Data analysis of cattle fattening operation in Animal Production Research Centre (APRC) Kuku - Sudan

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Abstract

Data from the APRC data base for three years (1996, 1999 and 2002) were obtained and analyzed with a view to estimating the effects of years and seasons and their interactions on total body weight gain, daily weight gain, and length of fattening period. Another objective was to look into the economics of this mode of urban system of production. Data on a total of 5558 Western Baggara bulls which went through the feedlot in the above mentioned period of time were used in the statistical analysis. The computer programme (SPSS) was used for statistical analysis. All variables were subjected to analysis of variance (ANOVA). It was shown that the effects of years on total gain and length of time to reach slaughter condition were highly significant ($P<0.001$) but the effects of years on daily gain were not significant ($P>0.05$). It was also shown that seasonal variation was important in determining both total gain and fattening period ($P<0.001$). The results indicated that the feedlot was operating efficiently. Profits up to 28.07% of the operation total cost achieved in 1999 (season 3) indicated the high profitability of this investment as compared to other types of businesses.

Keywords: Baggara bulls. Fattening operation efficiency. Daily weight gain

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Introduction

The use of agro-industrial by-products as animal feed in Sudan has been the result of intensified research activities designed to find efficient methods of recycling agricultural waste for ruminants in different production systems and production purposes e.g. the use of molasses-urea block as an emergency diet for sheep in the traditional system and for growing heifers in small households (Elkhidir *et al*., 1989 and Aboud *et al*., 1999). Finishing beef cattle depends heavily on concentrate diets e.g. sorghum grain and cotton seed cakes (CSC), a practice which is unjustifiable from economic viewpoint. In the past few decades many studies in finishing beef cattle (Mustafa *et al*., 1990; Eltayeb *et al.,* 1990; Nadya *et al*., 1991;) were carried out to investigate the nutritive value of crop residues and agro-industrial by-products, as replacement for sorghum grain in an endeavor to reduce the cost of finishing beef cattle. Western Baggara cattle are the major beef producing cattle that provide the bulk of meat consumed locally and contribute considerably in export trade of beef cattle.

Materials and Methods

Data collection

Data on a total of 5558 Western Baggara bulls from the APRC data base for three years (1996, 1999 and 2002) were obtained and analyzed with a view to estimating the effects of years and seasons and their interactions on total body weight gain, daily weight gain, and length of fattening period.

Management system in the research centre

At APRC the bulls were usually purchased from the central livestock market in Omdurman (Muwailih). The animals were kept in an open sided shed roofed with bamboo and provided with watering and feeding facilities. At arrival, bulls were kept for an adaptation

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period during which they were tagged, vaccinated and given broad spectrum antihelminthic. The animals were weighed at the beginning and at the end of the adaptation period.

Feeds and feeding practices

The bulls were offered both concentrate and roughage feeds. The concentrate given (Molasses based feed) was composed of 52% molasses, 39% wheat bran, 5% groundnut cakes, 3% urea and 1% common salt. The roughage component of the ration was sorghum straw. Feed was given to the animals according to body weight and increased gradually until it was 3% of the animal live weight.

Weight gain

The animals were weekly weighed during the fattening period. They were fasted overnight before each weight to exclude variation due to gut fill.

Statistical Analysis

The computer programme (SPSS) was used for statistical analysis. All variables were subjected to analysis of variance (ANOVA) using a factorial model to examine the effects of years, seasons and their interactions on total gain, daily gain and fattening period. For the purpose of the economic evaluation of the feedlot operation, data was collected on the purchase prices of animals and feeds and sale prices of bulls. The assessment of the economic performance of the fattening operation is based on the enterprise budget analysis using the accrual accounting methods.

Results and Discussion

Table 1 presents the overall means and the standard errors of the three traits: The overall mean of total gain was 23.42± 0.31 kg, daily weight gain (0.621± 0.04) kg and length of fattening period (35.99 ± 0.285) days. The means and standard errors for the three traits are presented in table 2. The highest total gain was obtained in year 1996 (31.70±0.41 (kg and the lowest in year

1999 (14.56±0.49 (kg.The daily gain realized in year 1996 was also the highest (648±0.06 (gm and the lowest was in year 1999 (593±0.07) gm. The fattening period was longest in year 1996 (43.88±0.37 (days and shortest in year 1999 (27.79±0.44 (days. The means and standard errors of total gain, daily gain and length of fattening period in different seasons are presented in

