 1988); in beef bulls (Lamm et al., 1980; Egan et al., 1993) and in lambs (Wiggins et al; 1976).

Likewise, Synovex-S as a hormonal implant has been able to improve feed efficiency and average daily gain (ADG) in beef steers over non-implanted controls (Sawyer et al., 1988 and Apple et al., 1991).

Concerning buffaloes, few reports are available on the effect of growth promoting implants. Gazzetta et al., (1988) reported imporoved ADG in 18 month buffalo bulls implanted with zeranol during 120 d trial. In Egypt, ADG was significantly imporved by

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zeranol-implantation in weaned male buffalo calves compared to controls (Shalaby et al., 1978 and Ayyat, 1980). Furthermore, the hormonal implant (estrogen-androgen) induced remarkable increase in body weight gain in young and old buffalo bulls (Shehata et al., 1978).

The present study was designed to investigate the effect of two types of growth promoting implants (Ralgro and Synovex-S) on the performance traits and the metabolic profile of buffalo calves.

MATERIALS AND METHODS

The present study was carried out in a private farm in Sharkia province. Thirty-two apparently healthy male buffalo calves (average age 14±2 months) were assigned into three groups of approximately equal average body weight (248.75 ± 2.5 kg).The groups were treated as follows: (1) 8 non- implanted control animals "C"; (2) 12 animals implanted with Ralgro*® containing 36 mg zeranol® "R"and (3) 12 animals implanted with Synovex-S*® containing 200 mg progestrone and 20 mg estradiol benzoate "S". The implantation was done subcutaneously at the base behind the left ear of the animal on day one of the 90 days experimental period. The animals were housed tail to tail in a close housing system with concrete floor using straw as a bedding . The animals in different groups were individually fed on a concentrate plus roughage ration (table 1) that covered the growing buffalo calves requirements according to Ranjhan and Pathak (1979). The proximate chemical analysis of the ration ingredients was done according to A.O.A.C. (1975). The ingredients of the ration were offered during the day time, while the roughage mixture was left to the animal during night.The calves were watered twice daily and weighing of the animals was done monthly, early in the morning before feeding.

Blood samples were collected from 6 calves per treatment by jugular vein puncture using vacutainer tubes every 30d. Serum was separated and stored at-20 °C for analysis. Another blood sample was obtained using EDTA anticoagulat for determination of erythrocytic count (RBCs), heamoglobin (Hb) and total leukocytic count (WBCs) according to Jain (1986).

Serum samples were analyzed for determination of calcium, total proteins , albumin, globulins, total lipids and total cholesterol levels using commercial diagnostic kits, Bio-Merieux Laboratory Reagents and Products, France.

The data were statistically analyzed using ANOVA with state view 512+ (1986), software on Apple Macintosh Computer.

Table (1) : Composition and chemical analysis of the basal ration fed to buffalo calves.

Ingredient	Amounts kg/head day	CP %	CF %	Fat %	SV a %
Commercial concentrate mixture[b]	4.0	13.6	13.2	3.1	58.1
Ground corn and horse bean hulls mixture (3:1)	0.5	6.6	11.1	2.2	67.8
Berseem hay	1.5	13.2	28.6	2.8	32.0
Roughage mixture[c]	1.0	4.4	36.3	1.04	20.98

SV= Starch value was calculated from the tables of feed analysis given by Aboria (1967).

b Commercial pelleted concentrate mixture consisted of ground yellow corn, wheat bran, cotton seed cake, rice polish, tapiokg limestone, salt and molasses, (Tanta for oil and Soap Co.)

c Roughage mixture, composed of wheat , horse bean and berseem straw (1:1:1).

RESULTS AND DISCUSSION

Results of the overall performance of buffalo calves in different groups are summarized in table (2). Buffalo calves performance indicated that implantation increased significantly ($P < 0.05$) total body gain, ADG and feed / gain ratio over the controls regardless the implantation type Ralgro or Synovex-S). The ADG increased by 16.4 and 21.3% in the calves implanted with R and S, respectively, over that of the non-implanted controls. The magnitude of these responses agrees with the previously published reports in beef

* Ralgro®, Pitman-Moore, Mundelein, IL, USA.
** Synovex-SR, Syntex Agribusiness Inc., Des Moines, IA, USA.

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Table (2) : Performance of buffalo calves in different groups during the experimental period.

Item \ Group	Control (C)	Ralgro-implated (R)	Synovex-S implanted (S)
No. of animals	8	12	12
Initial body weight (kg)	245.6±5.7	248.5±4.1	251.0±3.7
Final body weight (kg)	301.2±6.4^{b}	313.1±5.3^{ab}	317.8±4.8^{a}
Total gain (kg)	55.6±2.5^{b}	64.6±1.47^{a}	66.8±1.3^{a}
ADG (kg)	0.61±0.03^{b}	0.71±0.02^{a} (16.4%)	0.74±0.01^{a} (21.3%)
DMI (kg/d)	6.3	6.3	6.3
Feed DM / gain	10.3±0.48^{b}	8.86±0.2^{a} (13.9%)	8.51±0.16^{a} (17.3%)
Energy efficeincy (kg SV/kg gain)	5.4	4.7	4.5

- Values are mean ± SE.
a,b Means within raws with various superscripts are significantly differed (P< 0.05).
- Values in parenthesis represent % increase over the control.

