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PERFORMANCE TESTING IN BEEF CATTLE IMPROVEMENT PROGRAMMES

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SUMMARY

Eight batches comprising 298 weaner bull calves of the Jamaica Brahman, Jamaica Red Poll, Jamaica Black and composite breeds have completed the 140-day post weaning performance at the Minard facility since 1992. Calves were fed on a group basis, and data on pre-weaning and weaning parameters collated. Final indices and ranking were based on average daily gain, 400-day weight, and weight per day of age.

Average daily gain on test over all breed groups by batch were: 1.40; 1.19; 1.15; 1.30;1.24;1.23; and 1.25 Kg respectively. 400-day weights over all breed groups by batch were: 365.36; 382.14; 388.82; 421.45; 415.41; 392.41; 405.05; and 378.20Kg. Weight per day of age was 0.73; 0.86; 0.90; 0.93; 0.86; 0.88; 0.96; and 0.83 Kg.

Breed and batch differences were observed among the three traits.

INTRODUCTION

Jamaica, has boasted during the past 40 years, the development of three tropically adapted breeds of beef cattle, the Jamaica Red Poll, the Jamaica Black both of *Bos indicus* and *Bos taurus* origins, and the Jamaica Brahman, a *Bos indicus*. All three breeds have over time, exhibited differing levels of adaptation and productivity resulting from long term selection for beef characteristics.

The ability of any breed to survive is dependent on its contribution to the production and productivity of the specific commodity for which it has been selected. For the meat industry, optimal weight gains on feedlot or whichever feeding system employed, high final weights, dressing percentages and quality and grade yield are indicative of the breed's utility. The ultimate value of feeder calves and culls, from the breeding herds, is the weight of carcasses produced for the wholesale and retail markets.
While the ruminant is expected to display acceptable levels of production from forages, feedlot performance on high energy/protein rations, complimented with backgrounding, can determine the value of the product of a given genotype in the beef operation. Traits such as average daily gain, final weight, 400-day weight and weight per day of age, are used to determine the intrinsic value of the genotype.

Over the years, individual farmers, and the Ministry of Agriculture, Grove Place, have conducted feedlot performance tests to evaluate beef sires , and to select young bulls as future sires. This process ensured the continued development of the breeds and resulted in a measurable increase in genetic progress.

The feedlot performance test, while not necessarily a perfect indication of the average husbandry environment, is the quickest method of effectively and objectively evaluating the animal's growth performance. All animals are given an equal opportunity to perform through a uniform feeding and management system , while the records of performance are systematically collected, collated , and later evaluated on a constant age-basis.

Performance records are therefore a critical part of genetic progress within a breed and ultimately in the beef industry. The evaluation of these performance data will provide estimates of Expected Progeny Differences (EPDs) which allow producers to compare or rank the superiority of individual bulls for each trait. These values provide a prediction of future performances of one bull's progeny , compared to another, within or across

breeds, for a specific trait; that is a prediction of performance differences.

Genetie progress in beef traits, as well as in any other trait, is a measure of the amount, or degree of change in value, for the trait on an annual basis. This progress is dependent on factors such as the heritability of the trait, the selection differential applied and the generation interval, as determined by the culling rates and average age of the herd.

Beef traits , in general, and in particular the traits under study here, have always indicated medium to high levels of heritability, e.g. feedlot gain (0.45-0.60) final weight 0.50-0.60) efficiency of gain (0.40). There is also a high genetic correlation between efficiency of gain and pounds beef produced. With these relatively high values of heritability, intense seleetion of young sires for these traits will , in all probability result in progeny with above average performance levels, thereby improving the possibility of inereased genetic progress and ultimately levels of production.

MATERIALS AND METHODS

Between 1992 and 1998, 8 batches comprising 298 weaned bull calves were placed on a 140-day post-weaning gain performance testing programme at the Minard facilities in Browns Town.
Calves were preselected on weaning weight and age, and taken into the facility for a pre-conditioning period of 14 days; thereafter initial (shrunken) weights were recorded and a high energy beef ration fed at the rate of 2% body weight . The ration was offered each morning for a period of 3- 4 hours, thereafter the calves were backgrounded on pastures of Guinea grass, *Panicum maximum*.

