

## IMPACT OF MANAGEMENT PRACTICES, DAM AGE AND PARITY ON GROWTH RATE OF CAMEL CALVES UNDER FARMING SYSTEM

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### ABSTRACT

Farming system is a new technique for Camel production in arid and semi-arid regions, two experiments were conducted on sixteen camel calves, each experiment included eight calves, they were selected after calving directly Camel Research Centre and Zakiet Modern Farm in Khartoum Khartoum, Sudan. To investigate on new technique of restricted suckling of calves in order to evaluate technical effect on daily weight gain of calves for sixteen weeks under semi-intensive system, in addition to assess the impact of dam age and parity on calves growth rate from birth to four months of age under intensive system. The difference of birth weight between calves of two experiments not significantly (P0.05). High weight gain (P0.05) was observed in fourth week of restricted calves compared to that freely calves that attributed to early adaptability of restricted calves on feed concentrated. In the end of experiment, the technique of restricted suckling was not effect (P0.05) on daily weight gain of calves. Whereas, no effect of dam age and parity on growth rate of calves have been observed in this study. However, camel farming system was appreciated for improve camel productivity and reduces age of maturity.

**KEYWORDS:** Bahri, Camel Calves, Dam age, Restricted Suckling, Weight Gain

### INTRODUCTION

The camel will continue to play a significant role not only in supporting livelihoods of pastoral and agro-pastoral systems, but also as a source of income to pastoral household and the national economy. The general public is often surprised by the ability of the camel to produce milk, meat and wool and by the fact that consumers of those products still exist. It is obvious that the total camel milk or meat consumption is very marginal at the world level. The camel milk represents 2% of the world milk production and the camel meat, 1.1% only. However, its part is more important in desert countries. In fact, the camel has been able to enter in certain modernity and to integrate a productive dynamic for the satisfaction of a more urbanized population from arid countries in milk and meat (Faye *et al*, 2012).

Camels are good potential meat producers especially in arid regions where other meat-producing animals do not thrive. They grow well and yield carcasses of a comparable weight to beef cattle if optimal management conditions are

provided. Camel meat, especially from young animals, contains low fat with low cholesterol as well as being a good source of amino acids and minerals (Kadim *et al*, 2008). Tandon and Khanna (1988) noted that the camel is likely to produce animal protein at a comparatively low cost in the arid zones based on feeds and fodder that are generally not utilized by other domestic species due to either their size or food habits. Camel meat could be a cheap option to meet the growing needs for meat in developing countries especially for low income population groups (Saparov & Annageldiyev, 2005).

Calf is the main product of extensive camel breeding system in many African and Asian countries. Numerical productivity is low due to the low calving rate, which is lower than 0.45 per female per year, and the relatively high rate of calves' loss mainly during dry seasons (Faye, 1997). It is more difficult to improve calving rate than to reduce calves losses (Moslah, 1989). Productivity could be improved by new techniques: early separation and artificial nursing of calves by reducing interval between calving (Khorchani *et al*, 2004).

The main aims of this study are:

1. Detect the impact of new technique of restricted suckling of calves in order to evaluate technical effect on calf growth rate under semi-intensive system.
2. To evaluate impact of dam aging and parity on calf growth rate under intensive farming system

### MATERIALS AND METHODS

Sixteen calves were selected after calving. They were apparently healthy and safe of any inheritance disorders.

Criteria adopted for selection was similarity in age and breed order. Two trials have done to respect challenge factor in each trail such as the separation and restricted suckling on daily weight gain of camel calves under semi-intensive system, other side the factor of dam age and

parity on average daily weight gain of calves reared under intensive system have been accounted.

### Experiment I

Eight calves (includes male and female) have been selected after calving immediately and divided into two groups. Group one (CG1) all calves will be allowed to suckle freely up to 30th postpartum. Afterward, calves were allowed suckling little amount of milk before milking procedure when, they were used to stimulate milk letdown by sucking each of the she-camel's teats for a few seconds, the residual milk in the other quarters to be left consumed by the calf immediately after complete hand milking. Suckling is restricted by (Shemal) a traditional method adopted by herders. After 60th days all four quarters of the udder to be milked completely and just calves used sometimes for milk "letdown" stimulation with suckling few seconds before milking procedure. However, calves were kept in a pen near to their dams and they were restricted from sucking completely. These calves were supplemented with 0.5 kg/h of concentrated feed for calves less than 3 months then increased to 0.75 kg/h for calves more than three months old, in addition to green fodder (alfalfa fodder) daily.

