

**INTERNATIONAL JOURNAL OF ADVANCES IN
PHARMACY, BIOLOGY AND CHEMISTRY****Research Article****Impact of management systems and dam aging on
growth rate of camel calve****Ayman B. Mustafa¹, Elagba H.A. Mohamed^{2*} and Kadiga A. A/Atti³.**¹Faculty of Animal Production, University of Bahri, P.O. Box 1660, Khartoum, Sudan.²Natural History Museum, Faculty of Science, University of Khartoum, P.O. Box 321,
Khartoum, Sudan.³Faculty of Animal Production, University of Khartoum, P.O. Box 821, Khartoum, Sudan.**ABSTRACT**

The present study aimed to determine the effect of separating calves from their dams and restricted suckling, and effect of dam age and parity on the growth rate of calves under semi-intensive and intensive farming systems. Calves of trial (I) under semi-intensive system were divided into 2 groups (CG1 and CG2). Calves in CG1 were allowed to suckle each teat for a few seconds before hand milking for 60 days and calves in CG2 were allowed to suckle freely for 60 days during the day and restricted from suckling during midnight for 120 day postpartum. Highly significant difference in growth rate ($p<0.01$) was observed in the 4th week where in CG1 gained more weight compared to CG2. The growth rate subsequently decreased but was same in both groups in 10th week. In week 16, it was significantly ($p<0.05$) higher in CG2 compared to CG1. However, both groups showed an almost equal growth rate after four months of treatment. Calves in trial (II) were divided into young calves (CGy) from first and second parities after parturition and adult calves (CGa) from third, fourth and fifth parities. Both groups were managed under intensive farming system. The highest growth rate was reached by both groups in the second week. In the 4th week the rate decreased in both groups but more in CGa compared to CGy, then the growth of CGa increased and reached a high peak in the 12th week, while of CGy fluctuated with time in the subsequent weeks. In week 14 the rate came down in both groups and then increased in the 16th week, but was significantly ($p<0.05$) higher in CGa compared to CGy. It can be concluded that early separation and artificial nursing can lead to improvement in productivity and safeguard calves compared to freely suckling calves, but dam age and parity do not affect the growth rate of calves restricted from suckling. However, increase in growth rate of calves may be maintained through selection of appropriate physiological states coupled with special feed ingredients in the dairy production.

Keywords: Calves, dam age, growth rate, parity, restricted suckling, semi-intensive, intensive farming systems.

INTRODUCTION

The dromedary camel plays significant role in supporting livelihood of pastoral and agro-pastoral systems as well as a source of income generation and national economy in arid regions^{1,2}. Dromedary camel is also a good source of meat especially in tough climate that other meat animals cannot tolerate³. Physiological adaptation and behavioral adjustment are vital mechanisms for survival and reproduction of camels⁴. Although, camel meat represent 1.1% of the world meat

production, camel now enters certain modernity and integrates a productive dynamic for satisfaction of urbanized populations from arid countries in milk and meat¹. Dromedary camel is one of the most important domestic animal in Sudan, as it is equipped to produce milk, meat and wool at comparatively low cost and at extremely harsh conditions^{5,6}. Meat from camel contains low fat and cholesterol as well as amino acids and minerals^{7,8}. There are various estimates of camel live weight in the literature. The

weight of camel was found to depend on age, sex, genetics, nutrition level as well as the general health of the animal⁹. Camel reaches maturity slowly and attained its maximum live weight of about 650kg at age 7 to 8 years and calf is the main product of extensive camel breeding system. Numerical productivity is slow due to low calving rate, which is lower than 0.45/female/year, and the relatively high rate of calves' loss is mainly during the dry season¹⁰. It was found to be more difficult to improve calving than to reduce calves' loss¹¹. Early separation and artificial nursing of calves and reducing interval calving are new techniques that can be used to improve productivity¹². Therefore, the present study was designed to evaluate the effect of restricted suckling on calve weight under intensive farming system, and the impact of dam age and parity on growth rate of calves, from intensive farming system.

MATERIAL AND METHODS

The present study was conducted on sixteen healthy calves, selected from Arabi Kenana breed immediately after calving. Two trails were used: eight calves of trail (I) were divided into 2 groups: all calves in group 1 (CG1) were allowed to suckle each teat for a few seconds before hand milking to stimulate milk letdown for 60 days. The calves were daily supplemented with 1kg of concentrated feed and green fodder (alfalfa fodder). Eight calves in group 2 (CG2) were allowed to suckle freely for 60 days postpartum then left with their dams during the day and restricted from suckling during midnight for 120 day postpartum.

All calves in trial (II) were removed immediately after calving and divided into two groups: Young calves (CGy), from first and second parities after parturition; and adult calves (CGa), from third, fourth and fifth parities. Both groups were managed together under intensive farming system, provided daily with water and 1kg/day of concentrated feed and green fodder including green alfalfa. Feed was increased to 1.5kg/day/hour for calves that attend the third month of age till the end of the experiment. Body weight of calves was recorded in weekly intervals from birth up to the fourth month according to Yagil et al¹³.

