



Growth Management of Marecha Camel (*Camelus dromedarius*) in Feedlot under Desert Conditions

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Abstract | Present study was executed to investigate the growth achievement of Marecha camels in feedlot system. The study was carried out at Camel Breeding and Research Station (CBRS) Rakh-Mahni (Thal Desert). Twelve growing Marecha intact male camels around 15-18 months of age were raised under feedlot conditions in Thal Desert. They were fed two concentrate diets with different chemical composition. Regarding roughage proportion, lucerne and gram-straw were fed. Daily feeding allowance was offered as 3% body weight. Water was provided twice a day. Non-significant daily weight gain (DWG) and dry matter intake (DMI) was observed as 0.76 ± 0.05 and 0.81 ± 0.04 kg/d. The DMI of concentrate, fodder and gram-straw was 2.94, 3.10, 1.49 and 2.97, 3.09, 1.57 kg/d in group I and II, respectively. The results confirm previous studies that growing camel calves after weaning kept into feedlot and supplemented with additional fodder and concentrate are capable to adapt new husbandry method and can gain weight like other livestock species.

Keywords | Meat production, Fattening, Camel, Pastoral, Pakistan

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INTRODUCTION

Pakistan has a sizable population of camels as 1.1 million heads and ranks 8th in the world (FAOSTAT, 2019; GOP, 2019-20). Camel has unique physiological characteristics which enable him to maintain life in harsh and hot deserts. They are well adapted to native environments in Pakistan and are important source of meat for arid and semi-arid areas. The camels normally reared in extensive conditions as pastoralists are moving around for their feeding resources (Faraz et al., 2019a).

The camel being an important animal needs to be preserved and managed properly. The strategic idea is to develop native resources to meet with the demands of exceeding population. Now the time has come to recognize the

importance of camel to take higher outputs as it is not exploited yet completely (Faraz et al., 2019b).

Despite the camel's significant contributions to the livelihood of pastorals, little attempts are done to characterize its potential in intensive management conditions. It is reared in traditional systems where its production potential can't be fully exploited. But now, the pastorals are shifting to intensive conditions from traditional practices. Hence; there is a need to take multi-disciplinary studies regarding the changing scenario. So far in Pakistan, the research studies about camel are on nomadic herds and survey reports (Faraz et al., 2019c). The need of intensive study was felt and this trial was conducted to evaluate the growth potential of Marecha camel in feedlot design by feeding experimental animals

MATERIALS AND METHODS

METEOROLOGICAL CONDITIONS OF STUDY AREA

The CBRS is situated in Desert Thal which is classified as zone III of agro-ecological region having arid climate, with highest temperature as 45.6 °C falling from 5.5 to 1.3 °C in severe winter. The rainfall is increasing from south to north and ranges between 150 to 350 mm (Rahim et al., 2011).

EXPERIMENTAL ANIMALS AND MANAGEMENT PLAN

The animals were identification marked and dewormed with 1% Ivermectin @ 1ml/50kg bodyweight to reduce the parasitic load and sprayed with Ecofleece solution fortnightly. They were kept in semi-open housing system. Initially bodyweights of animals were taken and thereafter fortnightly weighing was done. The experiment was lasted for 3 months while fifteen days were given for the adaptation of diets.

About 12 growing Marecha intact dromedary male camels of 15-18 months of age were allotted to 90-days trial to study growth. They were reared with six animals each group in stall fed system and offered roughage to concentrate ratio as 60: 40. In roughage portion, the *Medicago sativa* (lucerne) and *Cicer arietinum* (gram-straw) were fed as 70: 30. The DM, CP, EE, CF, NDF, ADF and crude ash values of gram-straw and lucerne were 93.53, 18.2; 9.72, 22.5; 2.60, 1.7; 44.4, 24; 68.7, 42.4; 47.6, 29.6 and 7.83, 12.4 %, respectively. Water was provided twice a day. They were fed two different rations including ingredients maize grain, rice polish, wheat bran, cotton seed cake, rape seed cake, corn gluten 30%, cotton seed meal, molasses, DCP and salt, the chemical composition of rations is mentioned in Table 1. Daily feeding allowance @ 3% body weight was calculated and adjusted according to fortnightly live weights.