While group two (CG2), calves were freely suckling up to 60th - 75th day postpartum. Afterward, calves were used to stimulate milk letdown at each milking by sucking each of the she-camel's teats before milking procedure, milk of half udder plus the residual milk in the other quarters, to be left consumed by the calf. Calves were remaining with their dam whole day and restricted suckling at midnight by used traditional restricted methods (Shemal) until end of trial in day 120th postpartum. All trial calves were herded in closed pen during the night. Only calves have two month old allow to be free for 5 hrs at light day (9:00 am - 2:00 pm) then return pen. all calves over two month were supplemented with 0.5 kg/h of concentrated feed in addition to green fodder (alfalfa fodder) daily. Water source was available daily, health care and parasites control practiced sometimes.

### Experiment II

Eight camel calves were selected from Arabi Kenana breed immediately after calving. Each of calf was identified by fire markers on their mother. Selected calves were divided in to two groups. Calves of group young (CGy), which their dam became in first or second parity after parturition where, calves of group adult (CGa) were their dam became in third, fourth or fifth parity after parturition. Both groups of calves were managed together at the same environmental conditions under intensive system. All trial calves were herded in closed pen and supplemented with 1 kg of concentrated feed in addition to green fodder (includes green alfalfa) daily for calves in age ranged (30 - 60 days old). While, supplementation with concentrated feed was increased to 1.5 kg/day/h for calves, those attended third month old until end of experiment. Water source was available daily, ad libitum access to clean

water was renewed daily and using water running tape, health care and parasites control practiced. Infected she-camel was separated and kept as alone distance from herd.

### Body weight measurement

Measurement of live body weight of calves was taken biweekly interval, which was beginning from birth weight up to fourth month for age of calves. Weight of calves were estimated from body measurements according to Yagil (1994).

The following equation was used for the body weight estimation:

$$Y = SH (m) \times TG (m) \times HG (m) \times 50$$

Where:

$$Y = \text{The weight in kg}$$

$$SH (m) = \text{The height of the shoulder in meter}$$

$$TG = \text{the chest girth behind the chest pad in meter}$$

$$HG = \text{the abdominal girth over the highest part of the hump in meter}$$

### Statistical analysis

The data were analyzed using the computer software statistix, version 8 were subjected to General Linear Model. Mean of linear body measurement and weekly growth rate of calves were computed. ANOVA was run for linear body measurement of trials, weekly growth rate and week  $\times$  trial. Least Significant Differences (LSD) Test was used to compare between averages of treatments and weeks.

## RESULTS

### Experiment I

The data present in table (1) and figure (1) shown the effect of restricted suckling and separation on growth rate of calves reared under semi-intensive system. Average birth weight of calves in CG1 and CG2 were (33 $\pm$ 1.0 kg and 32.6 $\pm$ 11.17) kg respectively. However, the different not significantly ( $P > 0.05$ ) between groups for birth weight. The average weight gain of calves in first two weeks postpartum for CG1 was slight different than that of CG2, these were (343.33 $\pm$ 157.69 vs 361.20 $\pm$ 122.14 g/d) growth curve at week four postpartum, increased significantly of CG1 ( $P < 0.05$ ) compared to CG2 (866.67 $\pm$ 157.69 vs 236 $\pm$ 122.14 g/d). In 6th week, growth curve was raised gradually ( $P > 0.05$ ) to 678.25 $\pm$ 136.56 g/d for CG2 compared to 666.33 $\pm$ 157.69 g/d for CG1 but at 10th week, CG2 was recorded higher ( $P < 0.05$ ) weight gain than that of CG1 (626 $\pm$ 136.56 vs 359 $\pm$ 157.69 g/d). In 12th week postpartum, weight gain became dropping of both groups CG1 and CG2 were 380.33 $\pm$ 157.69 and 491 $\pm$ 136.56 respectively. In week 14 postpartum, growth curve was

increased ( $P>0.05$ ) till reached peak value at 16th week of CG2 compared to that of CG1, which were ( $735.75\pm136.56$  vs  $636\pm157.69$  g/d).

Generally, the mean of daily weight gain of calves, those restricted from suckling dam or on free suckling, which was recorded similar value ( $529.25\pm55.750$  vs  $528.61\pm46.166$  g/d) within four month postpartum.

