Pakistan J. Zool., vol. 52(2), pp 809-812, 2020. DOI: https://dx.doi.org/10.17582/journal.pjz/20190122060156

Short Communication

Comparison of Growth Rate of *Camelus dromedarius* Calves Reared under Open Grazing/Browsing and Stall Fed System

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Article Information
Received 22 January 2019
Revised 20 June 2019
Accepted 02 September 2019
Available online 14 February 2020

Authors' Contribution
AF conducted research and wrote up the article. AW, RHM and HMI helped in analysis and write up. MSN helped in conduct of research.

Key words
Camel calves, Grazing, Browsing, Growth rate, Stall feeding

ABSTRACT

This study was carried out to compare the effect of open grazing/browsing system (OGS) and feeding green fodder in the stall-feeding system (SFS) as cut and carry system on the growth of male camel calves. Fourteen Marecha male camel calves were either grazed/browsed (n=7) on natural pasture and were offered seasonal green fodder (lucerne) *ad lib* in the manger (n=7). The calves were kept on these treatments for 4 months. Initial body weights of the calves were recorded at the start of the trial and then weighed fortnightly. The overall weight gain per day in four months of feeding trial differed significantly between two groups. It is concluded that camel is a good candidate for feedlot.

Pakistan is 5th largest country in population and definitely challenged with food security. Exploring new resources is a big challenge. Livestock production requires greater attention because it provides food and livelihood support to more than 20 million people. Major constraints in livestock production are scarcity of feed resources. The demands for livestock products are steadily increasing on trends in consumption (Faraz *et al*., 2019a).

Camel is a future hope as it is playing an important role in the national economy and food security for some countries in the world. Camel is a best hope for dry areas and arid environments (Faraz *et al*., 2018; Raziq *et al*., 2008). It has nourished the bedouins, nomads and pastoral people since centuries. It is a source of food, fiber, riding, draft power and recreation (Faraz *et al*., 2013). It is a potential source for future food production especially for pastoralists and people in arid lands (Farah and Fischer, 2004; Ahmad *et al*., 2010). Camel can utilize poor quality forages with much more efficiency, as it retains fiber in its fore stomach for long as 70 hours (Kohler-Rollefson, 2005). It performs reutilization of urea for microbial protein synthesis (Mousa *et al*., 1983; Schwartz *et al*., 1992). Camels can use water economically for almost all metabolic functions (Khan *et al*., 2003).

Demand for camel meat appears to be increasing due to health reasons as it produces carcasses with lesser fat (1.2-1.8% vs. 4-8%) than cattle meat having high water contents (5-8 % more). It has relatively more poly unsaturated fatty acids (PUFA) contents than cattle meat (Kadim *et al*., 2008). It is being used as remedial purposes in the treatment of many diseases (Kurtu, 2004).

Among 1.1 million camel populations of Pakistan, Balochistan has 41%, Punjab has 22%, and Sindh has 30% while Khyber Pakhtunkhwa has 7%. Punjab has five breeds of camel in which Marecha is a best camel breed having great growth potential (GOP, 2018-19; Faraz *et al*., 2013). Hence this study was planned to evaluate its growth potential in grazing/browsing and stall-feeding system.

Materials and methods

Fourteen male camel calves (of Marecha breed) born in months of March to June 2013 around 330±30 days of age maintained at Camel Breeding and Research Station (CBRS) Rakh Mahni, Tehsil Mankera, District Bhakkar were used for this experiment. The climate of the area is arid to semi-arid subtropical continental and mean monthly highest temperature goes up to 45.6 ºC, while in winter it goes from 5.5 to 1.3 ºC. Mean annual rainfall in the region ranges from 150-350 mm, increasing from South to North (Rahim *et al*., 2011).

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0030-9923/2020/0002-0809 $ 9.00/0

The camel calves used for the experiment were divided into two groups balanced for weight and put on the following treatments: (1) Open grazing group (n=7): calves were allowed grazing/browsing 10 hours daily on natural pasture of CBRS. (2) Stall feeding group (n=7): calves were fed seasonally available fodder (lucerne) *ad lib*. The calves were kept on this treatment for four months. They were housed in semi-open pens throughout the trail. Water was offered twice daily. Before trial, camel calves were dewormed by injecting Ivermectin @1ml/50kg body weight to reduce the parasitic load. The calves were sprayed by negavon solution on monthly basis. Initially the weight of calves recorded before the respective treatment groups and thereafter weighed fortnightly on digital weighing scale (Impressum Pakistan) before morning feeding. The proximate analysis of available grazing/browsing species and fodder was performed by using standard method (AOAC, 1997; Van Soest *et al*., 1991). The feed intake was calculated in the manger as offered minus residue while in grazing animals by behavioral method as number of bites in hour multiplied by bite weight (Faraz *et al*., 2018). The average dry matter values of feed was measured and the dry matter intake then be determined. While in the grazing animals dry matter intake was estimated by using the proximate analysis values in the formula as given by Schroeder (2013).

$$\% DMI = 120 \div \% NDF$$

Overall weight gain, growth rate and feed intake were calculated for feeding period of four months and values were compared by T-test using SPSS software (Steel *et al*., 1997).