Table 1: Chemical composition of experimental rations.

Parameters (%)	Ration-I	Ration-II
DM	90.32	90.70
CP	18.76	21.90
TDN	72.5	74.5
ME (Mcal/kg DM)	2.61	2.76
NDF	29.09	20.57
ADF	14.41	11.63

DATA COLLECTION AND LABORATORY ANALYSIS

The growth rate of the animals was calculated. They were weighed on 15 d interval before morning feeding. The feed intake of stall-fed animals was measured on DM basis. The concentrate, crop residues and fodder samples were

analyzed for % DM (Method 930.15), % crude protein (Kjeldahl Method 955.4), % crude fiber (Method 962.9), % ether extract (Soxhlet Method 920.39), % ash (Method 942.5) (AOAC, 1990). The NDF and ADF was calculated by the method of Van Soest et al. (1991).

DATA ANALYSIS

The data obtained was statistically analyzed by applying t-test (Steel et al., 1997) using SPSS software (SPSS, 2008).

RESULTS

Marecha camel attained 68.4 and 72.9 kg growth during 90 days with growth rate (P>0.05) of 760 and 810 gm/d in feedlot with conversion index (quantity of concentrate/kg of gain) of 3.87 and 3.66 in group I and II respectively (Table 2). The DMI (P>0.05) of concentrate, fodder and gram-straw was 2.94, 3.10, 1.49 and 2.97, 3.09, 1.57 kg/d in group I and II on DM basis respectively (Table 3).

Table 2: Overall weight gain (kg), growth rate (kg/d) and conversion index for male camels in Group I and II.

Parameters	Group-I	Group-II
Overall Weight Gain	68.4±2.24	72.9±1.35
Daily Weight Gain	0.76±0.05	0.81±0.04
Conversion Index (quantity of concentrate/kg of gain)	3.87	3.66

Table 3: Average male camels' feed intake (kg/d) in Group I and II.

Parameters	Group-I	Group-II
Concentrate	2.94±0.05	2.97±0.07
Fodder	3.10±0.18	3.09±0.09
Gram straw	1.49±0.09	1.57±0.05

DISCUSSION

Sing et al. (2000) reported positive correlation between growth and DMI while dry fodder and water intake was found to be correlated positively by Tandon et al. (1993). A wide value of feed conversion index as 10.76 DM kg/d for Sudanese camels aged about 24 months and weighed 376.2±42.21 kg was reported by El Badawi and Yacout (1999). A limited data available on camel nutrition demonstrating significant relationship between average daily gain and feed intake of concentrates for camels. Camels fed a diet with high dietary protein and energy gained higher body weight (550 gm/d) than non-supplemented camels fed on mangroves (260 gm/d) as reported by Faye et al. (1992).

The results agreed with Bakkar et al. (1998) and Mohamed

(2006) who observed a clear variation in camel performance when fed different types of rations. Bakkar et al. (1998) used three types of diets fed to young camels and recorded that pelleted diet group had a higher gain (932gm) than the other groups (803 and 767gm). The average daily weight gain of present study is comparable with the results of Dabiri et al. (2003) who found 688 gm growth rate in 1 to 2 years old camels. Al-Saiady et al. (2006) reported ADG as 740 gm in 90 days trial in Saudi Arabian dromedary camels fed with concentrate and hay as 75: 25.

Mohamed (2006) fed growing dromedary camels of 2 years old, with two types of rations. The control group was fed complete diet at 3% (on dry matter basis) of camel body weight while the other group was fed a ration containing black cumin seed cake (35%), molasses (18%) and a mixture of different straws (45%). The results indicated that camels fed black cumin diet were superior in ADG compared with control group (930 vs 886 gm). However, the DMI didn't differ significantly among the two diets (8.97 vs 8.95 kg for control and black cumin, respectively).

