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DAILY GAIN, FEED CONVERSION AND CARCASS CHARACTERISTICS OF FRIESIAN AND BUFFALO MALES IMPLANTED WITH ANABOLIC AGENTS

A. F. El-Koly[1], M.A.I. Salem[1], H.A. Abdellatif [2] and A.S. Sami[1]

1 Department of Animal Production, Faculty of Agriculture, University of Cairo, Giza, Egypt, 2 Department of Animal Nutrition, Faculty of Veterinary Medicine, University of Cairo, Giza, Egypt

SUMMARY

Eighteen males (9 Friesian, FR and 9 buffaloes, BF) were used in a fattening trial to test the effect of anabolic agents on average daily gain (ADG), feed conversion FC, carcass characteristics and some physical and chemical parameters of meat produce. Calves of each breed were divided randomly into 3 groups. The first group included non implanted animals or control, in the second group, animals were implanted with Ralgro and in the third with Synovex-s. First implantation was carried out at 178 Kg BW, second after 100 d and the 3 *rd* 100 d after the second

The results showed that Friesian calves were faster gainers, more efficient feed converters at first and second periods (each 100 d duration) but buffaloe calves excelled the Friesian calves during the last 159 days of fattening. Ralgro groups showed the lowest ADG in the first, second and whole fattening period.

Control animals were more efficient feed converters compared to treated animals. The dressing percentages were higher in Friesian compared with buffalo calves. the higher dressing percentage for FR may be explained by their heavy carcass weight compared to buffaloes, The effect of implantation was statistically insignificant.

Differences between the two genotypes in percentages of entire and bonless cut weights were significant only in hindshank and thick flank. Implantation had no effect on fore quarter cuts while it affected fillet cut only in the hind quarter. Implantation with Synovex-s tended to promote ADG and slightly increase feed conversion efficiently but Ralgro showed effect on all traits studied.

Keywords: Buffalo, Friesian, calves, growth, carcass, anabolic agents.

INTRODUCTION

In Egypt the average daily per capita consumption of animal protein is only 10 g. The minimum human requirements, as fefined by WHO or UN, is 29 g /d. The animal protein deficit, especially in red meat production, is quite large. In the meantime, demand is increasing dramatically due to the increase in population and to the upgrade in the standards of living. Native cattle and buffaloes in Egypt are of

low meat productivity as compared to improved temperate breeds of cattle.

Growth promoter implants can be used for increasing meat production. They are known to improve rate of weight gain and feed conversion efficiency. Extensive research activities have been conducted throughout the last forty years to illustrate the possibility that hormonal treatment could increase protein production by young bulls, while modifying the pattern of fat deposition in the direction required by the consumer.

The main objective of the present investigation is to determine the effect of anabolic agents, namely the US products: Ralgro and Synovex-s on average daily gain, feed conversion and carcass of Friesian and buffalo males.

MATERIALS AND METHODS

A total number of 18 male calves (9 FR and 9 BF) were randomly assigned to test the effect of anabolic agents on average daily gain, feed conversion ratio and carcass traits. Animals of each genotype were divided randomly into three groups. Animals of the first group were not implanted (control), the second group was implanted with Ralgro and the third group was implanted with Synovex-s (Table 1). Ralgro and Synovex-s were adminestered subcutaneously in base of the ear. First implant, Ralgro (commercial name) pellets in which zeranol is the active substance, produced by Pitman-Mooer, Inc., USA. The other implant was Synovex-s (trade name) pellets in which progesterone and estradiol benzoate are the active substances, produced by syntex lab, ratories, Inc., Palo Alto, USA.

Table 1. Number of Friesian (FR) and buffalo (BF) calves used in the study

Treatment Breed	Control	Ralgro	Synovex-s
FR	3	3	3
BF	3	3	3*

* One died at the end of the experiment due to high acidosis.

The implemantation was carried out three times durind the fattening period. First implantation was at the start of experiment with average weight 178 Kg for FR and BF calves. The second was 100 days after the first implantation and the third implantation was 100 days after the second. For Ralgro each animal was implanted with three pellets containing 36 mg of zeranol in each implantation. Each Synovex-s implants, animals received eight pellets, contained 200 mg progesterone and 20 mg estradiol benzoat.