Results and discussion

On overall basis, camel calves attained 57.8 and 62.9 kg (P<0.05) weight in group-I and group-II under open grazing (OGS) and stall-feeding system (SFS), respectively during the experiment of 120 days. The average daily weight gain (DWG) of camel calves was 480 and 520 g/d (P<0.05), respectively under OGS and SFS (Table I). The findings of present study are in agreement with the values reported by Faraz *et al*. (2018) who compared the intensive management system (IMS) with semi-intensive management system (SIMS) regarding growth rate of camel calves and found higher growth rate about 674 g/d in male calves under IMS and 419 g/d in SIMS. The values of present study are also very close to their other study reporting 397 g/d in SIMS and 539 g/d in extensive management system (EMS) (Faraz *et al*., 2017). Current findings are also in agreement with the findings of another study of Faraz *et al*. (2019b) in which they compared the growth performance and hair mineral status of Marecha calves in different management systems and found significant increase in the average daily gain of male and female calves being higher in intensive management system than semi-intensive management system.

Table I. Overall weight gain and growth rate of male camel calves reared on open grazing system (OGS) and stall-fed system (SFS) for 120 days.

Parameter	OGS	SFS
Overall weight gain (kg)	57.8±3.3 [a]	62.9±3.3 [b]
Daily weight gain (kg/d)	0.48±0.02 [a]	0.52±0.02 [b]

Table II. Feed intake of different grazing/browsing species by camel calves under OGS.

Species	No. of bites /h	Bit weight(g)	DMI (g/h)	DMI (%)
Bushes				
Kari (*Capparis spinosa*)	270	2.5	675	2.3
Laana (*Haloxylon salincornicum*)	260	2.5	650	2.3
Phog (*Calligonam polygonoides*)	210	3.0	630	2.4
Karir (*Capparis decidua*)	200	3.0	600	2.2
KharLaana (*Haloxylon recurvum*)	240	2.8	672	2.4
Grasses				
Dhaman (*Cenchrus ciliaris*)	240	4.5	1080	3.1
Persain(*Suaeda fruticosa*)	180	3.0	540	2.4
Khawi(*Cymbopogon schoenanthus*)	90	3.5	315	1.9
Kali Bui (*Kochia indica*)	204	3.5	714	2.0
Bhakra (*Tribulus terrestris*)	160	2.5	400	2.6
Trees				
Kikar (*Acacia nilotica*)	220	2.8	616	2.1
Phulai (*Acacia modesta*)	165	1.3	215	2.6
Beri leaves (*Ziziphus mauritiana*)	264	1.7	449	2.5
Siras (*Albizia labbek*)	210	2.5	525	2.8
Jand (*Prosopis cineraria*)	228	3.5	798	2.5
Khagal (*Tamarix aphylla*)	210	3.0	610	2.8

OGS, open grazing system; h, hour; g, gram; DMI, dry matter intake.

Current findings are in line with the findings of Bhakat *et al*. (2008) who studied the growth performance of dromedary Indian camel calves aged between 7-10 months old in response to different management systems and reported higher growth rate in intensive system than semi-intensive management system (611 g/d in IMS and 319 g/d in SIMS). Present findings are aligned with Saini *et al*. (2014) who reported higher average daily gain in stall fed prepubescent camels as compared to grazing group. Moreover, Mohamedain *et al*. (2015) found average daily gain almost double in zero browsing groups (800 g/d) than free browsing group (350g/d) in Sudanese camel calves.

At reverse, present findings are not in agreement with the findings of Bhakat et al. (2009) who reported higher average daily gain in semi-intensive system with

Table III. Proximate analysis (%) of lucerne and different grazing/browsing species.

