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Performance of Hereford Crossbred and Kedah-Kelantan Cattle fed a Palm Kernel Cake-based Ration

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ABSTRAK

Di dalam suatu eksperimen pemakanan yang melibatkan kegunaan catuan "PKC-based" selama 105 hari, purata pengambilan makanan harian sebanyak 3.11 dan 3.31 kg bagi lembu kacukan Hereford dan Kedah-Kelantan tidak menunjukkan perbezaan yang bererti. Lembu kacukan Hereford mencapai purata kenaikan berat harian sebanyak 0.712 kg dan kenaikan ini lebih tinggi ($P < 0.05$) jika dibandingkan dengan kenaikan (0.586 kg) lembu Kedah-Kelantan. Lembu kacukan Hereford mencapai nilai kecekapan makanan (4.37) yang lebih baik ($P < 0.01$) jika dibandingkan dengan lembu Kedah-Kelantan (5.71). Pendapatan bagi kos makanan seekor lembu sehari adalah $1.344 bagi lembu Hereford dan $0.514 bagi lembu Kedah-Kelantan.

ABSTRACT

In a feeding experiment involving the use of a PKC-based ration for 105 days, the average daily feed intake of 3.11 and 3.31 kg in Hereford crossbred and Kedah-Kelantan cattle respectively, was found to be not significant. Hereford crossbred cattle had an average daily gain of 0.712 kg which was significantly higher ($P < 0.05$) than that of Kedah-Kelantan cattle (0.586 kg). Similarly Hereford crossbred cattle had a significantly better ($P < 0.01$) feed efficiency (4.37) compared to that of Kedah-Kelantan cattle (5.71). The income over feed cost per animal per day was $1.344 and $0.514 in Hereford crossbred and Kedah-Kelantan cattle respectively.

INTRODUCTION

The major source of domestic beef production in Malaysia comes from Kedah-Kelantan (KK) cattle, buffaloes and dairy-type as well as other crossbred animals. Growth studies in the KK have been reported (Devendra and Lee, 1978; Camoens, 1981 and Hutagalung and Mahyuddin, 1983) and crossbred cattle (Mak and Baharin, 1975). These studies involved the feeding of Guinea and Napier grass without or with minimum concentrate supplementation.

Palm kernel cake (PKC), which is the solid residue left behind after the extraction of oil from palm kernels either by solvent extraction or by the expeller pressed method, is one of the major by-products of the Malaysian palm oil industry. The feeding of PKC to dairy cross-bred cattle for milk and beef production was studied by Ganabathi (1983). He reported that solvent extracted PKC, which contains 1 to 2% residual kernel oil, could support milk production with a feed conversion efficiency of 2.2 litres of milk per kg of feed, while bull calves of dairy cross-bred

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cattle were found to achieve a body weight gain of 0.72 kg per animal per day at a feed conversion ratio of 6. Roughage was not provided in either case. It was also reported by Ganabathi (1983) that expeller pressed PKC, when used solely, was not suitable for beef production. This is because it contains 8% residual kernel oil, which often causes rancidity and thus affects palatability. In view of this and to offset this problem, a PKC-based ration consisting of 40% expeller pressed PKC and 60% commercial cattle concentrate was attempted in this study. The objectives of this study were firstly, to determine the suitability of PKC-based ration when fed to KK and Hereford crossbred cattle and secondly, to estimate the income over feed cost derived from the use of such a ration.

TABLE 1
Chemical composition of commercial cattle concentrate and PKC

Constituents	Commercial cattle concentrate [1]	PKC [2]
Ash (%)	8	5.4
Crude fibre (%)	15	23
Crude fat (%)	6	9
Crude protein (%)	15	14
Ca (%)	1.1	0.3
P (%)	1.0	0.5
ME (MJ/kg DM)	13.4	10.5

[1] Also contains Vit. A, D_3, B_{12}, trace mineralized salt and antioxidant.

[2] Palm kernel cake.

MATERIALS AND METHODS

A total of four KK and four Hereford crossbred cattle was selected randomly and assigned to two groups namely the KK and Hereford crossbred groups which had a mean weight of 96.75 and 90.25 kg respectively. Each animal was assigned randomly in a bull pen with a floor space of 2.42 sq metres. Thus the design of the experiment is a completely randomised one.

Both cattle groups were fed a ration consisting of 60% commercial cattle concentrate and 40% PKC and having a nutrient composition as indicated in Table 1. The PKC used is the expeller-pressed type. Feed and water were available to the animals at all times.

A Student's t test as described by Steel and Torrie (1980) was used to test for significance in the different variables studied in this experiment.

An adaptation period of 28 days was needed before the start of the experiment. During this period cut Guinea grass *(Panicum maximum)* was gradually withdrawn and an increasing amount of PKC-based ration was given to the animals. The age of the grass ranged from 28 to 42 days. Fertilizer application to the plot of Guinea grass was 225 kg N, 113 kg P_2O_5 and 135 kg K_2O per hectare per year. Fertilization was done, four times yearly. The duration of the experiment was 105 days.