Statistical analysis

Mean linear body weight and weekly growth rate of calves were determined and least significant difference (LSD) was used to compare between means by ANOVA using Computer Software Statistix, version 8. T-test was used to compare average of treatments and weeks.

RESULTS

Table (1) represents the effect of restricted suckling on the growth rate of calves under semi-intensive system. Average calve weight at birth was 33 ± 1.2 kg

in CG1 and 32.6 ± 11.7 kg in CG2. After the first 2 weeks of postpartum, average growth rate of calves in CG1 was slightly different from that in CG2, but a highly significant difference ($p<0.01$) was observed in the 4th week where in CG1 gained more weight compared to CG2. The growth rate subsequently decreased in CG1 in the 6th and 8th weeks, but increased in CG2. Both groups had almost same growth rates in 10th week. The growth rate of both groups continuously decreased in the subsequent weeks, but increased again in week 16, but the growth rate was significantly ($p<0.05$) higher in CG2 compared to CG1. However, both groups showed an almost equal growth rate after four months of treatment.

Table (2) represents the average gain in body weight and growth rate of calves from CGy and CGa reared under intensive system. Average birth weight of CGy was 33.8 ± 9.79 kg and 33.3 ± 4.57 kg of CGa. The highest growth rate was reached by both groups in the second week. After the first 2 weeks of postpartum, average growth rate of calves in CGy was significantly different from that in CGa (Fig. 2). Significant difference ($p<0.05$) was observed in the 4th week when the growth rate decreased in both groups but more in CGa compared to CGy, then the growth of CGa increased subsequently till it reached the highest peak in the 12th week, while the growth rate of CGy fluctuated with time in the subsequent weeks. In week 14 the rate came down in both groups and then increased in the 16th week, but was significantly ($p<0.05$) higher in CGa compared to CGy. However, both groups showed an almost equal growth rate after four months of treatment.

DISCUSSION

Trial (I)

According to the present results no significant difference in birth weight was observed between calves CG1 and CG2. This could be attributed to similar husbandry practices, and the fact that all dams belong to same breed and reared under same environmental conditions. A significant daily weight gained by separated calves compared to freely suckling ones at the 4th week postpartum, could be a result of early adaptation of CG1 on concentrated feed in addition to dam milk. This agrees with Khorchani et al¹⁴, who reported differences in daily weight gain between artificially nursed calves (594g/d) and calves kept with dams during the first 30 days postpartum (586g/d). A regular daily increase in weight of free suckling calves CG2 with advancing age, compared to a fluctuating increase of separated calve during the 4th and 12th weeks also agreed with Khorchani et al¹⁴ who observed daily gain weight at 3 months old to after weaning, no change in weight of

artificially nursed calves but a decrease in body weight of freely suckling calves. The present results did not detect significant difference in daily body weight gain of CG1 and CG2 at the 4th month of age. This agreed with Turkiet al¹⁵, who reported a daily growth rate of (530-540g/d) in calves from the birth day to the 4th month, reared under farming system, but higher than (477.6±10.9g/d) reported by Bakheit et al, for up to 6 months old calves, raised under semi-intensive system¹⁶. Khorchani found that early separation and artificial nursing lead to improvement in productivity and safeguard calves compared to freely suckling calves, but not affected the daily gain in body weight of calves¹⁴.

Trial (II)

No difference was observed in birth weight between CGy and CGa, but differences ($p < 0.05$) in daily body weight gain of calves 30 days old were recorded

between the two groups, where CGy gained more weight than CGa. This can be related to the early separation of CGa compared to CGy. Body weight gain was different between the calves of the two groups during the first and the fourth month. This may be due to fact that old dams give calves which have high growth rate than calves produced by young dams. These results agreed with the findings of Khorchani et al, those who observed that separation of three months old calves from dams which were provided with commercial concentrate or ordinary mixture with good quality fodder, allowed calves to develop efficient rumen and high capacity to digest these feeds¹⁷. In fact the daily weight gain declined during the 14th week postpartum due the drop in milk yield with increased cold conditions, but there is no studies conducted in this area.

Table 1
The growth rate of calves (g/day) during the trial (I) periods of restricted suckling under the semi-intensive system.

