

STUDIES ON GROWTH PERFORMANCE OF MALE BUFFALO AND BOVINE CALVES UNDER COMMERCIAL FATTENING FARMS IN MENOFIYA PROVINCE

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SUMMARY

The data used in this investigation were collected from three commercial fattening farms at Tabloha, Meet-khalaf and Salaka in Menofiya province. The data included 750 male calves, of which were 324 buffalo and 426 bovine calves. Live body weight gain and growth performance were considered during the fattening period, which lasted 7 months at various periods throughout the year. Results are summarized in the following:

(1) Least square means of initial body weight, final body weight, total gain and daily gain were 212.7 ± 0.7 kg, 369.5 ± 1.5 kg, 156.8 ± 1.6 kg and 746.7 ± 17.1 g/day, respectively.

(2) Purchase months significantly influenced the daily gain which reached its maximum for those purchased in April (910.5 g/day) and the least (671.9 g/day) was found for those purchased in September. The feed efficiency followed the same trend. Season of purchasing also had a significant effect on daily gain and feed efficiency. Spring season was superior (812.4 g/day and 12.6 kg DM/kg gain) as compared to Autumn (684.8 g/day and 14.7 kg DM/kg gain). Summer and Winter were similar in this respect. They were intermediate between Spring and Autumn.

(3) The highest average daily gain (840.0 g/day) was obtained from calves with initial weight less than 200 kg. Calves with an initial body weight between 200-250 kg had average daily gain of 729.0 g/day and those initial weight weighed more than 250 kg had the lowest

value (670.0 g/day). The feed efficiency values during the whole fattening period were 9.8, 13.2 and 16.9 kg DM/kg gain, for the corresponding groups.

(4) The differences among the farms were highly significant. Calves in farm of Salaka had the highest values of daily gain, being 797.1 g/day.

(5) The average daily gain of buffalo calves (782.4 g/day) was significantly higher than that of native bovine calves (711.0 g/day). The values of feed efficiency followed the same trend (12.9 and 14.5 kg DM/kg gain), respectively.

(6) Season of purchase, initial weights, farms and species had significant effects on economical efficiency during fattening period.

Keywords: Buffalo, growth, fattening and daily gain

INTRODUCTION

The great shortage of red meat production in Egypt is considered as one of the main motives for veal fattening policy. The project under consideration aims to change the pattern of red meat production in Egypt by delaying slaughter of suckling buffalo calves until they reach 400-500 kg live weight. The project consists of two stages. In the first stage, farmers raise the calves for 10 to 12 month until their weight reach 150 to 300 kg. In the second stage the Ministry of Agriculture receives such animals from the farmers to complete their fattening in the government or commercial fattening farms, until they reach 400 - 500 kg live body weight.

In the literature, there is a little information about the change in body weight gain and body performance of commercial buffalo and bovine male calves. In this respect, the daily weight gain and efficiency of feed utilization of such calves should be economically evaluated during fattening. The growth performances are the most important trait to be considered for evaluating the efficiency of meat production and economical significance for the producers.

The present study was carried out to throw some light on the effect of purchase months, initial weights, farm and species on the change of body weight, daily

gain and feed efficiency during the fattening period. The knowledge gained may yield information to be taken into consideration when planning for improving the efficiency of meat production from both buffalo and bovine male calves.

MATERIAL AND METHODS

Data were collected from three commercial fattening farms at Tabloha, Meet-Khalaf and Salaka at the Mid Delta (Menoufiya province). The data included records of 750 male calves, of them 324 were of buffaloes and 426 of bovine calves.

The bovine calves were purchased monthly from different markets in Menoufiya Province, while buffalo calves were received from the veal project. Their initial weights ranged between 150 to 300 kg. Animals were fed during the fattening period on concentrate mixture (co-op), wheat bran and rice straw according to the scheme of such farms (Table, 1). Samples of concentrate mixtures, wheat bran and rice straw were dried, ground and used for the chemical analysis according to A.O.A.C. (1980) (Table, 2). The animals were exposed to fresh water twice daily in farm of Tabloha, and four times daily in Meet-Khalaf and Salaka farms.