Animals were kept under open sheds and were individually fed concentrates according to their body weight, clover hay and rice straw were offered *ad. lib.* The concentrate mixture was compased of cotton seed cake (45%), wheat bran (26%), ricebran (7%), maize (14%), rice germ cake (3%), lime (1%), molases (3%) and ordinary salt (1%). Water was available twice a day.

Calves were slaughtered after the last implantation with average period of 159 days. Mean of slaughter weight was 419.5 Kg (just before meassacring) Animals were weighed every two weeks. Weights of hot carcass (HCW) and internal organs were recorded. The left side of each carcass was chilled for 24 h at 5°C, then the chilled left sides were halved and quartered between the 8*th* and 9*th* ribs into fore

(FQ) and hind quarters (HQ). The fore quarters were divided into: neck, shoulder brisket, flat ribs, fore ribs and shin. The HQ was divided into round, hind shank, sirloin, thick flank, thin flank and fillet. Each cut was weighed and then dissected into bone and boneless meat (lean meat and fat) and weighed. The best ribs cuts (9, 10 and 11*th*) were also weighed and dissected into lean, fat and bone and their weights were recorded.

The data were analysed by least squares analysis of variance using the General Linear Models Procedure of the Statistical Analysis System (SAS, 1990). The statistical model included the main effects of genotype and treatment. The results indicated that there was no significant effect of the interaction between the genotype and treatment, so, it was excluded from the analysis.

RESULTS AND DISCUSSION

Daily gain and feed conversion:

Table (2) shows that Friesian calves were faster gainers in the first and second periods (736 and 732 vs 531 and 514 gm, respectively).

Table 2. Least squares means[1](±SE) and mean squares of average daily gain (ADG) in g., feed conversion (FC), Kg SV/Kg gain of Friesian and buffalo male calves at different periods

Classfication	overall mean	Genotype		Treatment					
		FR	BR	Control	Ralgro	Synovex-s	Geno-type	Treat-ment	Error
No.	17	9	8	6	6	5	1	2	13
Average daily gain, g									
1*st* period (0-100d)	634 ±0.02	736a ±0.03	531b ±0.03	631ab ±0.04	540a ±0.04	731b ±0.04	0.18**	0.05*	0.01
2*nd* period (101-199d)	623 ±0.04	732a ±0.05	514b ±0.06	636a ±0.06	577a ±0.06	656a ±0.7	0.20*	0.01NS	0.02
3*rd* period (199-358d)	730 ±0.03	693a ±0.04	766a ±0.04	766a ±0.04	692a ±0.04	731a ±0.05	0.02NS	0.01NS	0.01
Total period	679 ±0.01	716a ±0.02	641b ±0.02	699ab ±0.02	627a ±0.03	711b ±0.03	0.02*	0.01NS	0.04
feed conversion									
1*st* period	6.39 ±0.36	4.98a ±0.49	7.96b ±0.53	6.04ab ±0.60	7.72a ±0.60	5.41b ±0.66	33.22**	8.05*	2.18
2*nd* period	6.99 ±0.40	5.88a ±0.55	8.09b ±0.59	7.17a ±0.68	6.89a ±0.68	6.91a ±0.74	20.56*	0.14NS	2.74
3*rd* period	7.14 ±0.24	7.54a ±0.33	6.74 ±0.35	6.88a ±0.40	7.50a ±0.40	7.05a ±0.45	2.66NS	0.62NS	0.98
Total period	6.59 ±0.11	6.19a ±0.15	6.98b ±0.16	6.32a ±0.18	7.08b ±0.18	6.36a ±0.20	2.60**	1.05*	0.19

1 Means with different letters in the same row differ significantly at 5% level.
NS not significant, * (P<0.05) and ** (P<0.01)

Buffalo calves excelled the FR by 73 gm daily during the last 159 days of fattening period the difference was nonsignificant. Comparing the total fattening period in both Friesian and buffalo calves, it is of interest to note that FR had higher growth rate than buffalo calves (716 vs 641 gm, $P<0.05$). Previous studies on ADG of buffalo calves showed comparable figures (Ghoneim *et al.,* 1957a, 0.64 Kg/d) but the present estimate is higher than the 0.54 Kg/d by El-Koly, 1991). However, El-Kholy, 1984 and El-Kholy, 1991 found that average daily gain (ADG) obtained in FR was higher than that of buffaloes (0.97 and 0.91 Kg/d).