## Experiment II

The result present in table (2) and figure (2) is indicated, average of daily body weight gain of calves (CGy) belonged young she-camel compared to calves (CGa) that belonged to adult she-camel, and they were reared together under intensive system. The average of calves birth weight of CGa ( $P>0.05$ ) compared to that of CGy, these were ( $33.8\pm9.787$  kg vs  $33.25\pm4.573$  kg) respectively. The average value of calf weight gain was recorded high value ( $P>0.05$ ) of CGy compared to CGa were ( $845\pm86.26$  and  $860.5\pm70$  g/d) respectively at 2nd week postpartum. In week four postpartum, weight gain of CGy recorded high value ( $P>0.05$ ) than that of CGa, these were ( $652.25\pm86.26$  vs  $436.60\pm77$  g/d) afterward the daily growth rate was raised ( $P>0.05$ ) from 6th week till 12th week of CGa ( $661.75\pm86$  to  $709.75\pm86$ ) compared to that of CGy ( $428.33\pm99.60$  to  $666.67\pm99.60$  g/d). Unexpected decline of daily weight gain of calves was observed on both groups ( $452.33\pm99.60$  vs  $446.50\pm86$ ) at 14th month postpartum. In week 16 postpartum, daily weight gain was increased in CGa ( $P>0.05$ ) compared to that of CGy, these were ( $731.75\pm86$  vs  $666.33\pm99.60$  g/d).

Generally, the daily weight gain of calves were belonged to young or adult she-camel, they were gained similar weights throughout the first 16 weeks postpartum. The average value of daily weight gain of CGa recorded slight different ( $P>0.05$ ) compared to that of CGy, these were ( $657.39\pm29.161$  vs  $606.66\pm33.833$  g/d).

## DISCUSSION

### Experiment I

The lack of significant different of birth weight between calves, which used in this experiment (CG1 and CG2) may be attributed to similarity in husbandry practices. Moreover, all dams that used in experiment were of same breed and reared under the same environmental conditions. The result in present study is in agreement with finding by (El-Amin, 1979), who said that the Sudanese camel had birth weight ranged between 30 – 40 kg. The high weight gain of separated calves compared to calves on free suckling at fourth weeks postpartum, which may be attributed to early adaptation of CG1 on concentrated feed in addition to slow adaptability of CG2 of semi-intensive because, where calf was stayed with dam in natural pasture for some hours. This results agreed with findings of Khorchani et al., (2005) who stated that, the daily weight gain was different between calves in artificial nursing compared to that in calves kept with dams during the first 30 days postpartum (594 vs. 586 g/d

respectively) and slight low than finding by hammadi et al (2001) who stated that the daily weight gained (580 gm/day) fo calves between birth to 90 days of age. For calves in free suckling (CG2), the daily body weight gain was increased regular with advanced age compared to that fluctuated in separated calves between 4th to 12th weeks postpartum.

This may be referred to some pathological cases like respiratory inflammation, which observed on CG1. This data is in line with the observations of Khorchani et al., (2005) who stated that the difference in daily weight gain (DWG) of calves at 3 months old, due to after weaning, daily body weight of calves in artificial nursing did not change but that of calves in free suckling decreased, but difference between the two groups was not significant.

At 4th month of experiment, the difference of DWG for CG1 compared to CG2 was similar, the results revealed in this research is similar to that finding discovered by Turki et al, (2007), who reported a daily growth rate of calves from birth day to 4 month old (530-540 g/d) reared under farming system, but higher than finding obtained by Bakheit et al., (2012), who reported a DWG of  $477.6\pm10.9$  on camel calves up to 6 month old raised under semi-intensively system. The result of current study is in line with finding of Khorchani et al., (2005) who observed that productivity could be improved by new techniques: early separation and artificial nursing of calves, and this technique don't affect daily body gain of calves. The artificial nursing technique safeguards calves and ensures comparable mean daily gain compared to those of suckling calves 593 g and 607 g respectively. The result of present was agreed with finding by kamoun (1995) and cross with finding by babiker and Tibin (1989), who reported that Pre and post-weaning growth rates have significant effects on final weights of camels. The pre-weaning growth rate of the camel calf is affected by milk quantity and the system of management.