Treatment	Weeks (g/d)								
	2 nd	4 th	6 th	8 th	10 th	12 th	14 th	16 th	Overall
CG1	343.33 ±157.7	866.67 ± 157.7	577.67 ± 157.7	404.67 ±157.7	666.33 ±157.7	359 ±517.7	380.33 ±157.7	636 ±157.7	529.25 ±55.75A
CG2	361.2 ± 122.14	236 ± 122.14	504.2 ± 122.14	596 ±136.56	678.3 ±136.56	626± 136.56	491± 136.56	735 ±136.56	528.61 ± 46.17A
Overall	352.27 ±96.56B	551.33±96.56 AB	540.93 ± 69.65 AB	500.58 ±103.23 AB	672.29 ±103.23 A	492.5 ±130.23 AB	435.67 ±103.23 AB	685.88 ±103.23 A	

Table 2
The growth rate of calves (g/day) during the trial (II) periods of restricted suckling under the intensive system.

Treatment	Weeks (g/d)								
	2 nd	4 th	6 th	8 th	10 th	12 th	14 th	16 th	Overall
CGy	845 ±86.26 a	652.25 ±86.26 abcd	428.33 ±99.6 d	571.33 ±99.6 bcd	571 ±996 bcd	666.67 ±99.6 Abcd	452.33 ±99.6 Cd	666.33 ±99.6 ab	606.66 ±33.833 A
CGa	860.5 ±70 a	436.6 ±77 d	661.75 ±86 abcd	663 ±86 abcd	749.25 ±86 ab	709.75 ±86 Abc	446.5 ±86 D	731.75 ±86 ab	657.39 ±29.161 A
Overall	852.75 ±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	499.42 ±65.205 C	699.04 ±65.205 AB	

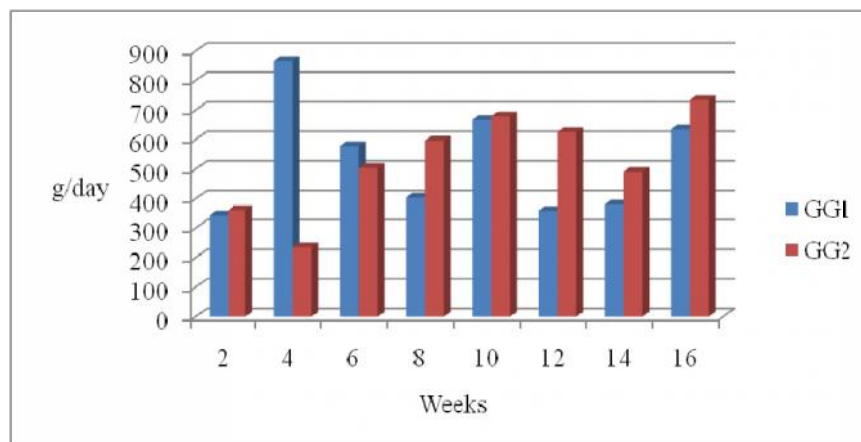


Figure 1

Diagrammatic representation of change in growth rate during the trial (I) periods of restricted suckling under the semi-intensive system

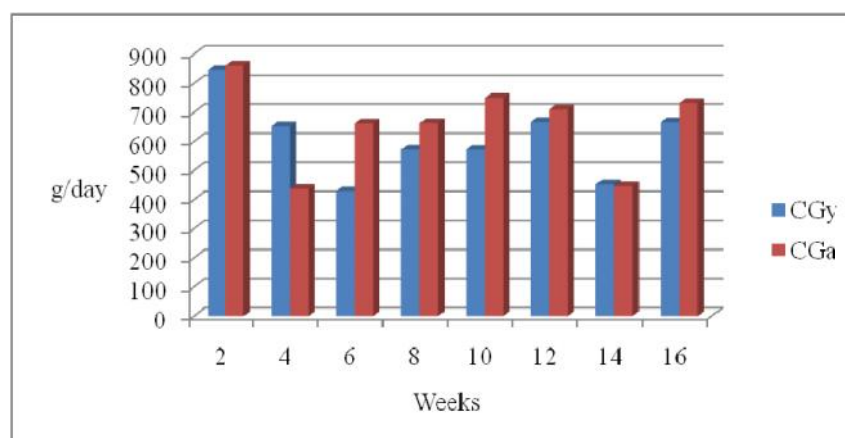


Figure 2

Diagrammatic representation of change in growth rate of young and adult calves restricted from suckling under the intensive system

CONCLUSION

The present study showed that restricted suckling resulted in fluctuating growth of calves under semi-intensive system, but both groups had almost same growth rates in 10th week and an almost equal growth rate after four months of treatment. It can be concluded that early separation and artificial nursing can lead to improvement in productivity and safeguard calves compared to freely suckling calves. In the second trial of calves managed together under intensive farming system, body weight gain was different between the calves of the CGy and CGa during the first and the fourth month, but both groups showed an almost equal growth rate after four months of treatment. So dam age and parity do not affect the growth rate of calves restricted from suckling. However, although it was proved that camel milk can

provide various potential health benefits, increase in growth rate of calves may be maintained through selection of appropriate physiological states and season coupled with special feed ingredients in the dairy production system^{18,19,20}.

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