The lowest ADG was observed in different periods for the Ralgro treated animals, but there was an increase in ADG of Synovex-s treated animals in the first and second implantation periods. Again, the animals treated with Synovex-s showed a slight increase in ADG in the whole fattning period over control group (711 and 699 gm/d.). However, difference among treatment groups were nonsignificant.These results agree with the findings of Perry *et al.* (1970) and Basker and Arthoud (1972) who stated that Ralgro and Synovex-s implants had no significant effect on gain of steer calves and young beef bulls.

With respect to feed conversion (FC), Friesian calves compared to buffalo were significantly more efficient at first (4.98 vs 7.96 Kg S.V./Kg gain), second (5.88 vs 8.09 Kg/gain) and during the whole fattening period (6.19 vs 6.98 Kg S.V./Kg gain), while buffalo calves were more efficient only at third period (6.74 vs 7.54 Kg S.V./Kg gain) than FR calves. In the previous studies, El-Sabban *et al.* (1979) and Bedeir *et al.* (1980) reported that feed conversion (Kg S.E/Kg gain) for castrated buffalo male calves were 4.42 and 5.25, while in incastrated buffalo males FC estimates were 4.45 and 4.32, more efficient than calves in the present study (6.98). Sadek *etal.* (1995) found that in the whole experiment period (371 d) FR was more efficient than buffalo which agreed with the results obtained in the present study.

The control and tthe Synovex-s realed animals were more efficient feed converters than the Ralgro treated animals. Synovex-group excelled Ralgro group at the first (5.41 vs 7.72 Kg SV/Kg gain) and at the total fattening period (6.36 vs 7.08 Kg S.V./Kg gain).

The results show that animals implanted with Synovex-s were more efficient than Ralgro treated group. Previous studies (Brethour and Schanbacher (1983), Price *et al.i (1983); Calkins* et al. (1986), Gordon *et al.* (1988), Newnan *et al.* (1990) and Apple *et al.* (1991) showed that Ralgro and Synovex-s implants had no significant effect on feed conversion efficiency. In contrast, Greathous *et al.* (1983) observed that feed conversion ratio was improved about (18%) in Zeronal implanted bulls.

Carcass traits:

Friesian bulls had higher dressing percentages (CCW/EBW%) than buffaloes (61.69% and 57.78%, respecively) as a colcarcass weight (CCW) from empty body weight (EBW) (Table 3). This result which could be attributed to high percentage of hide, head and legs in BF as compared to FR. The effect of implantation was statistically non significant (Table 4). The same results were reported by Price *et al.* (1983), Apple *et al.* (1991) and Adams *et al.* (1993) in bulls and steers implanted with Zeranol (59.9%) as compared to bulls and steers implantated with Synovex-s (60.2% and 60.9%).

It could be noted that the amount of boneless meat produced by FR's were higher (171 kg) than in buffalo carcasses (161.79 kg) but the difference was statistically not

significant. The diffeence in boneless meat to empty body weight (BM/EBW) between FR and BF carcasses was highly significant (46.83% and 42.72%,p<.01). Buffalo carcasses scored higher percentage of non carcass fat (2.59%) than FR (2.10%), but the difference did not reach the level of significance .

Table 3. Least squares means (±SE) of embty body weight (EBW), cold carcass weight (CCW), dressing percentage (CCW/EBW%) and boneless meat (BM) of , Friesian and Buffalo bullocks treated with anabolic agents

Classi-fication traits	overall mean	Breed		Treatmen		
		Friesian	Buffaloes	Control	Ralgro	Synovex-s
No.	17	9	8	6	6	5
EBW (Kg)	373.88 ±7.41	368.5a ±10.19	379.25a ±10.89	374.00a ±12.48	361.63a ±12.48	386.01a ±13.75
CCW (Kg)	223.24 ±5.14	227.33a ±7.06	219.19a ±7.55	221.67a ±8.65	213.67a ±8.65	234.38a ±9.53
CCW/EBW %	59.71 ±.67	61.69a ±0.93	57.78b ±0.99	59.27a ±1.14	59.07a ±1.14	60.72a ±1.25
BM wt (Kg)	166.40 ±3.25	171.00a ±4.47	161.79a ±4.78	164.81ab ±5.47	157.84a ±5.47	176.54b ±6.03
BM/EBW (Kg)	44.55 ±0.56	46.38a ±0.76	42.72b ±0.82	44.21a ±0.94	43.72a ±0.94	45.72a ±1.03

Table 4. Mean squares of EBW, CCW, DP and fore and hind quarters meat cuts for FR and BF treated with anabolic agents.