### Experiment II

In this research, the results revealed that, the age of dam had little effect on calf's birth weight under same management practices. This result is crossed with finding by Harmas et al; (1990) who stated that, the age of dam has a significant effect on birth weights. The difference of DWG at 30 days old between the two groups (higher in CGy than that in CGa), may be referred to the negative effect of separation on CGa in first week of separation compared to that of CGy. DWG was different between two groups for 1st to 4th month postpartum. This may be attributed to the highest milk production of old dam compared to young dam (Musaad et al. 2013). Therefore, calves of adult dam, they were more capability to thrive in different management system and tolerance to cold weather. According to Khorchani (1999) he reported that from the third week after separation dam/calf, commercial concentrates or ordinary mixture may be offered with a good quality fodder. Solid feeds allow calves to sufficiently develop the rumen and their capacity to digest these feed. In fact, daily body gain declined at

the 14th week postpartum due to drop in camel milk yield with increased cold condition. There was no previous studies conducted in this area.

Generally, the result of this research indicated that, high daily weight gain was observed of calves raised under intensive system. This finding is similar to that found by kamoun (1995), he observed that, Camels fed a diet with high dietary protein and energy gained more weight (550 g/d).

## CONCLUSIONS

Once research was conducted on early weaned (CG1) and freely suckling (CG2) of camel calves, there is no difference of daily weight gain between two groups from birth till four months of age. The fluctuation of growth rate during experimental periods may be attributed to calve adaptability. On other hand, lack difference was observed of birth weight of calves belong young dam compared to adult dam. obviously, the age and parity effect not significantly on daily weight gain of calves had four months of age. More research should be needed to improve daily growth rate from birth up to maturity, this to reduce the maturity age by using new techniques of camel farming system.

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**Table 1.** Average of weight gain of calves during trial period under semi-intensive system

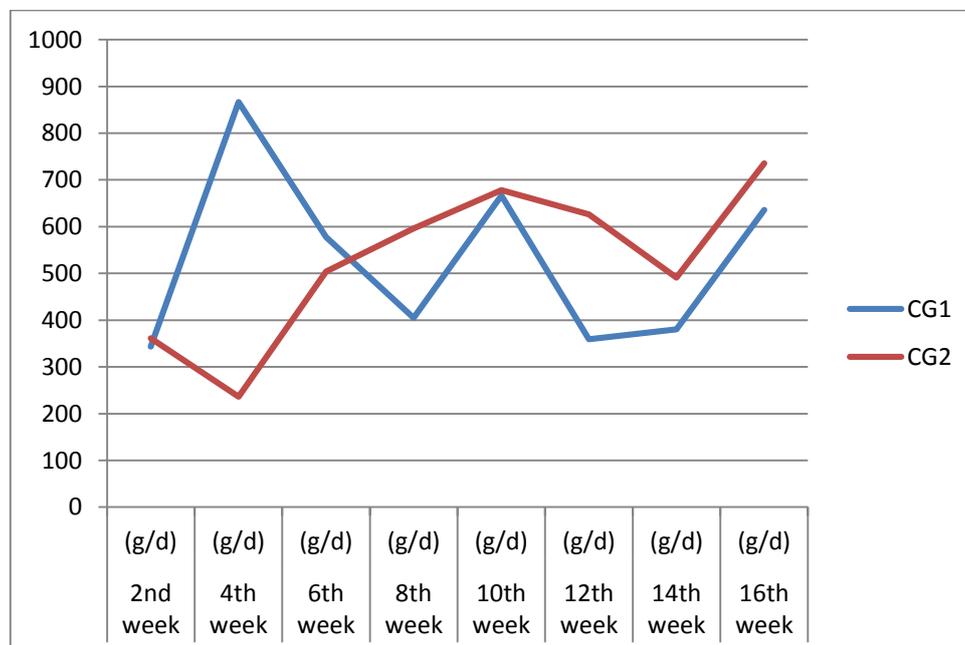
Treatment	2nd week (g/d)	4th week (g/d)	6th week (g/d)	8th week (g/d)	10th week (g/d)	12th week (g/d)	14th week (g/d)	16th week (g/d)	Overall (g/d)
CG1	343.33 ±157.69	866.67 ±157.69	577.67±157.69	404.67±157.69	666.33±157.69	359±157.69	380.33±157.69	636±157.69	529.25 ±55.750 A
CG2	361.20 ±122.14	236±12.14	504.20±122.14	596.5±136.56	678.25±136.56	626±136.56	491±136.56	735.75±136.56	528.61 ±46.166 A
Overall	352.27 ±96.56 B	551.33 ±96.56 AB	540.93±96.56 AB	500.58±103.23 AB	672.29±103.23 A	492.50±103.23 AB	435.67±103.23 AB	685.88±103.23 A	

