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GROWTH PERFORMANCE OF CALVES IN KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

Data from Feed Lot Fattening farms: operating under Livestock and Dairy Development Board; having at least one buffalo calf were collected for analyzing comparative performance of buffalo-calves for beef production. A total of 1408 animals present in 56 farms scattered over eight districts of Khyber Pakhtunkhwa were studied. In order to control for the variables that could potentially affect the growth but the data for which is not available e.g. ambient temperature and humidity, nature of green fodder, ingredients of concentrates, the model is augmented with location, year and specie specific fixed effects. The model fitted the data and suggests 30 percent of the variation in the daily weight gain as explained by variation in the independent variables. Mean weight at purchase were 139.4 ±1.77 and 131.4±1.40 kg of buffalo and cattle calves which fattened over a mean period of 94 days at different seasons in two years. The species, over the fattening period, gained mean weight of 70 and 72 kg for which the farmers received extra Rs. 3211.8 and Rs. 3030.6 per buffalo and cattle calf, respectively. The study estimates the effect of specie (buffalo and cow), year (2007 and 2008), location of farm (the eight districts), initial calf weight and season on the growth performance measured as daily weight gain of cows and buffaloes. The growth model while controlling for other variables, suggests that daily weight gain during winter is higher as compared to other seasons. However, the effect of herd size and specie on daily weight gain is non-significant. On overall, the combined effects of location and year on daily weight gain are significant implying that overlooking these effects in the analysis may result biased estimates similar to omitted variable in regression analysis.

Key words: Buffalo calves, feed-lot fattening, growth performance.

INTRODUCTION

Water buffalo evolved under the sub-humid and subtropical climate upon the river-beds and associated marshy soil of Indian sub-continent. Different breeds developed majority of them are milch type. In addition to milk production contributes 1.3, 2.8, 24.4, 26.9, 0.6, 21.2 and 51.8% of the total meat in world, Asia, India, Pakistan, china, Egypt and Nepal, respectively (FAOSTAT, 2007).

Increasing population pressure, land fragmentation and changing food habits emphasize to produce more meat and other livestock products. Under the conventional mixed farming system, beef is a by-product of both lactating and draft animals and after completing their productive life, animals are consumed for meat. Buffaloes are the major source (FAOSTAT, 2007) of meat and Punjab is the habituating the larger population. People in Punjab do not relish buffalo-beef; therefore the slaughtering animals are brought to adjacent province of North-Western province and coastal city of Karachi for consumption. Although non-estimated, but a considerable trucks of animals are taken across border to Afghanistan for slaughtering.

Buffalo and cattle breeds in Khyber Pakhtunkhwa are local-evolved. They are either fed at stall or pastured at the constant degrading ranges and pastures. Mortality is unusually higher, particularly among the young-born calves. Except the crossbred female-calves, calves raising is considered un-economical in view of the high cost of milk and non-availability of milk-replacer. The survived male calf-crop is generally sold to local traders for butchering. No collective commercial set up has yet in operation for protecting this tender crop for upcoming fattening and replacement operation.

Feedlot fattening program in the province was mandated to introduce a transition from subsistence and partially grazed farming to on-stall commercial beef farming and inculcate a beef farming culture. Farmers are taught beef-farming techniques which are economically rewarding too. More than 1600 farmers at 18 different districts of the province were selected for feedlot beef fattening. The selected farmers were only allowed to keep at least 10 calves aging above one-year for a minimum period of 3-4 months offering an affordable amount of concentrates.

Majority of the fattening stock are purchased from local markets. As no proper beef breed exists, however, Friesian-crossbreds, which are rarely available, are favoured over others. Majority of the local cattle breeds are either single purpose or a few are dual purpose. Among the buffalo calves majority belong to the five available breeds of the country i.e., Neli-Ravi, Neli,

Ravi, Kundi and Azikheli. Due to non-availability of proper implements and mechanization culture, greater reliance was inevitably placed on efficient labour management. Labour-efficient housing was another major intervention aiming proper animal comfort.