RESULTS AND DISCUSSION

As indicated in Table 2, the total feed intake was 347.64 and 326.90 kg for the KK and Hereford crossbred cattle respectively. Although Hereford crossbred cattle consumed less feed by 20.74 kg for the experimental period of 105 days, this difference was not statistically significant at the 5% level. The average daily feed intake likewise showed no significant difference between the two groups of cattle studied. Hereford crossbred cattle gained significantly more, up to 13.25 kg ($P < 0.05$) when compared to the KK animals. Similarly the difference in average daily gain of 0.126 kg in favour of Hereford crossbred cattle was significant at the 5% level. Feed conversion ratio was found to be 4.37 and 5.71 in Hereford crossbred and KK cattle, respectively. This difference of 1.34 was statistically significant at the 1% level and was to the advantage of Hereford crossbred cattle.

A comparison of income over feed cost between Hereford crossbred and KK catle is

TABLE 2
Mean values for total feed intake, total gain, feed conversion ratio, average daily gain and average daily feed for the experimental period of 105 days

	Hereford crossbred	KK[2]
Initial body wt (kg)	90.25 ±7.66	96.75 ±5.85
Final body wt (kg)	165.00 ±10.80	158.25 ±5.68
Total feed intake (kg)	326.90 ±17.43[a]	347.64 ±3.53[a]
Total gain (kg)	74.75 ±17.43[a]	61.50 ±3.75[b]
Feed/gain[1]	4.37 ±0.08[a]	5.71 ±0.33[b]
Avg daily feed (kg)	3.11 ±0.16[a]	3.31 ±0.03[a]
Avg daily gain (kg)	0.712±0.03[a]	0.586±0.03[b]

[a,b]Different letters in the same row, for each parameter, denote significance at the 5% level.

[1]Significant difference was at the 1% level.

[2]Kedah-Kelantan cattle.

TABLE 3
Comparison of income over feed cost between Hereford crossbred and KK cattle

	Hereford crossbred	KK[d]
Cost of concentrate consumed[a] ($)	83.85	89.17
Cost of PKC consumed[b] ($)	36.61	38.94
Total feed cost ($)	120.46	128.11
Selling price of total gain at $3.50 per kg liveweight[c] ($)	261.63	215.25
Income over feed cost/animal ($)	141.17	87.14
Income over feed cost/animal/day ($)	1.344	0.514

[a]Total concentrate consumed is 60% of total feed intake. The total feed intake is indicated in Table 2. Price of concentrate is $427.50/ton.

[b]Total PKC consumed is 40% of total feed intake. The total feed intake is indicated in Table 2. Price of PKC is $280/ton.

[c]The total gain is indicated in Table 2.

[d]Kedah-Kelantan cattle.

shown in Table 3. The total feed cost was $120.46 and $128.11 for Hereford crossbred and KK cattle, respectively. Although the difference in feed cost of $7.65 was small, the difference in the selling price of $46.38 was evident and in favour of Hereford crossbred cattle. The income over feed cost per animal per day was $1.344 and $0.514 for Hereford crossbred and KK cattle, respectively. The difference of $0.83 represents an economic advantage of 61.76% to Hereford crossbred cattle.

The superior performance of Hereford crossbred over that of KK cattle as indicated by

TABLE 4
Mean values for birth weight, total gain, age in days and average daily gain before the start of experiment

	Hereford crossbred	KK[2]
Birth wt (kg)	18.5 ±0.29[a]	13.5 ± 0.5[b]
Total gain (kg)[1]	71.75 ±7.41	83.25 ± 5.95
Age (days)[1]	190.25 ±1.44	298.75 ±33.76
Avg. daily gain (kg)	0.378±0.04[a]	0.286± 0.03[a]

[a,b]Different letters in the same row, for each parameter, denote significance at the 5% level.

[1]The age in days and total gain were not analysed statistically but were provided so that average daily gain could be computed.

[2]Kedah-Kelantan cattle.

the average daily gain and feed efficiency provide evidence of heterotic advantage when Hereford crossbred cattle were solely fed a PKC-based ration during the whole of the experimental period of 105 days. A definite economic advantage in feeding such a ration was also reflected in the income over feed cost.

An attempt was made to determine whether Hereford crossbred cattle performed better than KK cattle under grazing conditions prior to the experiment. The performance could be compared as both the Hereford and KK cattle were kept in the same location with the same management being provided. Rotational grazing on *Setaria splendida* and *Panicum maximum* was practised in this location. No concentrate was provided to these animals. Salt and mineral lick was given at all times. An observation of the data of the same eight experimental animals revealed that although Hereford crossbred calves were significantly heavier than the KK calves by 5 kg ($P < 0.05$) as shown in Table 4, there was no significant difference in the average daily gain, though the crossbred calves gained 0.092 kg more, before the experimental period.

The fact that the crossbreds were lighter by 11.5 kg and gained faster compared to the KK animals before the experimental period, could be explained by their difference in age. The average daily gain justifiably provides a measure for the difference between the two groups of animals in spite of the age difference as both groups of animals are still in the ascending stage of growth.

Clayton (1983) reported that although Brahman crossbred cattle showed as average daily gain of 0.077 kg over the KK, heterosis was not shown in the crossbred when compared to Brahman or KK under grazing conditions and without concentrate supplementation. Our observation with Hereford crossbred cattle also under grazing conditions but before the experimental period indicated an average daily gain of 0.092 kg more than the KK although such gain was not statistically significant. However, when the same animals were fed a PKC-based diet for 105 days, the Hereford crossbred cattle performed significantly better than the KK, in their average daily gain and feed efficiency, thus contributing to a much higher income over feed cost. Based on this study, Hereford crossbreds appear to perform very well when exposed to a superior feeding regime. In the absence of such a feeding regime, KK may, by comparison be the animal of choice.

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