

FATTENING PERFORMANCE AND CARCASS CHARACTERISTICS OF MALE AND FEMALE BUFFALO CALVES OF KUNDI BREED

*Zahid Iqbal Rajput^{1,4}, Adnan Ali², Imran Rashid Rajput³, Noor Ahmed Soomro⁴, Hamzo Khan Kunbhar², Ambreen Leghari¹, Khalid Mirbahar¹

¹Shaheed Benazir Bhutto University of Veterinary and Animal Sciences Sakrand, Pakistan

²Sindh Agriculture University, Tando Jam, Pakistan

³Lasbela University of Agriculture, Water & Marine Sciences, Uthal, Balochistan, Pakistan

⁴Research & Development Section, Directorate of Animal Husbandry Sindh, Hyderabad, Pakistan

*Corresponding Author: Zahid Iqbal Rajput, Email: rao_rajput2002@yahoo.com

ABSTRACT: Fourteen growing Kundi buffalo calves, 11-12 months of age were fed for a period of 120 days in ordinary village condition. The animals were divided into male and female (7 of each) groups of an average weight 158 ± 9.92 and 140 ± 7.15 kg respectively. Experimental diet offered was formulated with corn yellow grain, rice grain, rapeseed meal, cotton seed cake, molasses cane, calcium carbonate, dicalcium phosphate, urea, salt, mineral premix and wheat bran with 14.03% crude protein and 55.06% Total Digestible Nutrient. Animals were fed on ration contained 2 kg experimental diet and wheat straw ad-lib along with 5kg chaffing green maize fodder for each animal. The calves were weighed fortnightly intervals and average daily weight gain (ADG), in male and female, was recorded. There was no significant difference in ADG although male buffalo calves had numerically higher ADG (0.804 vs 0.728) than female. Dressing percentage, boneless meat, lean meat, bone, fat and other tissues in male and female were 52.5% and 51%; 77.5 and 76; 59% and 58.5%; 22.5% and 24%; 12.9 and 11.5; 5.6 and 6 respectively. Likewise, crude protein (20.8% vs 20.8%) and moisture in lean meat (74.55% vs 74.5%) of male and female were similar. It is concluded that there was no significant difference in ADG and carcass characteristics between male and female buffalo calves.

Key Words: Kundi, Buffaloes, Male calves, Female calves, Fattening, Meat production

INTRODUCTION

The domestic buffaloes (*Bubalus bubalis*) belong to the family bovidae, sub-family boviniae and genus bubalis. Buffalo is considered more beneficial than cow in terms of health and production [1], however the Asian buffaloes are believed dynamic properties of meat and milk production [2]. Worldwide, most of the buffaloes are riverian or swamp type. It was observed that less than five buffaloes were raised by 98% of small farmers with not a much of two hectares of agriculture land [3]. Asia especially in sub-continent, buffalo is a major source of meat and is very popular in most buffalo loving countries [4] Buffalo has a great potential to meet the deficiency of per capita requirement of meat [5].

The buffalo meat is contributed 3,722,800 tons in total meat production of world (310,780,820). Pakistan is the 2nd largest buffalo meat producer (833,000) after India (1,610,000) [6] however, most of the meat is produced from culled or surplus animals [4]. It has been imparted that buffalo meat is tendered, palatable of high quality, low in fat and acceptable to the consumer. Meat production is desired to get the high weight gain in the form of veined carcass with more muscles and minimum fat percentage [7]. However, an adequate amount of intramuscular fat is important for beef flavor [8]. The quality of beef is the key of demand with main features of tenderness and flavor [7,9,10,11]. Eating poor quality roughage, buffalo grows faster than cattle because of their better digestibility of dietary crude protein and crude fiber [12,13,14]. The cost of fattening per kg body weight is therefore much lower for buffalo than cattle [15]. In Sindh province, Kundi is a massive buffalo breed of riverian type used for triple purposes (milk, meat, draught) having small and spirally twisted horns. Present study was planned to

investigate the fattening potential and carcass quality of males and female calves of kundi buffalo breed.