The current study focusing analyzing beef production potential of buffalo calves under feedlot system in comparison to cattle calves. The study further analyzes the newly introduced system for its performance, management factors and the economic return.

MATERIALS AND METHODS

Data extended over a period of two years (2006-2008) was collected from a total of 1408 animals present in 56 buffalo-calves (male) containing herds scattered over eight districts of Khyber Pakhtunkhwa (Table 1). These herds were registered and operating under the extension and support services of the Livestock and Dairy Development Board. Information regarding initial and final weights; fattening period; prices at purchase and selling; year and part of the growing period were utilised for analysis. The year was distributed in to five seasons: winter (Dec-Jan); spring (Feb-Apr); hot summer (May-Jun); wet summer (Jul-Sep); fall (Oct-Nov). The effect of location (district) was taken as variable and fitted in to the model. Data were edited for outliers prior to analyses.

Table 1 shows the number of observations, mean, standard deviations and minimum and maximum values for variables affecting daily growth performance in calves. Season affected growth performance. Summer (both hot and wet) yielded the best results, followed by fall and spring. Except a few exceptions, wet summer gave the best results for calf growth. Winter was found as the least suitable season for beef production. Calves growth has been variable among districts which can be understood considering the availability of vegetation/fodder-crops. Abbotabad, which receives more than 1000 mm rainfall annually, nicely spread over the year, provides abundant green vegetation for cutting. This is followed by Swabi, has vast ranges situated on the river bed, providing sufficient vegetation during spring, summer and fall months. Growth performance in other districts is almost similar except the poor performance at Charsadda and D.I. Khan. D.I. Khan, being semi-arid to arid in climate, has bare plains, providing a poor vegetation/fodder supply. Charsadda on the other hand, has wide spread canal irrigation system, supporting arable farming of cash crops, leaving no/limited land for fodder crops and grazing. Animals under this system mostly rely upon the agri-residues and wastes like, sugar cane tops, vegetable residues and leaves, wheat straw, sugar beat leaves and pulp, maize thinning etc. Year, specie and herd size were among the other variables tested; where only year was found effective variable affecting daily growth rate in calves.

The external environmental factors are becoming increasingly important (Keeney, 1997; Bontems and Thomas, 2000). Five capital assets available to rural communities, that is human, physical, natural, social and financial capitals, differ among farmers are needed to optimally exploit to the extent of capabilities of the farming community (Bebbington, 1999) for successful beef farming.

The models used for analyses for daily growth rate included fixed effects of location, year of fattening, season of fattening and specie. Since the model uses cross-sectional data, tests for normality of the errors were carried. The Statistical Package for Social Sciences (SPSS 10) was used for these analyses.

RESULTS AND DISCUSSION

A total of 1408 calves belonging cattle and buffalo species, having both sexes, kept under feedlot fattening program were studied. These calves reared distributed among 56 farms scattered over eight different districts of Khyber Pakhtunkhwa under different batches. The growth performance of calves, factors affecting the growth rate and some economic aspects of beef farming is presented.

Growth performance: Growths in buffalo calves were higher ($P<0.001$) than the cattle calves as given in Table 2. Mean initial body weight of buffalo and cattle calves were 139.4 and 131 kg respectively. The daily weight gain achieved during the growth period was similar i.e, 752.1±5.87 and 766.3±4.83 for buffalo and cattle calves, respectively. The p-value for this 0.059, though not significant but still a trend toward significance is there, indicating more capability of cattle calves to attain higher weight gain per day. However, the difference in weights at sale between the two species was due to the different initial weights of buffalo and cattle calves. All these calves had age above one year as per requirement of the programme. The additional weight obtained during the growth period of 94 days, was 50% more than their initial body weights. This clearly shows that the growth potential of the local stock has not been exploited and any attempt which could harvest the optimum potential of these calves may provide enhance the quality beef to the market. Literature shows that growth in calves varied widely. Male buffalo calves, having initial body weight of 190 kg, grew at an average rate of 520 g /day when raised on ration containing Sorghum Sudan Hybrid known as (Sadabahar) as basal diet (Tahir and Rehman, 1987). Pasha, 1986, reported a growth rate of 430 to 700 g growth rate in male buffalo calves having initial live weight of 142 kg, grown on rice straw, rice husk and maize cobs. Other workers in Pakistan (Pasha and Tahir,