Feed/Forage species	DM	CP	EE	CF	NDF	ADF	Crude ash
Lucerne	20.8	19.8	22.9	28.9	41.3	33.2	3.1
Kikar (*Acacia nilotica*)	28.5	16.7	1.8	25.1	55.4	25.4	5.9
Phulai (*Acacia modesta*)	53.4	13.2	2.2	35.4	46.6	28.8	6.9
Beri leaves (*Ziziphus mauritiana*)	40.2	15.5	5.8	28.0	48.3	26.9	8.5
Siras (*Albizia labbek*)	37.3	16.2	6.6	27.3	43.0	29.0	16.3
Jand (*Prosopis cineraria*)	46.1	16.9	6.5	19.1	47.5	29.0	5.0
Khagal (*Tamarix aphylla*)	31.9	12.8	3.3	17.3	42.4	31.6	13.0
Dhaman (*Cenchrus ciliaris*)	31.9	14.7	3.9	26.5	38.5	18.2	15.7
Persain (*Suaeda fruticosa*)	30.3	10.6	5.5	33.1	48.7	27.6	7.5
Khawi (*Cymbopogon schoenanthus*)	34.6	9.5	2.0	35.7	62.1	43.5	7.1
Kali Bui (*Kochia indica*)	33.8	10.8	4.9	27.6	58.6	39.8	13.3
Bhakra (*Tribulus terrestris*)	32.1	8.8	4.6	32.6	46.7	35.4	9.6
Kari (*Capparis spinosa*)	36.7	17.8	1.2	30.8	51.8	33.5	7.0
Laana (*Haloxylon salincornicum*)	34.2	15.9	3.0	32.3	51.3	37.5	11.9
Phog (*Calligonam polygonoides*)	34.7	9.0	4.8	23.4	49.6	31.9	8.8
Karir (*Capparis decidua*)	49.4	16.8	1.5	24.6	53.6	37.8	14.8
Khar Laana (*Haloxylon recurvum*)	47.9	12.4	3.3	25.0	49.2	31.3	12.2

DM, dry matter; CP, crude protein; EE, ether extract; CF, crude fiber; NDF, neutral detergent fiber; ADF, acid detergent fiber.

browsing/grazing (325 and 476 g/d) than intensive system of management (278 and 331 g/d) with *Cyamopsis tetragonoloba* (guar phalgati) and *Phaseolus aconitifolius* (moth chara) feeding, respectively in Indian male dromedary camel calves. Furthermore, Bakheit *et al*. (2012) reported 535 g/d in semi-intensive and 317 g/d average daily weight gain under traditional management system in Sudanese camel calves. Obviously, the comparisons could be debatable because, the experimental conditions (notably the age of the calves, the nutritive values of grazed plants and the duration of the experiment) being different. However, most of the published results emphasize the possibility of a better growth with intensive feed system and consequently a better precocity of the puberty (Al-Saiady *et al*., 2013).

The daily feed intake (DFI) of lucerne fodder was 7.5 kg on DM basis and 41.62 kg on fresh weight basis in stall feeding group. While dry matter intake (DMI) of different bushes, grasses and trees available in natural pasture in experimental area and proximate analysis of these species is shown in Tables II and III. In a former trial, Faraz *et al*. (2018) studied the growth performance of camel calves in different management systems and reported higher weight gain as well as daily feed intake in calves reared under intensive management system. Faraz *et al*. (2017) studied growth performance of camel calves in semi-intensive and extensive management systems. In semi-intensive system the calves were fed crop residues as manger feeding along with 8 hr grazing while in extensive system the calves were allowed grazing for 10 hr and rest of time fed with households. They found non-significant differences regarding feed intake among calve groups between these systems. In very recent study of Faraz *et al*. (2019b), they compared the growth performance and hair mineral status of Marecha calves in different management systems and found significant difference in crop residue's intake in male and female Marecha camel calves being higher in intensive management system than semi-intensive management system.

Bhakat *et al*. (2008) studied the effect of management systems on growth performance of Indian camel calves and reported significant differences about the crop residue intake between two groups, 5.53 vs. 4.37 kg/calf/d in intensive system of management (ISM) and semi-intensive system of management (SISM), respectively. Moreover, Saini *et al*. (2014) reported higher DMI (kg/d) in stall fed pre-pubescent camels as compared to grazing group.

Conclusion

Higher daily weight gain (growth rate) was observed in stall fed calves than grazing calves. It is evident that camel has remarkable growth potential under the stall-feeding system that proves it a good candidate for feedlot and it can contribute to bridge the food shortage gap of the country. Further studies should be done in this regard to check the growth potential of camel calves in different

management systems of different breeds and feedlot designs to know about the responses to different feeding regimens. These types of studies are very important to build the country's database for future studies and to check the production potential of indigenous genetic resource that will help to overcome the prevailing food shortage in the country and to ensure the food security.

Acknowledgements

The Authors gratefully acknowledge the cooperation and kind support of the management of Camel Breeding and Research Station (CBRS) Rakh Mahni district Bhakkar, Punjab Pakistan. The financial support of Higher Education Commission (HEC) Islamabad, Pakistan, made this study possible.

Statement of conflict of interest

The author declares there is no conflict of interest.

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