MATERIALS AND METHODS

The feeding trial was conducted under Livestock Sector Development Project in Sindh.

Animals

Fourteen growing male and female Kundi buffalo calves (7 each) with an age of 11-12 months, were fed during the investigation period of 120 days. The animals were distributed randomly into two groups. Group -I was comprised with male of an average weight 158 ± 9.92 kg and Group-II of an average weight 140 ± 7.15 kg.

Experimental diet and chemical composition

The ingredients used in experimental diet were corn yellow grain, rice grain, rapeseed meal, cotton seed cake, molasses cane, calcium carbonate, dicalcium phosphate, urea, salt, mineral premix and wheat bran with 14.03% and 55.06% CP and TDN respectively (Table-1).

Feeding trial

All the animals were housed individually in ventilated and concrete floored house with availability of fresh water round the clock. A 15 days adjustment period was given to the animals prior to data collection during which de-worming for internal parasites and vaccination against contagious diseases (FMD & HS) were performed. All the animals were offered the ration as per Table-2 comprised of 2 kg experimental diet along with 5 kg of chaffing green maize fodder and wheat straw (*ad-lib*). The animals were weighed fortnightly intervals early in the morning before feeding and average daily weight gain (ADG) and feed conversion ratio (FCR) were calculated.

Table-1 Composition of experimental diet

Name of Ingredient	Percentage
Corn Yellow Grain	15.000
Rice Grain	16.500
Rapeseed meal (15%)	15.500
Wheat bran	38.00
Cotton Seed Cake	7.000
Molasses Cane	4.000
Calcium Carbonate	1.100
Dicalcium Phosphate 17%P	0.250
Urea 281 % Prot, Equiv.	1.000
Salt, NaCl	0.650
Mineral Premix	1.000
Total	100.00
C.P.	14.03
T.D.N.	55.06

Carcass evaluation

At the end of trial, two calves from each group were slaughtered for carcass evaluation. The calves were fasted for 12h prior to slaughter. The values of dressing percentage, boneless meat (%), lean meat (%), bone (%), fat (%) and other tissues (%) in male and female were recorded. The physiochemical analysis of lean meat was carried out as described previously [16].

Statistical analysis

All data gathered were subjected to ANOVA using Microsoft Excel-2003.

RESULTS**Growth performance and feed conversion ratio**

Table-2 presents the comparative growth rate of male and female kundi buffalo. The averages of initial weight, final weight, total weight gain and daily gain were 158 ± 9.92 and 140 ± 7.15 ; 254.48 ± 18.58 and 227.364 ± 7.97 ; 96.48 ± 10.96 and 87.364 ± 1.8 ; 0.804 ± 0.091 and 0.728 ± 0.015 in male and female buffalo calves respectively. There was no significant difference in ADG between male and female calves. The ADG was similar, although male buffalo calves showed numerically higher value as compared to female calves (Fig.1). The FCR of group I and II were recorded 10.44 ± 0.46 and 11.4 ± 0.5 respectively (Table-2).

Table-2 Growth performance of group I and II (mean±S.D)

Parameters (per animal)	Group-I (♂)	Group-II (♀)
Ration		
Green Maize fodder	5	5
Experimental diet	2	2
Wheat straw	ad-lib	ad-lib
Growth performance (Kg)		
Average initial weight	$158\pm 9.92^*$	140 ± 7.15
Average final weight	$254.48\pm 18.58^*$	227.364 ± 7.97
Average Total weight gain	96.48 ± 10.96	87.364 ± 1.8
Average daily weight gain	0.804 ± 0.091	0.728 ± 0.015
Feed conversion ratio	10.44 ± 0.46	11.4 ± 0.5

*Significantly different ($P < 0.05$)