Table (3): Effect of Ralgro and Synovex-S implants on gain (kg) and relative gain (RG)* responses of buffalo calves at different time phases of the experiment.

Days post-implantatio	30		60		90	
Aspect / Group	Gain	RG	Gain	RG	Gain	RG
Control	17.4±0.8^{b}	0.066±0.0021^{b}	19.4±0.86^{b}	0.069±0.0035^{b}	17.9±1.4^{b}	0.059±0.0046^{b}
Ralgro	19.3±0.63^{ab} (10.9%)	0.072±0.0015^{ab} (9.1%)	22.4±0.57^{a} (12.5%)	0.077±0.0021^{ab} (11.6%)	22.6±1.0^{a} (26.3%)	0.072±0.0025^{a} (22.0%)
Synovex-S	20.1±0.62^{a} (15.5%)	0.074±0.0012^{a} (12.1%)	23.5±1.10^{a} (21.1%)	0.079±0.0015^{a} (14.5%)	23.1±0.95^{a} (29.1%)	0.073±0.0026^{a} (23.7%)

* RG = period gain (kg)/ average period weight calculated according to Loy et al. (1988).
Values are means ± SE and values in parenthesis represent the percentages increase over the control.
a,b Means within the same column with differed superscripts are signicicantly differed at P< 0.05.

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Table (4): Effect of Ralgro and Synovex S implantation on serum biochemical parameters and blood hemogram of buffalo calves during the experimental period.

Days post implantation / Group \ Aspect	30: Calcium mg/dl	30: Total lipids mg/dl	30: Total cholesterol mg/dl	30: Hb g/dl	30: RBCs x10⁶/µL	30: WBCs x10³/µL	60: Calcium mg/dl	60: Total lipids mg/dl	60: Total cholesterol mg/dl	60: Hb g/dl	60: RBCs x10⁶/µL	60: WBCs x10³/µL	90: Calcium mg/dl	90: Total lipids mg/dl	90: Total cholesterol mg/dl	90: Hb g/dl	90: RBCs x10⁶/µL	90: WBCs x10³/µL
Control	7.05 ±0.13	220.0^{c} ±9.3	79.2^{b} ±1.4	9.5 ±0.7	6.783 ±0.66	11.366 ±0.91	6.6 ±0.18	214.0^{b} ±11.7	104.2^{b} ±4.1	10.6^{b} ±0.4	5.867 ±0.506	10.900 ±1.39	ND	235.2^{c} ±12.1	95.3^{b} ±3.0	10.2 ±0.3	6.390 ±0.511	10.400 ±0.467
Ralgro	7.50 ±0.2	390.0^{a} ±14.1	99.3^{a} ±3.1	10.5 ±0.5	6.626 ±0.96	11.75 ±0.641	7.6 ±0.4	444.0^{a} ±20.1	145.3^{a} ±6.9	12.2^{a} ±0.7	6.220 ±1.25	11.070 ±1.100	ND	248.3^{a} ±14.3	115.6^{a} ±5.4	11.0 ±0.4	6.950 ±0.790	10.250 ±0.870
Synovex-S	7.20 ±0.21	253.6^{b} ±11.0	94.2^{a} ±2.0	9.3 ±0.2	6.466 ±0.69	10.15 ±0.726	6.9 ±0.26	400.0^{a} ±16.4	126.5^{a} ±5.0	11.6^{a} ±0.3	6.600 ±1.65	11.000 ±1.350	ND	246.2^{b} ±9.5	105.2^{a} ±3.8	10.6 ±0.5	7.220 ±0.110	10.520 ±0.955

Values are means ± SE. ND = Not done.
a,b,c: Means within the same column with different superscripts are significantly differed at P< 0.05.

Fig.(1): Total serum proteins in buffaloe calves during the implantation period.

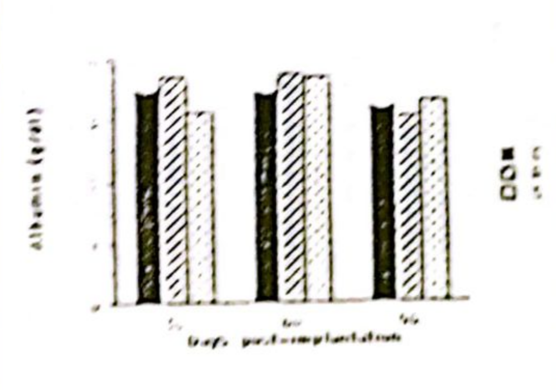

Fig.(2): Serum albumin in buffaloe calves during the implantation period.