Table 1: Overall means of total and daily gain and length of fattening period

Trait	Mean	S. E.
Total gain (kg)	23.422	0.313
Daily gain (kg)	0.621	0.043
Period (days)	35.996	0.285

Source: E. A. Mustafa, 2008

Table 2: Means and standard errors of total and daily gain and length of fattening period in different years

Trait	Year	Mean	S. E.
Total gain (kg)	1996	31.703	0.405
	1999	14.562	0.488
	2002	25.160	1.092
Daily gain (kg)	1996	0.648	0.056
	1999	0.593	0.067
	2002	0.624	0.151
Period (days)	1996	43.877	0.368
	1999	27.785	0.443
	2002	36.981	0.992

Source: E. A. Mustafa, 2008

Table 3: The effect of seasons on total gain, daily gain and length of fattening period

Trait	Season	Mean	S. E.
Total gain (kg)	1	21.726	0.539
	2	26.879	0.497
	3	22.509	0.551
Daily gain (kg)	1	.520	0.074
	2	.727	0.069
	3	.667	0.076
Period (days)	1	36.975	0.489
	2	37.128	0.452
	3	33.394	0.501

* Season (1 winter, 2 wet summer, 3 dry summer) Source: E. A. Mustafa, 2008

Table 4: Partial budget statement of Kuku cattle fattening operation in APRC during the 1999 (Values in SD[1])

	*Season 1	Season 2	Season 3
Feedlot operating income per bull (1)			
Sale of Bull calves	41144.83±26193.96	36513.99±14495.06	43030.14±66542.34
Feedlot operating expenses per bull (2)			
Feed	4382.173±1842.942	3896.571±2883.504	4074.047±2705.432
Bull purchase [2]	31238.51±28793.25	26247.13±19990.71	33600.06±26584.02
Sub-total	35620.683±15318.096	30143.701±11437.107	33600.06±14644.726
Net cash operating income (3) = (1-2)			
	5524.83±7137.21	6370.289±3057.953	9430.08±51897.614
	15.5%	21.13%	28.07%

Source: E. A. Mustafa, 2008; [1]SD = Sudanese Dinar; 1$US = 200 SD; [2] Labour cost included; * Season 1: Winter (November, December, January. February); Season 2: Wet Summer (July, August, September, October); Season 3:   Dry Summer (March, April, May, June)

Table 5: Partial budget statement of cattle fattening operation in APRC during the 2002 (winter) (Values in SD[1])

Feedlot operating income per bull (1)	
Sale of Bull calves	42470.182
Feedlot operating expenses (2)	
Feed	8228.035
Bull purchase [2]	27590.974
Sub-total	35819.009
Net cash operating income (3) = (1-2)	6651.173
	18.57%

Source: E. A. Mustafa, 2008; [1]SD = Sudanese Dinar; 1\$US = 200 SD; [2] Labour cost included

table 3. The highest daily gain was scored in season 2 (727±0.07 (gm together with the highest total gain (26.88±0.5 (kg and the longest fattening period (37.13±0.45) days.

Economic performance of cattle fattening operation

The assessment of the economic performance of the fattening operation was based on the enterprise budget analysis using the accrual accounting methods. Table 4 and Table 6 below show the structure of costs and benefits from fattening operation. The results indicated that the feedlot was operating efficiently. On average, the net cash operating income per bull in 1999 was 5524.83±7137, 6370.289±3057 and 9430.08± 51897 SD for seasons 1, 2 and 3, respectively. However, the results indicate high variability between the three seasons. Bulls in season 3 earned more profit (28.07%) than bulls in season 2 (21.13%) and season 1 (15.5%) (Table 5). The high profit in season 3 (1999) might be attributed to the fact that bulls on pasture attain their maximum weight during winter season (Rahama, 2005) and when subjected to a fattening period in feedlot during dry summer they will maintain high weight gains. On the other hand, the average net cash operating income per bull in 2002 (winter season) was 6651.173 SD (18.57%) (Table 5). The variability between years and seasons could be attributed to feed cost and availability and prevailing climatic conditions in the study area. Profits up to 28.07% of the operation total cost achieved in 1999 (season 3) indicated the high profitability of this investment as compared to other types of businesses. This might be attributed to the fact that optimal feeding system and inputs (animals, feed ingredients, salts etc...) that were purchased in wholesale had reduced the cost.

Conclusion and Recommendations

It appeared that the success of cattle fattening operation in APRC was exemplified by the intensified research activities conducted mainly to utilize cheap crop residues and agro-industrial by-products available in huge quantities, as replacement for sorghum grain to reduce the cost of finishing beef cattle.

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