Carcass evaluation

Carcass evaluation is shown in Table-3. Dressing percentage was determined by dividing total dressed meat by the total live weight of animal. The dressing percentage in male and female calves was determined 52.5 ± 0.707 and 51 ± 1.414 respectively. The value of dressing percentage in male was

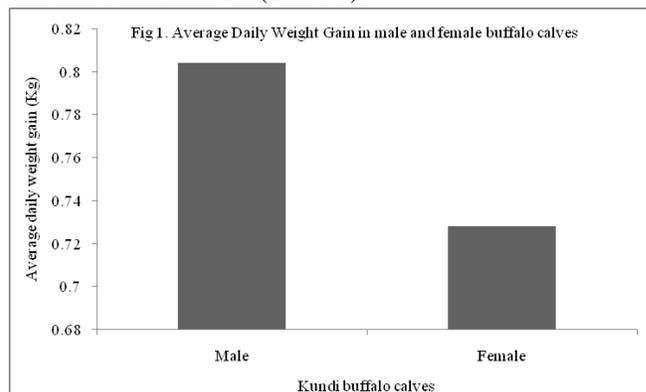
numerically somewhat higher than female. However, the difference was statistically non-significant. The percentage of boneless meat in male and female group was 77.5 ± 0.989 and 76 ± 0.707 respectively and shown non-significant difference. The percentage values of lean meat, bone, fat and other tissues were 59 ± 1.414 and 58.5 ± 2.121 ; 22.5 ± 0.848 and 24 ± 1.697 ; 12.9 ± 0.565 and 11.5 ± 0.282 , and 5.6 ± 0.141 and 6 ± 0.424 for male and female, respectively. The values of lean meat and fat were slightly higher while the values of bone and other tissues were slightly lower in male than female but non-significant in present study.

Table-3 Carcass evaluation (mean±S.D)

Parameters	Group-I (♂)	Group-II (♀)
Dressing percentage	52.5 ± 0.707	51 ± 1.414
Boneless meat (%)	77.5 ± 0.989	76 ± 0.707
Lean meat (%)	59 ± 1.414	58.5 ± 2.121
Bone (%)	22.5 ± 0.848	24 ± 1.697
Fat (%)	12.9 ± 0.565	11.5 ± 0.282
Other tissues (%)	5.6 ± 0.141	6 ± 0.424
Chemical composition of lean meat		
Moisture (%)	74.55 ± 0.09	74.5 ± 0.14
Crude protein (%)	20.8 ± 0.51	20.8 ± 0.52

Chemical composition of lean meat

The average values of moisture observed in lean meat of buffalo calves were almost similar for male ($74.55\pm 0.09\%$) and female ($74.5\pm 0.14\%$). The values of crude protein in the lean meat of male (20.8 ± 0.51) and female (20.8 ± 0.52) observed was also same (Table-3).

**Fig. 1: Average daily weight gain in male female buffalo calves****DISCUSSION**

The results of present investigation revealed that there was no significant difference in ADG but numerical values in male calves were higher than female. Previous researchers [17,18] conducted numerous feeding trials with different composition of ration, in different ages of male and female buffalo calves and found no significant differences between both sexes except the numerical differences in average daily weight gain. In present study, average daily weight gain in male and female calves was 804g and 728g respectively. The ADG had also been reported previously as 752g [19] and between 700-800g [20] in different feeding trials while in another two studies the ADG was observed 782g and 841g [21]. These values were closer to our findings. However, some other studies shown ADG 0.63, 0.74, 0.619, 0.930 and 0.828 kg with various feed composition offered to buffalo calves [22,23,24,25,26]. Present findings of FCR were also in agreement with the findings of Lapitan *et al.* [26] reported 11.1 FCR of cross breed buffalo (Philippine carabao x