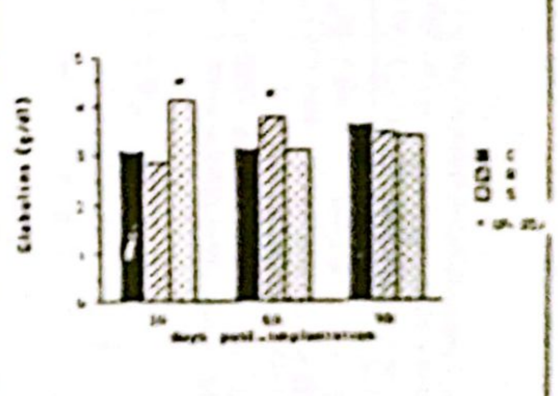

Fig.(3): serum globulins in buffaloe calves during the implantation period.

cattle (Borger et al., 1973 and Loy et al., 1988), and with those of Shehata et al., (1978) and Ayyat (1980) in weaned buffalo calves implanted with zeranol. Since the dry matter intake was constant in all groups, and the gain was improved by implantation, so feed / gain ratio and energy efficieny were subsequently improved. The R and S-implanted groups showed significant ($P < 0.05$) improvement in feed / gain ratio compared to the non-implanted control group. Nevertheless, the improvement percentage in feed/gain ratio was higher in S-group (17.3 %) than for R-group (13.9%). A similar result was observed by Loy et al., (1988) as Synovex induced a better feed/gain ratio compared with Ralgro in implanted steers. The improvement of energy efficiency observed in the implanted calves as they consumed less SV/kg gain was also recorded by Ayyat (1980).

Rasults of gain and relative gain (RG) of buffalo calves calculated on 30 d time intervals are presented in table (3) . It was clearly observed that gain response to implantation was higher during the second and third phases than for the early phase, whereas the control group achieved the maximum gain at the second phase of the experiment. The implanted groups sustained higher gain and RG during each time phase of the experiment over the non-implanted control group, however, the percentage increase of gain and RG was utmost at the third phase . This trend was consistent with Ayyat's findings (1980) who reported 22.8% increase in gain of weaned buffaolo calves implanted with R above that of the controls. The growth promoting action observed in our study by the anabolic implants could be explained on view of the work of Lemieux et al., (1988) suggested that anabolic implants support protein growth and function as repartitioning agent, establishing new periorities and pattern for daily protein growth through homeorhetic mechanisms.

The effect of R and S implantation on different blood biochemical and hematological parameters of male buffalo calves are presented in table (4) . Calcium, RBCs and WBCs values showed insignificant changes in R ad S-implanted buffalo calves throughout the study compared to the controls. The insignificant change in calcium level due to implantation was also reported previously by Heitzman (1974) in anabolic implanted beef cattle . Furthermore, it was observed that implantation did not affect hemoglobin values, except at 60d post-implantation as R and S-implanted group demonstrated significant ($P < 0.05$) increase. The recorded values for such parameters were within the normal range reported in buffalo calves by Ahmed (1989).

Total lipids and cholesterol levels exhibited significant ($P < 0.05$) increase by both implants reaching the maximum at 60d. compared to the control group. Ralgro-implanted calves had the highest total lipids and cholesterol level during the study which might be attributed to the work of Borger et al., (1973) who implicated that zeranol treatment might influcnce the transport and availability of growth hormone which has a lipolytic action.

The results of total serum proteins , serum albumin and globulins are illustrated in figures 1, 2 and 3, respectively. Ralgro ad Synovex-S implantation had significantly ($P < 0.05$) increased total serum protein values at 60 and 30d post-implantation, respectively (Figure 1). The increase in total serum protein was accompanied by a remarkable increase in the respective value of globulins at such time (Figure 3). The result is in accordance to the work of Ibrahim et al. (1976) who found significantly higher serum protein values following zeranol implantation in suckling buffalo calves and with the work of Contreras et al ., (1984) achieving the same result at 60d post-implantation but in Holstein steers. On the contrary. Ramadan (1979) and Ayyat (1980) found a significant decrease in the total serum protein values in zeranol-implanted buffalo steers and bulls. The action of the anabolic implants in increasing serum protein level, might be attributed to the suggestion of Hetizman (1974) indicated that anabolic steroid significantly increased N-retention and the precise action on the protein metabolism is almost certainly multifactorial which includes the effect of anabolic implants on pituitary gland, growth promoting hormones and the direct action of implant on non-endocrine tissues as liver and muscles. Albumin levels (Fig. 2) showed insignificant changes due to implantation which come in agreement with the findings of Contreras et al., (1984) in Holstein steers.

These data suggest that Ralgro and

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Synovex-S as growth promoting implants could be successfully used to improve body wight gain and feed utilization efficiency in the Egyptian male buffalo calves raised for beef production. Moreover, Synovex-S surpassed Ralgro not only in improving body gain but also by the absence of withdrawal period which was recommended to be 65 days for Ralgro-implanted beef animals.

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