Table 1: The quantity of concentrate mixture (co-op), wheat bran and rice straw to each calf (kg/head/day) in fattening farms.

Initial weight, kg	Co-op *	wheat bran	Rice straw
150-249	4	1	3.5
250-299	5	1	4.0
300 or more	6	1	5.0

* Co-op feed contained: corticated cotton seed meal, 28%; wheat bran, 44%; yellow maize, 19%; rice bran; 3%; molasses; 3%; calcium carbonate, 2% & sodium chloride, 1%.

Table 2: Chemical composition of feed stuffs used.

Ingredient	Chemical Composition					
	DM	CP	CF	EE	NFE	Ash
Co-op	88	15.2	8.9	4.1	52.4	7.4
Wheat bran	91	10.5	9.2	2.5	63.2	5.6
Rice straw	92	1.5	37.8	1.6	34.6	16.6

Fasted body weight of each calf was estimated at purchase and then at monthly intervals during the fattening period, which lasted to 7 months. Economical efficiency were calculated as follow:

$$\begin{aligned} \text{L.E./kg gain} &= \frac{\text{Changing cost (feedstuffs price \& worker's wages \& medical price)}}{\text{Total gain}} \\ \text{L.E./kg live weight} &= \frac{\text{Changing cost \& purchase price}}{\text{Final weight}} \end{aligned}$$

The obtained data were classified and analysed using Least Square Procedures (Harvey, 1976) according to the following model:

$$Y_{ijklm} = U + M_i + W_j + F_k + S_l + e_{ijklm}$$

U is the general mean

M_i is the effect due to the i^{th} purchase months, $i=1-12$;

W_j is the effect due to j^{th} purchase weight, $j=1, 2, 3$, where;

1=<200 kg, 2=200-250 kg, 3=>250 kg;

F_k is the effect due to the k^{th} farm, $k=1, 2, 3$, where;

1=Tabloha, 2=Meet-Khalaf, 3=Salaka;

S_l is the effect due to l^{th} species, $l=1, 2$, where;
1=male buffalo calves, 2=male cattle calves;

e_{ijklm} is the random error effect.

Test of significance among means were performed by applying the Duncan's Multiple Test (Duncan, 1955).

RESULTS AND DISCUSSION

The least squares means and standard errors of initial and final body weights, as well as total and daily gains are presented in Tables (1, 2, 3 & 4). The corresponding overall means were 212.7 ± 0.7 , 369.5 ± 1.5 , 156.8 ± 1.6 kg and 746.7 ± 17.1 g/day, respectively. From results presented in Tables (1&2), it could be noticed that the average values of final body weight, total gain, relative growth rate and daily gain were significantly higher for calves purchased in April than those purchased in September. This could be due to the,

male calves purchased in April being subjected to the fattening program during the Summer hot season, while those purchased in September were fattened throughout the Winter cold season. A quite similar trend, was generally noticed in this concept for calves purchased in Spring as compared to those purchased in Autumn (Table, 2). In this connection, Afifi *et al.* (1974 & 1977) found that, cold weather during the fattening period caused such a drop in daily gain. El-Menshawwy (1983) observed that the daily gain of Summer fattened calves was higher than that of Winter ones. Therefore, in the present study male calves purchased in Spring months, grew faster during the Summer fattening period than those purchased in Autumn months (Tables 1&2). Also, data presented in Tables 1&2 show that calves purchased in Spring months appeared slightly better in their feed efficiency than those purchased in Autumn. However, calves purchases in Winter and Summer had intermediate values of daily gain, being 736.2 and 753.8 g/day, respectively.

Data in Table (3) show that, which calves had initial weight less than 200 kg significantly expressed the highest daily gain (840.0 g/day), meanwhile the lowest value (670.0 g/day) was found for calves initially weighing more than 250 kg. An intermediate value (729.0 g/day) was found for the calves of initial weight 200 to 250 kg. The total gain, relative growth rate and feed efficiency followed the same trend (Table, 3). In general, the total gain significantly decreased with the increase of the initial body weight. This could be explained on the basis that when the calves purchased at lighter body weight expressed greater response to the management and feeding systems applied in these farms. Duncan's Multiple Range Test revealed significant differences in the daily gain among the calves with different initial weight.