Murrah) in a feeding trial for 180 days. However, Hasimoglu *et al.* [21] and Paul *et al.* [24] reported FCR values, as 5.088 & 5.655 and 8.76 respectively, which were not in agreement with present findings. The difference in ADG and FCR could be due to the differences in feed formulation, breed, environment and length of trial. The values of dressing percentage in males buffalo calves were in accordance with the study of El-Serafy [27], Paul [24] and Spanghero *et al.* [25] who reported 52.3, 52.7 and 52.6 dressing percentages respectively. While some other authors [28,29,30,31,32], recorded 55.2, 48.5, 53, 53.33 and 48 dressing percentage. Present results of boneless meat were also in agreement with the result of Thu [33] who recorded 77.61% boneless meat. While some other authors [28,27,29,30] reported 82.7, 81.7, 68.21 and 78.45 percent boneless meat. The difference may be attributed due to the differences in breed and feed offered. The lean meat percentage found in present investigation (59% & 58.5%) was in agreement the findings of Lambertz *et al.* [34] that was 58.9% but not in agreement with the some other findings [28,29] those were reported 68.673% and 49.63% of lean meat. The values of bone (i.e. 22.5% & 24%) in present study was in accordance with previous study [33] that shown 22.39% bone in buffalo fattening trial. While some other researcher's [27,28,29] observations 17.3%, 18.3% and 12.96% of bones were not in agreement with present findings. The variation again might be due to the differences of breed, ration formulation and management practices. The percentage of fat (12.9% & 11.5%) and other tissues (5.6%) in present findings were in agreement with another finding [34] reported fat (12.7% & 11.8%) and other tissues (4.2%) and also with the findings of Ahmad *et al.* [29] who reported 12.96% (fat) and 5.62% (other tissues). The average values of moisture (74.5%) observed in present study was almost in agreement with previous (75.4%, 73.34% & 73%) finding [25, 29 & 34] respectively, but not in agreement with the another findings (62.94%) that was miht be due to different ration [35]. . The same value of crude protein (20.8%) in the lean meat of male and female observed in present study was in agreement with the findings (20.85%) of Spenghero [25] while not in agreement with other study [35] with 29.79% crude proten. The differences in the values could be due to the breed and age of slaughter.

CONCLUSION

It is concluded that there was no significant difference in ADG and carcass characteristics between male and female buffalo calves. However numerically, the ADG values of male were higher than female. Buffalo calves had good fattening potential and they could be saved from slaughter at early age.