Source of variance	MS		
	Genotype	Treatment	Error
d.f.	1	2	13
EBW (Kg)	484.71NS	808.92NS	934.17
CCW (Kg)	281.75NS	584.89NS	448.75
CCW/EBW%	74.65**	13.37NS	7.74
wt (Kg)	340.02NS	493.87NS	187.09
M/EBW (Kg)	54.38*	6.13NS	5.10

NS= Not significant ** = (P<0.01).

The two implants treatment (ralgro and synovex -s) did not have any effect on fat content and non carcass components. The results from previous studies showed no significant differences between nonimplanted and implanted animals with Ralgro and Synovex-s (Greathouse *et al* 1983), Gray *et al.* (1986), Jones *et al.* 1986 and Rumsey *et al.* (1992).

Animals implanted with Synovex-s had the highest values of absolute boneless meat weight and its percentage to EBW as compared to these of the control and Ralgro groups (45.72%, 43.72 and 44.21% respectively). Howerver, the differeaces due to treatment were non significant. Higher percentages of boneless meat from EBW were reported for buffaloes by Sadek, 1980 (45.6%) and El-Asheeri, 1992 (43.66%).

In agreement with results reported by El-Kholy (1991) who found that FR male calves exceeded buffalo males in meat as percentage to EBW, but his estimates were higher than the estimates obtained in this study (52.4 and 46.3% for FR and BF, resp.). On the other hand, findings of Jones et al 1986, Funagall et al., 1989 and Keane and Drennan, 1990 are in agree ment with our results that implantation with anabolic agents increases lean percentage.

Table 5 show weights of boneless cuts, table (6) show their analysis of variance. Friesian bulls had higher weights of all cuts than buffalo bull calves. The same trend was found in animals implanted with Synovex-s where they had higher weights of all cuts of the fore quarter except in shin cut.

Table 5. Least squares means[1] (±SE) of different cuts weights.

Classi-fication traits	overall mean	Breed		Treatmen		
		Friesian	Buffaloes	Control	Ralgro	Synovex-s
No.	17	9	8	6	6	5
Neck	10.36±0.28	10.64a±0.38	10.07a±0.41	10.41a±0.48	10.02a±0.48	10.92a±0.53
Shoulder	15.57±0.36	16.08a±0.50	15.05a±0.53	15.29a±0.61	15.47a±0.61	15.95A±0.67
Brisket	7.22±0.35	7.85a±0.48	6.59a±0.52	7.09a±0.59	6.92a±0.59	7.65a±0.65
Flat ribs	4.55±0.25	4.66a±0.37	4.43a±0.37	4.40a±0.42	4.06a±0.42	5.17a±0.46
Fore ribs	10.16±0.30	10.65a±0.41	9.67a±0.44	10.11a±0.50	9.72a±0.50	10.65a±0.55
Shin	4.06±0.09	4.10a±0.13	4.02a±0.14	4.14a±0.15	4.02a±0.15	4.01a±0.17
Round	33.19±0.68	33.56a±0.93	32.87a±1.00	32.55a±1.14	32.35a±1.14	34.75a±1.26
Fillet	3.09±0.07	3.05a±0.09	3.14±0.10	2.98a±0.12	2.92a±0.12	3.37b±0.13
Sirloin	6.57±0.18	6.27a±0.16	6.86a±0.26	6.38a±0.30	6.24a±0.30	7.08a±0.33
Best ribs	3.18±0.12	3.28a±0.10	3.07a±0.17	3.19a±0.20	3.16a±0.20	3.18a±0.22
Hind shank	4.63±0.08	4.83±0.12	4.44b±0.11	4.73a±0.13	4.59a±0.13	4.64a±0.14
Thick flank	3.28±0.09	3.04a±0.12	3.52b±0.13	3.07a±0.15	3.41a±0.15	3.36a±0.16
Thin flank	5.33±0.29	5.54a±0.40	3.12a+0.43	5.63a±0.49	4.57a±0.49	5.78a±0.54