El-Badawi (2018) reviewed the present situation of animal protein in Egypt and the role of camels in providing cheap and healthy meat for people in poor greenery lands and stated that the response of camels to economical fattening was studied by many workers. The results were contradictory; most studies have been done under different feeding systems, sex and age, limited numbers, short experimental time and different types of desert range plants. Anyway; the average daily weight gain was noted to be 186-565 gm for Tunisian male camels (Kamoun et al., 1989) and much lower as 174-227 gm for Indian camels fed rations contained 11.5-12.9 % crude protein. While, El-Badawi and Yacout (2004) and Yacout and El-Badawi (2001) recorded average daily weight gain as 810-840 gm for Sudanese growing camels of 2-3 years old on rations contained 12-14 % crude protein.

Current findings are in agreement with the results reported by Mohamed (2007); twelve growing Maghrebi dromedary camels of two years old were divided in 2 groups (6+6) fed with two different dietary regimes at the rate of 3% of body weight. One group was fed diet having corn, wheat bran, soybean meal, groundnut hay as 20, 20, 15, 40 % while other group was fed with ration containing black cumin seed-cake, mixture of different straws and molasses as 35, 45 and 18 %. ADG was observed higher in experimental group as compared to control (930 vs 880 gm) with feed conversion index of 9.62 and 10.12 respectively. While the DMI ($P>0.05$) was found to be 8.97 and 8.95 kg / animal, respectively.

In their study about feedlot; Turki et al. (2007) divided twelve 2-year old intact Sudanese male dromedary

camel (6+6) in 70-day trial. Three complete concentrate diets containing different dietary feed ingredients were formulated for the experiment and offered to the animals beside the roughage and fodder. The diets were iso-caloric and isonitrogenous. Before beginning of feeding trial, camels were adapted to the experimental diets for a period of three weeks. The 3 diets were Kenana pelleted feed, cotton-seed-cake (CSC) and groundnut-cake (GNC). The reported ADG and DMI was 0.81, 4.53; 0.59, 3.99 and 0.67, 4.42 kg with Kenana pellets, CSC and GNC based diets, respectively. Feed conversion efficiency was found to be 7.14, 9.98 and 6.86 for three groups respectively.

Chibsa et al. (2014) conducted a trial on weaned camel calves (weaned at 10 months age) in Ethiopia then further supplemented with concentrate and concluded that they gained weight at 300 gm/d. Eltahir et al. (2011) studied feedlot performance of Sudanese intact camel aged about 18 months old and reported ADG (gm) and feed conversion ratio (kg feed/ kg body gain) as 620, 13.87 and 610, 12.82 in camels fed molasses and sorghum-grain based diets, respectively.

Mohamed et al. (2011) evaluate the fattening performance of Sudanese growing camels of 3-4 years old having average body weight of 260.4 kg in a 98 days trial. The animals were randomly allotted to two dietary treatments diet-A consisting of molasses feed while diet-B consisting of sorghum grain feed. During the adaptation period of 12 days the animals were fed sorghum stover diet, the experimental diets were introduced gradually until full replacement. The results indicated that no significant differences were observed in dry matter intake, rate of body weight gain and feed conversion ratio. The average daily gain (gm) and feed conversion index (kg feed/ kg body gain) was found to be 620, 10.16 and 610, 10.65, respectively for diet A and B.

Hamed et al. (2014) investigated the effect of age at fattening on Butana Sudanese male camel: 12 camels were divided at the basis of age as 2, 3 and 4 years old and fattened for eight weeks. They were weighed before the morning meal at the beginning of the experiment and then weekly. The animals were fed sorghum stover ad lib in two equal meals at 8.00 am and 4.00 pm Each animal was daily offered 2.0 kg concentrates. The animals were fed for two weeks as a preliminary period before fattening. At the end of the experiment the animals were fasted overnight, weighed and then slaughtered. Slaughter weight increased with age at fattening and were significantly ($P<0.05$) lighter at 2 years old. Saini et al. (2014) determined impact of feeding on pre-pubescent dromedary camels' growth of 300 ± 7.0 kg body weight of age between 1.5-2 years old under pastoral conditions in western Rajasthan and reported higher total and ADG in stall-fed than grazing group.