REFERENCES

- [1] Bhat, N.P., Buffaloes. In: Payne WJA, Wilson TR, editors. An Introduction to Animal Husbandry in the Tropics. UK: Blackwell Science Oxford (Oxfordshire); pp. 815(1999).
- [2] Cockrill, W.R., Present and future of buffalo production in the world. Proceedings of the Fifth World Buffalo Congress, 27-30 June (1994), Sao Paulo, Brazil. Ahmad, F., Jabbar, M.A., Ahmad, I. and Afzal, M., Comparative Fattening Potential and Carcass Evaluation of Simmental and Brown Swiss Crossbred Calves. *Int. Agri. Biol.*, **6**(1):206-208(2004).
<http://www.lrrd.org/lrrd18/9/bila18128.htm>
- [3] Mudgal, V.D., Buffalo meat. In: Encyclopedia of Food Science Technology and Nutrition. Academic Press, London, UK. pp. 521(1992).
- [4] Bilal, M.Q., Suleman, M. and Raziq, A., Buffalo: Black gold of Pakistan. *Livestock Research for Rural Development*, 18, Article #128, Retrieved October 29, (2016).
- [5] Kondaiah, N. and Anjaneyulu, A.S.R., Potential of buffalo meat to processing different products. Proc. of Fourth Asian Buffalo Congress, New Delhi, India, Feb. 25-28: 200-204(2003).
- [6] FAOSTAT., FAOSTAT Agriculture Data, FAO Statistics, Rome, Italy (2013). <http://apps.fao.org/faostat/collections>
- [7] Ahmad, F., Jabbar, M.A., Ahmad, I. and Afzal, M., Comparative Fattening Potential and Carcass Evaluation of Simmental and Brown Swiss Crossbred Calves. *Int. Agri Biol.* **6**(1):206-208(2004).
- [8] O'Quinn, T. G., Woerner, D. R., Engle, T. E., Chapman, P. L., Legako, J. F., Brooks, J. C., Belk, K. E. and Tatum, J. D., Identifying consumer preferences for specific beef flavor characteristics in relation to cattle production and postmortem processing parameters. *Meat Sci.*, **112**:90-112(2016).
- [9] Igo, J. L., VanOverbeke, D. L., Woerner, D. R., Tatum, J. D., Pendell, D. L., Vedral, L. L., Mafi, G. G., Moore, M. C., McKeith, R. O., Gray, G. D., Griffin, D. B., Hale, D. S., Savell J. W. and Belk K. E., Phase I of The National Beef Quality Audit-2011: Quantifying willingness-to-pay, best-worst scaling, and current status of quality characteristics in different beef industry marketing sectors. *J. Anim. Sci.*, **91**:1907-1919(2013).
- [10] Steiner, J. G., Estimating U.S. consumer beef demand differentiated by USDA quality grades. M.S. Thesis, University of Missouri, Columbia, (2014).
- [11] Corbin, C. H., O'Quinn, T.G., Garmyn, A.J., Legako, J.F., Hunt, M.R., Dinh, T.N., Rathmann, R.J., Brooks, J.C. and Miller, M.F., Sensory evaluation of tender beef strip loin steaks of varying marbling levels and quality treatments. *Meat Sci.*, 100:24-31(2015).
- [12] Sebastian, L., Mudgal, V.D. and Nair, P.G., Comparative efficiency of milk production by Sahiwal cattle and Murrah buffalo. *Jour. Anim. Scie.*, **30**:253-256(1970).
- [13] El-Ashry, M.A., Impact of feeding and management on maturity in buffalo. Proceedings of the World Buffalo Congress, Vol. II. New Delhi, India, pp. 548-555(1988).
- [14] Pradhan, K., Bhatia, S.K. and Sangwan, D.C., Relative rumen ecosystem and nutrient digestibility in cattle and buffalo fed high fibrous diets. Technical bulletin Haryana Agriculture University, Hisar India, (1991).
- [15] Chantalakhana, C., Urgent need in buffalo development for food security and self-sufficiency. Proceedings of the National Workshop on Swamp Buffalo Development, Hanoi, Vietnam, pp. 1-10(2001).
- [16] AOAC., Official Methods of Analysis. 13th Ed., Assoc. of Official Agric. Chemists Washington, DC. (1984).
- [17] Romita, A. e Da and Silva Dias, A.V., Accrescimenti e indici di conversione di bufali allevati fino a sei mesi con tre regimi alimentari diversi. *Annali dell'Istituto Sperimentale per la Zootecnia*, **7**:79-87(1975).