1 Means with different letters in the same raw differ significantly at 5% level.

Keane and Mooer O'ferrall (1988) reported that lean (9/ kg side lean) in most of fore quarter cuts (Neck, brisket, chuck and plate) was increased by implantation with anabolic agents compared to non implanted animals (193.9 vs.99.6gm/kg side lean), while there was no significant effect of amabolic agents on lean of fore-rib (36.2 and 37.6 gm/ kg side lean) for treated and untreated steers, respectively. Almost the same results were obtained by keane and Drennan (1990). El-kholy (1991) reported that neck, shoulder, brisket, flat ribs, fore ribs and shin cuts contributed 7.40, 16.43,6.09,2.93,9.57 and 3.63% from cold carcass weight (CCW) of FR and BF males slaughtered at 450 kg live weight. Regarring weights of the hind quarter cuts, Friesian carcasses excelled those of buffaloes in the round, bestribs, hind shank and thin flank cuts weight. On the contrary, buffalo carcasses exceeded FR carcasses in the fillet, sirloin and thin flank.

Synovex-s group had the heaviest cuts, especially the high priced cuts (round, fillet, sirloin and bestribs), compared to the other two groups. Genotype had no significant effect on the hind quarter cuts weight except in the hind shank and thnck flank cuts ($p<.05$). The same trend was found among the three treatment groups, except in the fillet between synovex-s group (3.37 kg) and Ralgro and control groups (2.92 and

2.98 kg, respectively). Vanderwert *et al* (1985) found that the percentages of round and loin were 23.39 and 15.15% from carcass weight of steers and bulls implanted with zeranol. Lean of sirloin was found to be reduced by the anabolic agents in Holstein and Friesian steers (Keane and Moore Oferrall, 1988). Also, Keane and Drenan (1990) mentioned that the lean percent of fillet cut was reduced by the use of anabolic agents in heifers.

Table 6. Mean squares of meat cuts for FR and BF treated with anabolic agents.

Source of variance	MS		
	Genotype	Treatment	Error
d.f.	1	2	13
Neck	1.39NS	1.26NS	1.36
Shoulder	4.43NS	0.61NS	2.21
Brisket	6.72NS	0.77NS	2.11
Flat ribs	0.21NS	1.72NS	1.05
Fore ribs	4.00NS	1.19NS	1.49
Shin	0.03NS	0.03NS	0.14
Round	1.99NS	9.38NS	7.85
Fillet	0.04NS	0.32*	0.08
Sirloin	1.49NS	1.07NS	0.55
Best ribs	0.18NS	0.001NS	0.24
Hind shank	0.67*	0.06NS	0.10
Thick flank	1.00*	0.20NS	0.13
Thin flank	0.75NS	2.48NS	1.44

NS= Not significant ** = (P<0.01).

Best ribs cut composition:

The importance of the 9.10 and 11th rib cuts (bes tribs) is due to their positive relation with the boneless meat in the whole carcass. Tables (7) and (8) show means of the lean, fat and bone percentages in best ribs cuts and their analysis of variance. There were significant differences between friesisn and buffalo in lean (71.25 vs61.88%) and fat (10.32vs. 17.48%) percentages, the difference were highly significant (P<0.01). However, the difference in bone% was not significant (18.43 and 20.64°%, resp.). Lower values of lean and fat percentages in best ribs (60.4 and 11.2°%, resp.) and higher bone percentage (28.1°%) of buffalo calves slaughterd at 18 months of age were found by Sadek (1980). The same trend was found by Salem *et al* (1983) (62.3,10.6 and 27.1%, resp.). In the Egyptian buffalo calves slaughtered at 6 months. El-Kholy (1991) found that the mean percentages of lean, fat and bone in best ribs cuts were 64.78,10.04 and 25.19% resp. of 8 FR calves slaughtered at 450 kg live weight.

There was no significant effect of Ralgro and Synovex-s on the best ribs composition. All differences were not significant. Vanderwert *et al.*(1985) found lower lean percentage in the best ribs cuts (59.87%) than those (65.92%) obtained in the animals implanted with Zeranol. The same outcome in bove percentage was reported by Gray *et al.* (1988) in young bulles implanted with Zeranol.