Changes in monthly gain for calves as affected by initial body weight groups are shown in Figure (1). It can be seen that monthly gain for the three groups were slightly increased until the fourth month of the fattening period. There after it sharply increased especially in the group which started with lightest body weight (<200 kg) for a month followed by a sudden decrease. So, it can be concluded that the fattening period should not exceed six month.

The results presented in Table 4 showed significant differences in the growth performance of the calves among the fattening farms under consideration. Calves belonging to the farms of Salaka and that of Meet-Khalaf were superior in their final body weight, total gain, relative growth rate and daily gain. In contrast, the calves fattened at Tabloha farm had significantly inferior daily gain ($P < 0.01$) Table 4. There were remarkable differences among the calves of the three fattening farms in the efficiency of feed utilization. Calves fattened in Meet-Khalaf showed better feed efficiency (12.6 kg DM/kg gain), followed by those fattened in Salaka farm (13.4 kg DM/kg gain). The difference among the fattening farms in the growth performance may be due to the different in management. At Meet-Khalaf and Salaka farms the watering system was four times daily, while in the Tabloha farm it was restricted to only twice daily. The role of water in fermentation, digestion, absorption and heat dissipation is well known. This may explain the differences in daily gain among the various farms due to daily number of drinking bouts. Houria (1989) has found that, the increase in drinking frequency resulted in an increase in water consumption which led to increase in ruminating activity. He added that restriction of water to 2 times daily caused a decrease in growth rate in buffalo calves under summer condition.

Figure (2) shows the changes in monthly gain for calves in the three farms. It can be noticed that, calves in Meet-Khalaf and Salaka farms had higher values than those in Tabloha farm starting from the second month. The former two farms differ starting from the fourth month. However, both were still higher than those at Tabloha farm. The most remarkable differences were in general at the last three months.

Data presented in Table (5) show that, the average initial body weight was similar (212.7 kg) for both buffalo and bovine calves. However, the average daily gain of the buffalo calves was significantly greater ($P < 0.05$) (782.4 g/day) than that of the bovine calves (711.0 g/day) Table 5. This observation agrees with those obtained by El-Kashab *et al.* (1985) and Ghoneim *et al.* (1957). Figure (3) shows the changes in monthly gain of both buffalo and bovine calves throughout the fattening period. It can be observed that buffalo calves

Fig. 1: Monthly gain of male calves as affected by initial body weight groups

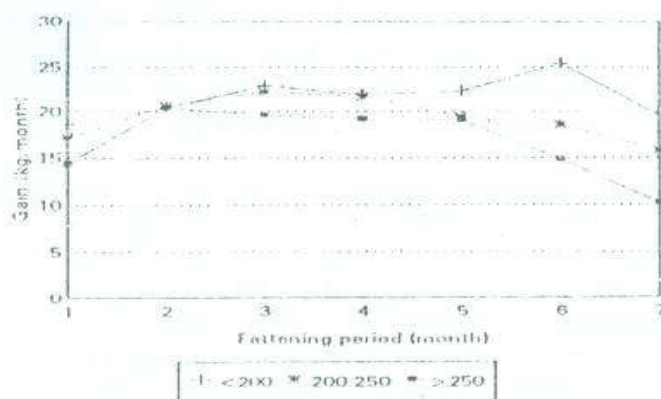


Fig. 2: Monthly gain of calves in three farms during fattening period.