- [18] Ahmad, I.A. and El-Shazly, K., Ruminant nutrition: selected articles from the world animal review. Early weaning of buffaloes in Egypt. *FAO animal production and health paper*, **86**:14-15(1978).
- [19] Ahmad, S.I., Haq, Z.U., Jabbar, G., Muhammed, Y., Sultan, S., Ihsanullah and Khan, D., Growth performance of calves in Khyber Pakhtunkhwa. *The Journal of Animal and Plant Sciences*, **23**(1 Suppl.): 98-102(2013).
- [20] El-Ashry, M.A., El-Sherafy, A.M., Khattab, H.M., Aly Abbas, M. and Zaky, A.A., Effect of milk replacer diets on post-weaning performance and carcass measurements of buffalo calves. *Indian Jour. Anim. Sci.*, **51**:32-38(1981).
- [21] Hasimoglu, S., Channa, A.D., Baloch, G.M., Waggan, P.K., Gunther, K.D. and Menke, K.H. 1984. Fattening of young cattle and buffalo on straw based rations, increasing their digestibilities and effect of whole and crushed barley. *Zeitschrift-fur-Tierphysiologie,-Tierernahrung-und-Futtermittelkunde*, **52**:143-154(1984).
- [22] Sharma, K.M. and Talapatra, S.K., Growth response in buffalo calves. *Jour. Dairy Sci.*, **19**:236-244(1963).
- [23] Charles, D.D. and Johnson, E.R., Live weight gains and carcass composition of buffalo (*Bubalus bubalis*) steers on four feeding regimes. *Aust. Jour. Agri. Res.*, **26**:407-413(1975).
- [24] Paul, S.S., Kamboj, M.L. and Chawla, D.S., Growth performance and carcass characteristics of Nili-Ravi buffalo calves reared for beef on roughage dominated feeding regimes. *Buff. Jour.*, **17**:331-342(2001).
- [25] Spanghero, M., Luisa Gracco, Valusso, R. and Piasentier, E., In vivo performance, slaughtering traits and meat quality of bovine (Italian Simmental) and buffalo (Italian Mediterranean) bulls. *Livest. Prod. Scie.*, **91**:129-141(2004).
- [26] Lapitan, M. Rosalina, Arnel N. Del Barrio, Osamu Katsube, Tomomi Tokuda, Edgar A. Orden, Alberto Y. Robles, Tsutomu Fujihara, Libertado C. Cruz and Yukio Kanai, Comparison of feed intake, digestibility and fattening performance of Brahman grade cattle (*Bos indicus*) and crossbred water buffalo (*Bubalus bubalis*). *Anim. Sci. Jour.*, **75**:549-555(2004).
- [27] El-Serafy, A.M., Feeding riverine buffaloes for milk/dual purpose production. Feeding dairy cows in tropics. *FAO Animal Production and Health Paper*, **86**:3-4(1991).
- [28] Charles, D.D. and Johnson, E.R. Carcass composition of the water buffalo (*Bubalus bubalis*). *Aust. Jour. Agri. Res.*, **23**:905-911(1972).
- [29] Ahmad, S., Pasha, T.N. and Ahmad, N., Comparative meat production potentials and carcass evaluation of buffalo and different breeds of cattle calves. Proceed of National Symposium of Animal Nutritionists. College of Veterinary Sciences, Lahore, November 29-30 (1995).
- [30] Zhang, C.X., Wu, W.Q. and Zou, L.S., Science of Chinese Buffalo. Nanning: Science and Technology Publishing House of Guangxi (2000).
- [31] Somapala, K.C., Cattle and Buffalo Breeding in Sri Lanka. Development Strategies for Genetic Evaluation for Beef Production in Developing Countries. Proceedings of an International Workshop held in Khon Kaen Province, Thailand, July 23-28 2001. Australian Centre for International Agricultural Research Canberra, *ACIAR Proceedings*, **108**:88-92(2002).
- [32] Faruque, M.O. and Bhuiyan, A.K.F.H., Cattle and Buffalo Breeding in Bangladesh. Development Strategies for Genetic Evaluation for Beef Production in Developing Countries. Proceedings of an International Workshop held in Khon Kaen Province, Thailand, July 23-28 2001, Australian Centre for International Agricultural Research Canberra, *ACIAR Proceedings*, **108**:23-27(2002).
- [33] Thu, N V., Breed characteristics and productivity of local buffaloes in Mekong Delta of Vietnam. Paper presented at the Conference of Animal Production in the South of Vietnam (1987).
- [34] Paleari, A.M., Beretta, G., Colombo, F., Foschini, S., Bertolo, G. and Camisasca, S., Buffalo meat as a salted and cured product. *Meat Sci.*, **54**:365-367(2000).
- [35] Lambertz, C., Panprasert, P., Holtz, W., Moors, E., Jaturasitha, S., Wicke, M. and Gauly, M., *Asian-Australas. J. Anim. Sci.*, **27**(4):551-60(2014).