Letters on the same column bearing differ superscripts differ significantly (P<0.05)

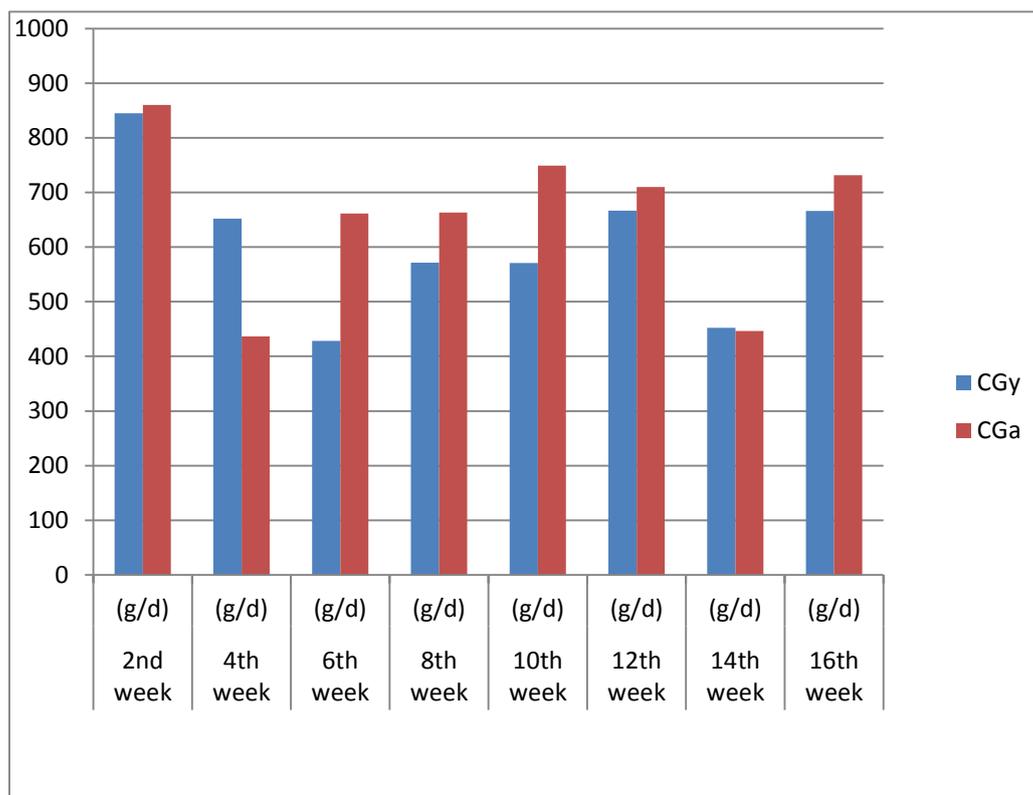
**Table 2.** Average of weight gain of calves during trial period under intensive system

Treatment	2nd week (g/d)	4th week (g/d)	6th week (g/d)	8th week (g/d)	10th week (g/d)	12th week (g/d)	14th week (g/d)	16th week (g/d)	Overall (g/d)
CGy	845±86.26 a	652.25±86.26 abcd	428.33 ±99.60 d	571.33 ±99.60 bcd	571 ±99.60 bcd	666.67 ±99.60 abcd	452.33 ±99.60 cd	666.33 ±99.60 abcd	606.66 ±33.833 A
CGa	860.5 ±70 a	436.60 ±77 d	661.75±86 abcd	663±86 abcd	749.25 ±86 ab	709.75 ±86 abc	446.50 ±86 d	731.75 ±86 ab	657.39 ±29.161 A
Overall	852.7 ±54.554 A	544.42±57.505 BC	545.04±65.205 BC	617.17±65.205 BC	660.12±65.205 B	688.21±65.205 AB	449.42 ±65.205 5 C	699.04±65.205 AB	

Letters on the same column bearing differ superscripts differ significantly (P<0.05)



**Figure 1.** Estimation growth rate of calves during trial period under semi-intensive system



**Figure 2.** Estimation growth rate of calves during trial period under intensive system