Table 7. Least squares means[1](±SE) and mean square of the lean, fat and bone precentages of the best ribs cut

Classi-fication traits	Overall mean	Genotype		Treatment		
		FR	BF	Control	Ralgro	Synovex-s
No.	17	9	8	6	6	5
Lean%	66.56±1.23	71.25±1.69	61.88±1.81	66.98±2.07	65.92±0.07	66.79±2.28
Fat%	13.90±0.80	10.32±1.10	17.48±1.17	14.17±1.35	14.44±1.35	13.10±1.48
Bone%	19.54±0.80	18.43±1.10	20.64±1.17	18.85±1.34	19.64±1.34	20.11±1.48

1 Means with different letter in the same raw differ significantly 5% level

Table 8. Means squares (MS) of lean, fat and bone percentages of the best ribs cut

Source of variance	MS		
	Genotype	Treatment	Error
d.f.	1	2	13
Lean%	369.40**	1.88NS	25.77
Fat%	163.74**	3.25NS	10.86
Bone%	20.48NS	2.25NS	10.82

NS= Not significant, ** = (P<0.01).

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معدل الزيادة الزيادة اليومية والكفاءات التحويلية وصفات الذيجة لذكور الفرزيان والجاموس باستخدام منشطات النمو.

أحمد فريد الخولى [١] - محمد على إبراهيم سالم [١] - حسام أحمد عبد اللطيف [٢] - أحمد سعد سامى [١]

١-قسم الإنتاج الحيوانى، كلية الزراعة، جامعة القاهرة ٢- قسم التغذية، كلية الطب البيطرى، جامعة القاهرة.

تم فى هذا البحث إستخدام ١٨ ذكر (٩فريزيان ، ٩جاموس) ووضعت تحت نظام تسمين لدراسة تأثير المستحضرات البنائية على متوسط الزيادة اليومية والكفاءة التحويلية وايضا دراسة صفات الذبائح.

قسمت العجول من كل نوع عشوائيا إلى ٣ مجموعات:

الأ ولى: كانت عبارة عن مجموعات المقارنة (الكنترول)، الثانية: إستخدام الزرع لمادة الرالجرو بينما فى المجموعة، الثالثة: أستخدم الزرع فى الأذن بمادة سينوفيكس-اس.

بدأت التجربة، بأستخدام حيوانات متوسط وزنها ١٧٨ كجم وهو الوزن الذى إبتدأ عنده أول زرع ثم تم الزرع المرة الثانية بعد ١٠٠ يوم من المرة الأولى وتم الزرع للمرة الثالثة بعد ١٠٠ يوم من المرة الثانية.

أظهرت النتائج أن عجول الفريزيان كانت اسرع فى النمو وأكثر كفاءة فى تحويل الغذاء عند أول وثانى فتره. (كل فتره ١٠٠ يوم) ولكن عجول الجاموس تفوقت على الفريزيان خلال ١٥٩ يوم الأخيره قبل الذبح ، وأظهرت مجاميع الرالجرو أنخفاض فى معدل الزياده اليومية خلال كل الفترات بينما أظهرت مجاميع السينوفيكس-اس قيماً أعلى فى معدل الزياده فى الوزن خلال الفتره الأولى والثانيه وعلى طول مدة التسمين. بينما أظهرت مجموعة المقارنه كفاءة أعلى فى تحويل الغذاء مقارنه بالحيوانات المعاملة.

و بالنسبه لصفات الذبيحه فقد أظهرت نسبة التصافى إرتفاعاً فى عجول الفرزيان مقارنه بعجول الجاموس. والإختلاف بين الأفراد الراجعه لتأثير النوع كانت معنويه إحصائياً. والإختلاف بين النوعية كانت ظاهره فقط فى الموزه الخلفيه والبطن. والمعامله بالسينوفكس-اس كانت غيرمؤثره على القطعيات فى الأرباع الأماميه بينما كان لها تأثير على تنشيط معدل الزياده اليوميه وزيادة بسيطه فى كفاءة تحويل الغذاء بينما أظهر الرالجرو تأثيرا على كل الصفات تحت الدراسه.