Animals were weighed each fortnight, when ration amounts were adjusted. Water and minerals were offered *ad libitum*. Eaeh batch of animals was removed from the test on the 140th day of the trial when final weights were taken. Data eollected and parameters estimated were:

- ealf identifieation
- Sire , Dam
- date of birth
- birth weight (estimates used if not available)
- weaning weight , weaning age
- initial weight, initial age
- fortnightly weights
- final weight
- 210-day weight
- avèrage daily gain on test
- 400-day weight
- weight per day of age

Results of individual traits were then ratioed against the contemporary group average and indices for each trait estimated. Comparisons of these ratios were confined within contemporary groups for ranking of young sires.. Final indices for selection were based on;

- average daily gain
- 400-day weight
- weight per day of age
- breed type
- conformation

RESULTS AND DISCUSSION

Table 1 and Figure 1 show the summary statistics of calves entering the test by breed and batch. The Jamaica Brahmans comprised the largest group (133), the Jamaica Red Polls, 112, and the Jamaica Blacks, 36. Crossbreds were the smallest group with 17 calves.

Data analysis and discussions will now be confined to our local breeds as they form the genetic base for our beef industry.

Average daily gain

Jamaica Red Polls displayed gains ranging from 1.25 Kg/day to 1.46 Kg/day, while Jamaica Brahmans ranged from 1.17 Kg/day to 1.53 Kg /day. Jamaica Blacks from 1.17 to 1.53 Kg/day as indicated by the least square means for breed and batch number presented in Table 2 and illustrated in Figure 2.

Calves of the Jamaica Red Poll breed showed highest daily gains over all batches except batches 1 and 5. Jamaica Black calves had highest gains in those batches. Mean values over all breeds ranged from 1.19 Kg/ day to 1.40 Kg/day. Analyses show a significant difference ($P<0.05$) between the Jamaica Brahman gains (1.20Kg / day) and the Jamaica Red Poll (1.29 Kg/day). Differences between the Jamaica Black (1.27 Kg/day) and the Jamaica Brahman were not significant. On a batch basis, there were significant differences. ($P<0.05$). Batch 1 (1.40 Kg/day) was significantly different from both Batch 2 (1.19 Kg/day) and Batch 3 (1.15 Kg/day).

400-day weight

400-day weights ranged from 387.98 Kg to 485.05 Kg for the Jamaica Red Polls; 340.88 Kg to 399.03 Kg for the Jamaica Brahmans; and between 344.30 Kg and 431.40 Kg for the Jamaica Blacks ,as shown in Table 3 and Figure 3

Liveweight at 400 days was influenced by breed. There was a significant difference ($P<0.05$) between the Jamaica Red Polls (418.82 Kg) and the Jamaica Brahmans (375.91 Kg), and the Jamaica Red Polls and the Jamaica Blacks (375.5 Kg). Differences between the Jamaica Blacks and the Jamaica Brahmans were not significant. On a batch basis, differences, ($P<0.05$), were between Batch 1 (365.36 Kg) and Batch 4 (421.45 Kg); Batch 5 (415.41 Kg); Batch 6 (392.41 Kg); Batch 7 (405.05 Kg) and Batch 8 (378.20 Kg).

Weight per day of age

Weight per day of age ranged from 0.75 to 0.98 Kg for the Jamaica Red Polls; 0.73 to 0.88 Kg for the Jamaica Brahmans; and 0.72 to 0.98 Kg for the Jamaica Blacks as shown in Table 4 and Figure 4.

Jamaica Red Poll calves displayed highest weight per day of age, 0.93 Kg, followed by Jamaica Blacks and the Jamaica Brahmans 0.83 Kg and 0.82 Kg respectively. There were significant differences between the Jamaica Red Polls and the other breeds. Significant differences were also displayed between Batch 1(0.83 Kg) and all other batches. Differences between Batch 2 (0.86 Kg) and Batch 7 (0.91 Kg) were also significant ($P<0.05$).

The implications of these results are that the Jamaica Red Poll with its superior performance in all three traits would produce calves of marketable weights in a shorter time than the other two breeds. While there appears to be no significant differences between the Jamaica Brahman and Jamaica Black for the traits studied, this difference may be attributed to the smaller number of animals of Jamaica Black breed which has been on test. On the other hand the lowered performance of the Jamaica Brahman may be explained by their apparent propensity for a low voluntary dry matter intake when compared to *Bos taurus* cattle of the same weight (Ledger et al. 1970).