1985; Pasha, 1987; Jabbar and Iqbal, 1993; Jabbar *et al*., 1993) found the daily growth rate of 780 to 1010 g per day in calves when selected at initial body weight ranging from 116 to 188 kg. Basra, 1992, reported growth rate in buffalo calve ranging form 549 to 728 g per day when grown on medium-protein high-energy diets. Growth rate in cow calves have been sufficiently studied. Yearling male calves from Sahiwal and (Friesian x Sahiwal) crossbreds having initial body weight of 180 kg, grew at a rate of 0.94 and 0.97 kg per day respectively (Asrar, 1986). Basra, (1992) reported that crossbred (839-869 g per day) calves perform better than Sahiwal (795-805 g per day) than buffalo (751-781 g per day) calves when grown on similar fattening diet in a trial. Mohsin *et al*., (1995) found cow clave better than buffalo calves in growth performance (796 g vs 566 g/day in cattle and buffalo calves, respectively). . In Indonesian farmers generally breed Friesian Holstein crossbreed (FHC) females with superior bulls like Simmental, Limousine, Brahman, Charolais, Hereford and Brangus. The feedlots obtain an average daily weight gain of 1.2 (1.0–1.3) kg. By contrast, the growth rate of crossbred calves the local breed 'Peranakan Ongole' grow with an average daily weight gain of 0.6 kg (Hadi *et al*., 2002).

Economic aspects of beef farming are given in Table 3. Purchase and sale prices of calves from both species were similar. Calves were purchased at a mean price of 8241.1±116.97 and 8072.7±94.22 PKR, and sold at a mean price of 9021.8±207.52 and 8463.1±225.91 PKR, respectively. Despite the fact that there is no tradition of marketing calves based on their body weights, however, price per kg of body weight highly differed ($P<0.001$). Buffalo calves were cheaper at purchase (59.2±0.41 vs 61.5±0.36 for buffalo and cattle calves) but expensive at sale (55.7±0.48 vs 50.9±1.03 for buffalo and cattle calves). The data imply poor marketing skills of the farmers rather than the inference that calves at tender age costs more per kg than at later ages regardless of their good finish. Knowledge of marketing techniques and skills are expected to improve income, which in turn might stimulate investment (Whiteside, 1998.)

Calves, regardless of the species were equally rewarding and provided a gross difference of 3211.8±144.23 and 3030.6±270.11 PKR for buffalo and cattle calves, respectively. The daily variable costs including, feeding, housing, health, labour and miscellaneous cost, if found less than 35.9 PKR per calf, would be a profitable activity. In case the daily expenses per calf are equal or exceeds this limit, may result in unprofitable/loss-making activity. In a study carried out under Pakistani conditions during 2004, the feed cost alone was (25%) i.e., Rs. 17 per kg live weight gain, when beef was pricing Rs. 70 per kg (Ahmad, *et al*., 2004. At present the feed cost are much higher and the situation demands the combination of animal and feed giving maximum growth and profitability. The break even point under the Indonesian conditions for average daily weight gain is 0.8 kg (Hadi *et al*., 2002).

Factors affecting growth rate in buffalo calves: Results of the regression analysis are given in table 4. The cross-sectional nature of data when applied, the model fitted the data. The independent variables, given in table 3, affected daily growth rate in buffalo significantly. The estimated R-Squared suggests that 30.3 percent of the variation in growth rate of buffalo calves is explained by these variables.

