PERFORMANCE OF FRIESIAN CROSSBRED CATTLE IN MALAYSIA

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ABSTRACT

The performance (first lactation milk yield, yield per day calving interval, yield per day from birth to second calving, first calving interval, first calving age, first lactation length, days open after first calving, first service period and service age) of the local Zebu cattle in Malaysia, imported Friesians and the crosses between them were studied using least squares method with year, season within year, calving age (except for first calving age) and genotype as effects in the model. Year and season effects were significant except for lactation length. Calving age was not significant for all traits except days open. Genotype was significant for all the traits except for lactation length and service period. Average first lactation milk yield increased from 687 kg amongst the local Zebu cattle to 1309 kg amongst the F_1 and to even higher levels among the backcrosses with higher levels of Friesian inheritance. There were similar improvements in first calving age but the improvement in calving interval, days open and service period was inconsistent. Level of Friesian inheritance that gave the highest yields was estimated to be 60%. Improvement of the present management standards will allow this level to be further increased for higher levels of production.

INTRODUCTION

Cattle production in the tropics is largely dependent on the environment. Crossbreeding between *Bos indicus* and *Bos taurus* has been well accepted as an effective and quick method to increase milk production and overall performance of dairy cattle in the tropics.

During the last two decades, a number of reports have been made (for a review see Sivarajasingam, 1984) on the performance of the Local Indian Dairy cattle in Malaysia and their crosses with both *Bos indicus* and *Bos taurus* breeds. Results on crossbreeding from the rest of the tropics are numerous and have been reviewed by several authors (Taneja and Bhat, 1986 and Galina and Arthur, 1989). The purpose of this paper is to report on the productive and reproductive performance of crossbred cattle of various levels of Friesian inheritance after systematic environmental effects have been removed.

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MATERIAL AND METHOD

The base population that made up the *Bos indicus* herd was a mixture of the Local Indian Dairy (LID) cattle and its crosses with Red Sindhi and Sahiwal breeds (F0). These animals were mated with frozen Friesian semen imported mainly from Australia since 1962. The first generation of half breds (F50(F1)) was backcrossed to Friesian in order to produce the various higher grades of Friesians denoted as F followed by % Friesian inheritance (F62.5, F75, F87.5) or with locally bred F0 bulls to get the lower grade Friesians (F37.5, F25) or mated *inter se* to produce a limited number of F_2s (F50(F2)). A small herd of Friesians (F100) imported from Australia was also maintained purebred.

The performance records (from 1969 to 1983) were collected from Institute Haiwan Station. Records having uncertain pedigree information, incomplete lactation records, missing information and those suspected to be from improper recording and of heifers affected by disease were removed. The final data set contained a total of 639 heifer records with first lactation milk yield(TM), and for 529, 551, 476, 493, 569, 448 of these animals first lactation length(LL), first calving age(CAGE), first calving interval(CI), days open(DO), first service age(SA) and first service period(SP) were derived respectively. Certain limits were imposed to the maximum and minimum of these reproductive traits to minimise recording errors. These limits included minimum lactation length of 30 days, and maximum of 370 days, CAGE not less than 18 months and not greater than 48 months and CI within the range of 11 and 20 months. Yield per day of calving interval(YC) and yield per day from birth to second calving (YL=TM/(CAGE+CI)) were additional traits.

A uniform management system was given to all animals. After morning grazing, the animals were stall fed with fodder and concentrate. Crossbreds and purebred Friesians were machine milked whereas the Zebus were hand milked with calf at foot. Calves were weaned a week after birth. Proper health care was maintained. A programme of regular heat detection and insemination was in force.

Analyses were carried out by least squares. Fixed effects included season (wet and dry periods of precipitation) within year of calving and genotype as defined by the proportion of Friesian inheritance. Linear and quadratic effect of age was also included in the model as covariates for all traits except CAGE.

RESULTS

Year and season within year effects were highly significant ($p<0.01$) for all traits except days open. Least-squares means for production traits for the animals that calved during the wet seasons were generally higher than those for dry seasons and the least-squares means during later years were higher than during earlier years. The effect of age at calving was not significant on TM, LL, YC, YL, CI, SA and SP. Genetic group effect was highly significant for all traits ($p<0.001$) except for LL and SP. Linear and quadratic contrasts were also not significant for these two traits whereas they were highly significant for all other traits. The least-squares means for the various genetic groups are summarised in Tables 1 and 2 for productive and reproductive traits respectively. Figure 1 shows the relationship between level of Friesian inheritance and yield per day of calving interval and yield per day up to second calving. Linear and quadratic effects were both significant ($p<0.05$).

DISCUSSION

The crossbred cattle showed remarkably increased performance especially in milk yield and first calving age over the F0 cows. The improvement in total milk yield was in the range of 54 to 61%. Production figures presented in this study are generally lower than those reported in India but similar to those in Thailand, Sri Lanka and other parts of the tropics (Amble and Jain, 1966; Madsen and Vinther, 1975; Buvanendran and Mahadevan, 1979). The reproductive characteristics of the crossbreds however, were comparable (CI, DO, SA and SP) or even superior (CAGE) to those in the above reports. 'Heterosis' estimates computed as the superiority of F_1s over the mean of LID and Friesians, for milk yield from least-squares estimates were high,

Table 1: Least-squares means (m) and standard errors (se) for productive traits by genetic groups.