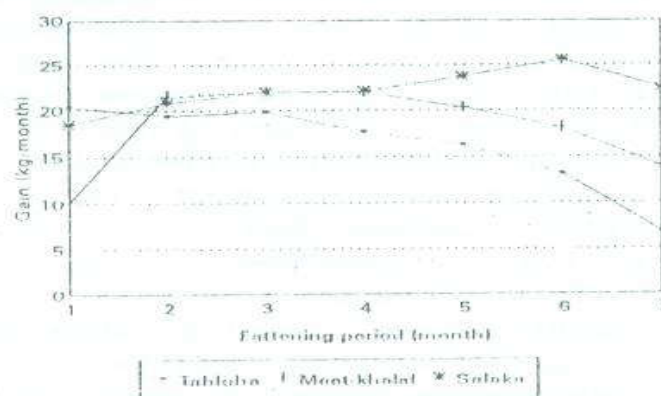
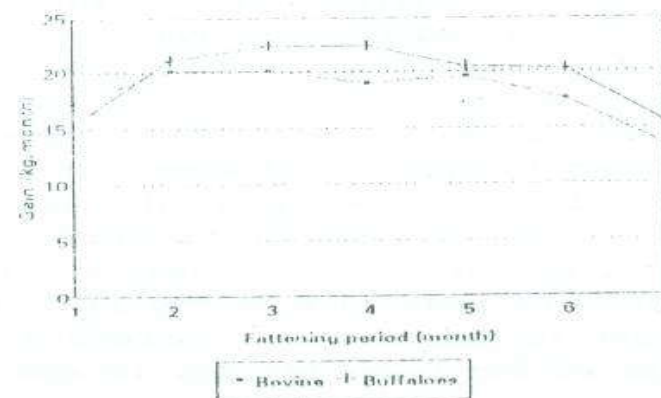


Fig. 3: Monthly gain of both buffalo and bovine during fattening period.



had higher monthly gain than the bovine calves except at the first month where the opposite was true. The coefficient of variability of both buffalo and bovine calves was similar. This means that the frequency distribution of the various groups of the initial body weight within each group was a quite similar. Therefore, the significant differences in the average daily gain between the buffalo and bovine calves were most likely due to animal species rather than differences in the initial body weight. The average daily gain of the buffalo calves in the present study was in accordance with that reported by Ghoneim *et al.* (1957), El-Koussay and Soliman (1988) and El-Koussy *et al.* (1992). They found that the average daily gain of buffalo calves ranged from 640 to 827 g/day. However the average daily gain of either buffalo or bovine calves under consideration (Table, 5) were comparatively lower than that reported for corresponding calves in Sherkia province, by El-Menshawy (1983) who found the average daily gains to be 992.5 and 947.9 g/day, respectively. These differences may be due to differences in feeding system and management conditions. The average value of daily gain of fattening bovine calves obtained by Nigm (1979) of 595.0 g/day was lower than that obtained in the present study (711.0 g/day) (Table,5). Afifi *et al.* (1977) found average daily gains of 710.0, 680.0 and 644 g/day for buffalo calves fed rice, wheat and bean straws, respectively. Consequently the feeding system substantially affects the average daily gain, which may explain the conflicting results obtained for this measurement among the various studies.

Data presented in Table (5) show that, the values of feed efficiency were slightly better in the buffalo calves than in the bovine calves. This suggest that buffalo calves utilized the low quality roughages (rice straw) more efficiently than did bovine calves.

From the foregoing results, it could be readily seen that the economical efficiency were greater for calves purchased in Spring and Summer months and calves which had initial live weights of less than 200 kg (Tables, 2 & 3). It is worth mentioning that the calves price in Summer months was relatively lower than that in the other months of year, due to the large deficiency in green feedstuff in Summer time. Therefore, most farmers sell their calves for lower prices. In addition, buffalo

calves scored, on the average higher values (2.55 L.E./kg gain and 3.70 L.E./ kg live weight) for economical efficiency as compared to 3.05 L.E./ kg gain and 3.86 L.E. / kg live weight for bovine calves. The differences among the different farms and due to species were significant. The overall average was 2.80 L.E./kg gain and 3.78 L.E. / kg live weight for fattened calves under commercial fattening farm conditions (Menoufiya province).