Table 1: Descriptive statistics of daily weight gain (g) in response to different variables.

Variable	Observations	Mean	Std. Dev.	Min	Max
Buffalo	651	752.1	149.85	135.4	1239.1
Season					
Winter	81	569.0	161.64	206.2	880.4
Spring	62	748.8	158.53	511.1	1095.2
Wet summer	553	789.6	115.53	144.6	1239.1
Hot summer	76	792.1	96.647	543.5	967.4
Fall	616	765.8	131.02	135.4	1120
District					
Abbottabad	28	880.0	84.86	741.6	1044.9
Charsadda	179	700.4	135.09	381.8	1064.5
D.I. Khan	35	713.0	118.60	351.6	880.4
Haripur	187	759.1	110.75	511.1	1239.1
Mardan	597	765.9	124.24	135.4	1120.0
Nowshera	129	771.1	204.17	206.2	1171.1
Peshawar	171	756.8	177.86	144.6	1239.1
Swabi	82	812.7	81.38	648.9	927.8

Table 2: Description of some performance/biological parameters of feedlot fattening farms (Mean±SE)

Variable	Buffalo	Cattle	Level of Sig.
Initial body wt (kg)	139.4±1.77	131.4±1.40	0.000
Final body wt (kg)	209.4±1.99	203.5±1.53	0.016
Wight gain (kg)	70.0±0.52	72.1±0.44	0.003
Growth period (days)	93.6±0.30	94.3±0.24	0.094
Daily wt gain (g)	752.1±5.87	766.3±4.83	0.059

Table 3: Description of some economic parameters of feedlot fattening farms (Mean±SE)

	Buffalo	Cattle	Level of Sig.
Purchase price (PKR)	8241.1±116.97	8072.7±94.22	0.257
Sale price (PKR)	9021.8±207.52	8463.1±225.91	0.106
Purchase price per kg	59.2±0.41	61.5±0.36	0.000
Sale price per kg	55.7±0.48	50.9±1.03	0.000
Gross difference per calf/batch	3211.8±144.23	3030.6±270.11	0.520

Table 4: Estimates of the daily weight gain function worked out using ordinary least squares

Logarithm of the variable	Coefficient	Standard Error	95% Conf. Interval		P-value
Winter	106.709	20.408	66.674	146.744	0.000
Spring	-58.210	36.503	-129.817	13.398	0.111
Hot summer	-42.599	31.610	-104.606	19.409	0.178
Wet summer	-25.838	30.840	-86.336	34.660	0.402
Fall	-45.150	28.821	-101.688	11.388	0.117
Abbottabad	(dropped)				
Charsadda	-135.706	17.201	-169.448	-101.964	0.000
D.I. Khan	-61.821	44.737	-149.581	25.939	0.067
Haripur	-138.486	18.693	-175.156	-101.817	0.000
Mardan	-124.726	17.917	-159.873	-89.578	0.000
Nowshera	-89.543	20.418	-129.596	-49.490	0.000
Peshawar	-114.799	21.191	-156.369	-73.229	0.000
Swabi	-83.586	19.252	-121.351	-45.820	0.000
Year	-371.758	25.996	-422.755	-320.762	0.000
Buffalo	1.653	7.176	-12.425	15.730	0.818
Herd size	-0.019	0.153	-0.318	0.281	0.903
Constant	936.101	34.159	869.093	1003.110	0.000
Linear regression statistics					
R-squared	0.3026	R-squared adjusted	0.295	F-statistics	0.000.

The estimated model implies that spring, hot summer, wet summer and fall, despite its negative sign, are statistically non-significant. Winter, on the other hand significant affected the trait. All districts affected had variable response to growth, probably due to their varied ecological placement and cultural practices. The specie (whether buffalo or cattle) and herd size were among the non-significant factors. However, year differences significantly affected daily growth rate in buffalo calves.

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