Genetic group	TM		YC		YL		LL	
	m	se	m	se	m	se	m	se
F0	812.0[1]	92.7	1.58	0.24	0.399[1]	0.081	200.0	14.8
F25	1194.5	256.8	2.40	0.75	0.738	0.279	216.5	37.0
F37.5	930.4	481.0	3.00	1.31	0.881	0.524	207.1	69.3
F50(F_1)	1270.7*	48.4	3.38*	0.15	0.951*	0.046	210.1	6.9
F50(F_2)	775.1[2]	202.1	1.76[2]	0.69	0.501[2]	0.200	167.8	23.1
F62.5	1298.4	237.6	3.35	0.65	0.821	0.216	226.0	34.2
F75	1303.6*	92.6	3.60*	0.26	0.986*	0.081	233.5	13.3
F87.5	1271.4	314.4	3.84+	1.00	1.095+	0.275	235.2	45.3
F100	1021.2	185.8	2.10[2]	0.55	0.616[2]	0.159	177.9	26.7

* = significantly different from F0 at P<.01 or + at P<.05
1 = significantly different from F1 at P<.01 or 2 at P<.05

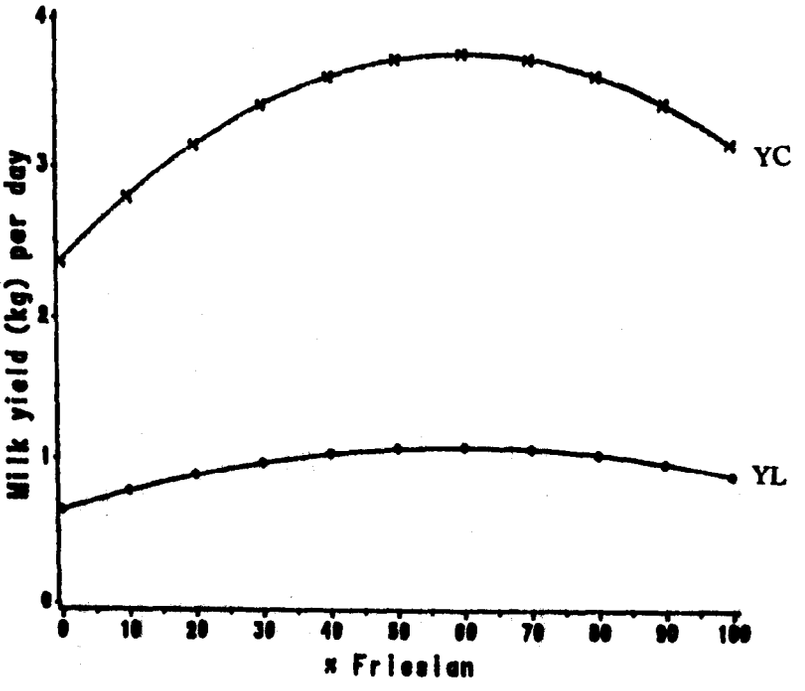
Table 2: Least-squares means (m) and standard errors (se) for reproductive traits by genetic groups.

Genetic group	CAGE		CI		DO		SA		SP	
	m	se	m	se	m	se	m	se	m	se
F0	1300.2[1]	23.6	494.6[1]	20.4	230.5	23.4	1141.7[1]	43.8	138.0	29.9
F25	1148.0[1*]	53.1	499.2	56.2	207.3	65.4	631.7*	109.2	161.5	57.4
F37.5	1261.7	138.0	374.8	97.9	117.6	113.3	1099.8	207.4	269.4	98.7
F50(F_1)	1023.8*	11.0	429.7*	11.2	139.8*	12.8	741.2*	22.2	130.7	16.5
F50(F_2)	1130.6*[2]	41.9	428.9[1]	51.3	103.1+	55.7	790.2*	95.1	104.1	61.3
F62.5	1097.7*	38.0	460.6	48.5	177.6	56.3	771.9*	72.9	161.8	55.0
F75	1129.4*[1]	19.3	477.6[2]	19.5	200.1[1]	22.0	877.7*[1]	38.0	190.7[2]	26.5
F87.5	1079.7*	72.0	457.3	71.2	193.2	82.2	1016.4[2]	133.7	194.0	85.4
F100	1150.2*[1]	37.2	575.0+[1]	40.7	300.8[1]	47.3	923.3*[1]	76.5	164.7	48.8

TM = Total milk (kg); YC = yield (kg) per day calving interval; YL = Yield (kg) per day from birth to second calving; LL = Lactation length in days; CAGE = days to first calving; CI = interval between first and second calving in days; DO = days open after first calving; SA = days to first service; SP = days between first and last service dates between first and second calvings.

36.5% for TM. Similar estimates for CAGE ,CI, DO, SA and SP were -16.4, -19.6, -47.3, -28.2 and -13.9 respectively.

Milk production per day increased with increasing levels of Friesian inheritance (Figure 1). Maximum yield was reached at 60.4% Friesian inhertance.



YC = milk yield (kg) per day of calving interval.
YL = milk yield (kg) per day from birth to second calving.

Figure 1: Relationship between yield per day and level of Friesian inheritance.

F_2 crossbreds dropped by as much as 38% in milk yield from the performance in the F_1 generation with a similar trend of lowered performance in lactation length and calving age. The F_1 sires used to breed the F_2 crosses were however often unselected or untested and could therefore be even below average of the herd in genetic merit thus the cause of the poorer performance of the F_2s (Taneja and Bhat, 1986).

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Table 1: Least-squares means (m) and standard errors (se) for productive traits by genetic groups.

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