Emmanuel et al. (2015) studied the effect of different levels of supplementation on nutrient intake and growth performance in growing camels fed roughage based complete pellet diets. Eighteen growing camels of 18-24 months age having an average body weight of 306.17 ± 2.05 kg was randomly assigned to three treatment groups T1: roughage complete pellet diet without urea, T2: T1+ 1% urea, T3: T1 + 2% urea. The ADG (gm/d) and feed conversion index (kg feed/ kg body gain) was observed as 500, 12.88; 740, 9.40 and 606, 11.72 respectively, in T1, T2 and T3. Mohamedain et al. (2015) investigated growth pattern in Sudanese dromedary camel of 18-24 months age and average body weight of 225 ± 35 kg under two feeding regimens. The ADG was higher in no-browsing group as 800 gm with feed conversion index of 5.8 in comparison to 350 gm in browsing group.

Dereje et al. (2016) evaluated feedlot performance of Ogaden intact dromedary camels of 24-30 months of age with 162.8 ± 25.4 kg initial body weight. The experimental feed was urea (5%) treated maize stover basal diet fed ad libitum and a supplement consisting of wheat bran (66%), Noug (*Gizotia abyssinica* Cass), seed cake (13%), sorghum grain (20%) and mineral-vitamin premix (1%). The supplementary diet was offered to the camels in amount of 0.5 (low), 1.0 (medium) and 1.5 (high) % of body weight. Difference was observed in roughage, total DM and CP intakes, respectively for low, medium and high levels of supplements. Daily body weight gain was lower for the low supplement group as compared to the other treatments as observed 680, 790 and 840 gm respectively, in low, medium and high levels of concentrate.

Faye et al. (2018) studied the effect of date-urea blocks as supplementary feeding on growth of young camels and reported daily weight gain (gm) and feed conversion index (quantity of protein in the diet/kg of gain) as 509, 2.46 and 414, 3.04 respectively, in control and treated group in 3 years old camels. Faraz et al. (2018) investigated the growth potential of weaned Marecha dromedary calves around 10 months of age by feeding two high energy/protein rations in a feedlot and reported daily weight gain as 953 and 997 gm/day with feed efficiency of 7.08 and 6.83 respectively. Faraz et al. (2020) compared growth rate of weaned growing camel calves of almost 1-year age reared under open grazing/browsing and stall-fed system and found average daily weight gain (DWG) as 480 and 520 gm/d ($P < 0.05$), respectively under open grazing and stall-fed system while feed conversion index (quantity of fodder/kg of gain) was found to be 14.42 in stall-fed animals. The values of daily weight gain (gm) and feed conversion index (gm/kg average daily intake) of male and female weaned dromedary calves around 1-year age were found to be 670, 97.1; 650, 101.5 and 540, 154.3; 440, 125.7 reared under intensive and extensive feeding systems, respectively (Faraz, 2020).

CONCLUSION

There is a variation found in the daily gain of growing camels from different regions of the world and these results could be due to difference in the management systems, the nutritive value of the diet distributed to the animals and the breed characteristics. However, in present study there is not a great variation in weight gain with feeding two rations and non-significant results obtained as both diets were protein and energy rich and the camels were of same age, breed, sex and environmental conditions. But the cost of ration II was more than ration I as having high energy and protein than former. So, it is recommended that, for weight gain in feedlot for growing camels, the protein and energy proportions should not be too high as it will add the cost only. In addition, the growing Marecha camel attained higher daily gain in stall-fed conditions in its natural habitat. This indicates a great potential of feedlot and become a good candidate for controlled system in desert conditions. The study is a further confirmation that growing camels kept in feedlot and supplemented with additional fodder are gaining weight, like other common livestock species so camel can play a pivotal role to overcome the needs of exploding populations in the country.

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AUTHORS CONTRIBUTIONS

Asim Faraz conducted research and write up. Muhammad Younas supervised the research. Muhammad Shahid Nabeel and Naeem Ullah Khan helped in conduct of research, Abdul Waheed analyzed the data, Nasir Ali Tauqir helped in write-up, Riaz Hussain Mirza and Hafiz Muhammad Ishaq reviewed the article.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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