Voisinet et al in a 1997 report indicated that animals with Brahman breeding had a higher mean temperament rating or were more excitable than animals with no Brahman influence, and that increased temperament scores

Table 1. Batch Summary Statistics of Weaner Bull Calves on Performance Test.

Batch No.	Jamaica Red Poll	Jamaica Brahman	Jamaica Black	Crossbreds	Total
1	4	19	4	3	30
2	8	25	0	2	35
3	17	17	5	1	40
4	16	13	1	0	30
5	10	16	1	2	29
6	22	15	9	6	52
7	20	21	12	1	54
8	15	7	4	2	28
TOTAL	**112**	**133**	**36**	**17**	**298**

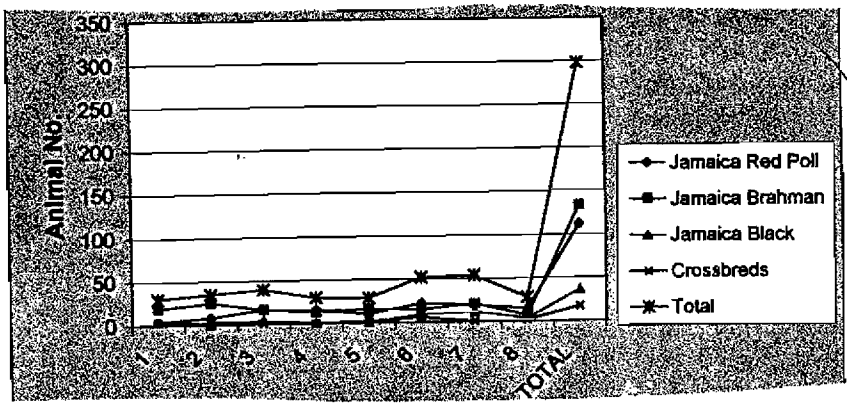

Figure 1. Batch population by breed

Table 2. Least Square Means by Batch and Breed Type for Average Daily Gains.

Batch No.	Average Daily Gain (Kg)				
	Jamaica Red Poll	Jamaica Brahman	Jamaica Black	Crossbred	Overall
1	1.46	1.37	1.53	1.28	1.40
2	1.31	1.14		1.32	1.19
3	1.25	1.04	1.21	1.35	1.15
4	1.36	1.23	1.35		1.30
5	1.25	1.33	1.44	1.80	1.34
6	1.31	1.18	1.17	1.25	1.24
7	1.28	1.17	1.25	1.35	1.23
8	1.31	1.11	1.24	1.34	1.25

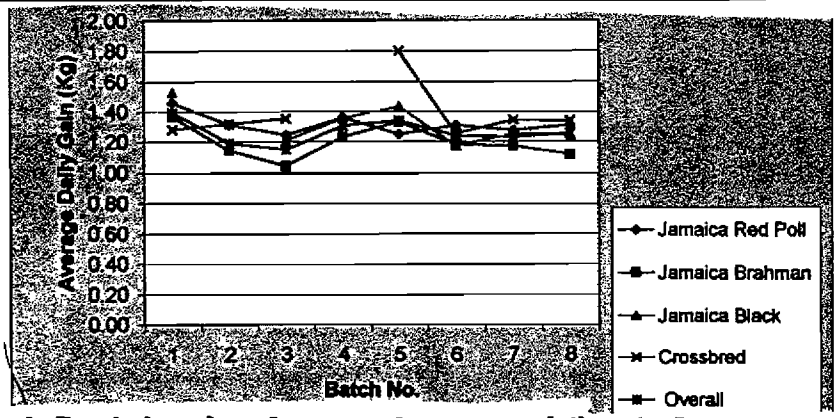

Figure 2: Batch, breed performance for average daily gain (least square means)

Table 3 Least Square Means by Batch and Breed Type for 400-day Weight.