From information of fattened calves under consideration, it could be concluded that using low quality roughage (rice straw) with restricted amount of concentrate in feeding male calves during the second stage of fattening, could be economically efficient for the animal producer, and that the application of such feeding system would reduce the total feeding cost. Calves purchased in Spring months, if they initially weighed less than 200 kg would be expected to express higher daily gains and better feed efficiency during the fattening period. Watering of the animals may affect the rate of gain, so that it is recommend to increase the frequency of drinking to be at least four times per day.

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دراسات على أداء النمو لعجول الجاموس والابقار تحت ظروف مزارع التسمين التجارية بمحافظة المنوفية

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أجريت هذه الدراسة على ٧٥٠ من العجول الذكور منهم ٣٢٤ عجل جاموس (مشروع البتلو و ٤٢٦ عجل بقرى مشتراه من الاسواق وجرى تسمينها فى مزارع التسمين بمحافظة المنوفية (مزرعة طبلوها ، ميت خلف وسلكا)). . وذلك بفرض محاولة التعرف على بعض العوامل التى لها علاقة بأداء النمو والقابلية للتسمين . وقد دلت أهم النتائج المتحصل عليها أن :-

١- كان المتوسط العام لكل من وزن العجول عند الشراء ، وزن الجسم النهائى، النمو الكلى ومعدل الزيادة اليومية فى الوزن على التوالى هى : ٢١٢,٧ كجم ، ٣٦٩,٥ كجم ، ١٥٦,٨ كجم ، ٧٤٦,٧ جم / يوميا .

٢- تأثير شهر الشراء على متوسط معدل النمو اليومى والكفاءة الغذائية كان من الاهمية بمكان حيث أن العجول المشتراه فى شهر ابريل كانت تظهر أحسن معدل نمو خلال فترة التسمين ٩١٠,٥ جرام / يوميا. بينما كانت العجول المشتراه فى شهر سبتمبر أقل من معدل نموها ٦٧١,٩ جرام / يوميا . ايضا ظهر تأثير معنوى لموسم الشراء على معدل الزيادة اليومية حيث كانت ٨١٢,٤ جرام / يوميا فى فصل الربيع فى حين كانت فى فصل الخريف ٦٨٤,٨ جرام / يوميا . أما العجول المشتراه خلال فصلى الصيف والشتاء فقد سجلت قيما متوسطة بالنسبة لمعدل النمو اليومى والكفاءة الغذائية مقارنة بفصلى الربيع والخريف .

٣- ظهر تأثير معنويا لوزن الشراء على معدل الزيادة اليومية ، حيث كانت العجول ذات الاوزان أقل من ٢٠٠ كجم تنمو بمعدل أسرع ٨٤٠,٠ جرام/ يوميا بالمقارنة بالاوزان الاخرى ٢٠٠ - ٢٥٠ كجم ، ٧٢٩,٠ جرام / يوميا واكبر من ٢٥٠ كجم ٦٧٠,٠ جرام / يوميا . وكانت الكفاءة الغذائية ٩,٨ ، ١٣,٢ ، ١٦,٩ كجم مادة جافة / كجم نمو لكل من الاوزان أقل من ٢٠٠ ، ٢٠٠ - ٢٥٠ واكبر من ٢٥٠ كجم على التوالى .

- ٤- تأثر معدل النمو اليومي بمكان التسمين فى المزارع المختلفة ، فالعجول المسمنة فى مزرعة سلكا نمت بمعدل أسرع ٧٩٧,١ جرام / يوميا بالمقارنة بالمزارع الاخرى .
- ٥- سجلت عجول الجاموس خلال فترة التسمين قيم أعلى معنويا فى معدل النمو اليومي ٧٨٢,٤ جرام / يوميا . فى حين نمت العجول البقرى بمعدل ٧١١,٠ جرام يوميا وكانت الكفاءة الغذائية ١٢,٩ ، ١٤,٥ كجم مادة جافة / كجم نمو لكل من العجول الجاموس والبقرى على التوالى .
- ٦- أظهر كل من موسم الشراء للعجول واوزانها عند بداية التسمين وكذلك نوع الحيوان وأماكن التسمين تأثير معنوى على العائد الاقتصادى الناتج للمربي .