Batch No.	400-day weight (Kg)				
	Jamaica Red Poll	Jamaica Brahman	Jamaica Black	Crossbred	Overall
1	387.98	358.94	378.22	358.75	365.36
2	395.53	373.80	-	433.18	382.14
3	395.38	390.30	349.05	450.86	388.82
4	439.71	399.03	431.40	-	421.45
5	485.05	373.94	344.30	434.57	415.41
6	415.03	370.64	357.53	416.22	392.41
7	424.36	384.83	406.79	421.69	405.05
8	397.84	340.88	360.02	397.95	378.20

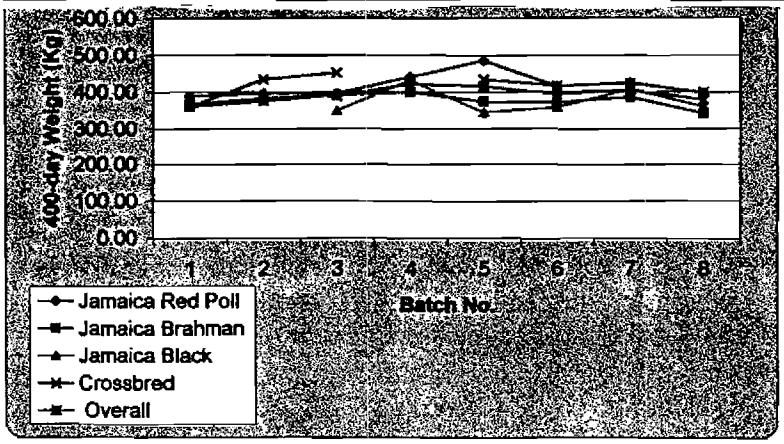

Figure 3: Btcb, breed performance for 400-day weight (least square)

Table 4. Least Square Means by Batch and Breed Type for Weight Per Day of Age.

Batch No.	Weight per day of age (Kg)				
	Jamaica Red Poll	Jamaica Brahman	Jamaica Black	Crossbred	Overall
1	0.75	0.73	0.72	0.70	0.73
2	0.89	0.84		0.99	0.86
3	0.94	0.87	0.82	1.14	0.90
4	0.98	0.88	0.98		0.93
5	0.95	0.80	0.72	0.91	0.86
6	0.94	0.81	0.80	0.94	0.88
7	0.97	0.85	0.92	0.91	0.96
8	0.88	0.77	0.75	0.82	0.83

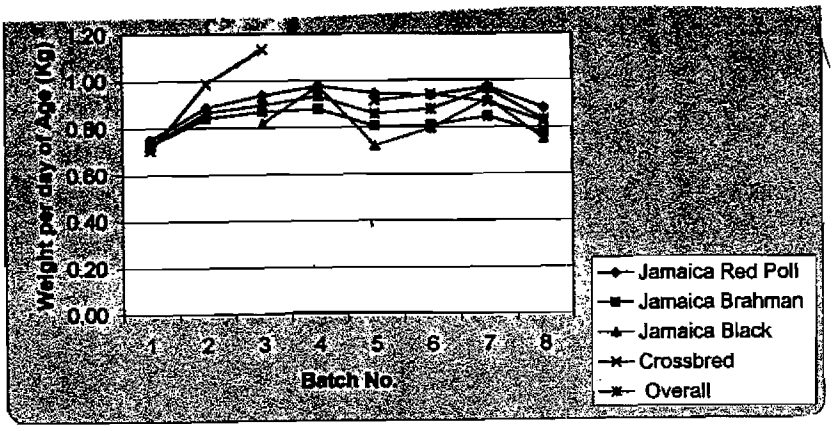

Figure 4: Batch, breed performance weight per day of age (least square means)

resulted in decreased average daily gains ($P<0.05$). The data concluded that cattle that were quieter and calmer during handling had greater average daily gains than cattle that became agitated during routine handling. The Jamaica Brahman has evolved from a group of cattle which was bred and selected for the hot environment of the tropics. Its place in the industry cannot be overlooked as it can still provide the base and source of animals for our local farming systems environment with low quantity, poor quality feed.

Based on these results, it is fair to say that the trends, phenotypic and genetic, appear to be positive within our local beef breeds, but further evaluations will determine their productive values and continued relevance in an ever changing market environment. It is obvious however, that more intense selection pressure should be applied to all breeds for their continued improvement.

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