PRODUCTIVE, REPRODUCTIVE AND ECONOMIC PERFORMANCE OF DAIRY CATTLE IN BANGLADESH

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SUMMARY
The dairy cattle improvement programme in Bangladesh aims to improve local cattle for milk production by incorporation of both tropical breeds (Red-Sindhi, Sahiwal) and temperate breeds (Holstein- Friesian and Jersey). The CCBS controls overall breeding programmes throughout the country, except for the Cooperative Dairy Production System. The productive and reproductive performances of different crossbreds have been studied by several researchers and they showed that the Holstein-Friesian crossbred performed comparatively better than others. An economic evaluation of dairy cattle in Bangladesh showed that the purebred and crossbred of temperate breeds had higher profit than other crosses but their survivability is lower than tropical breeds.
Key words: Dairy cattle, Improvement, Productive and Reproductive Traits, Profit.

INTRODUCTION
Crossbreeding experiments have been conducted on governmental dairy farms in Bangladesh since 1970. The Central Cattle Breeding Station (CCBS) controls cattle breeding throughout the country and they maintain different genotypes such as Local, Sahiwal, Red-Sindhi, Holstein, Jersey, Holstein-Friesian crosses, Jersey crosses and Sahiwal crosses. In addition, there are some commercial herds around the larger cities like Dhaka, Chittagong, Rangpur, Khulna, Sylhet where herd size ranges from 5-100 cows. Commercial farms possess mainly Holstein and Holstein crosses (F_1 and F_2). A large cooperative dairy production system group, the Bangladesh Milk Producers Cooperative Union Limited (BMCUL), has around 40,000 small holder dairy farmers who milk Pabna cattle (a local variety) and its crosses with Sahiwal, Red- Sindhi and Hariana breeds. The majority of cattle in Bangladesh are zebu type (*Bos indicus*) and one to two cows and half an acre of land is typical.

The existing breeding programme, as adopted from 1982, was (i) breed females in urban, semi-urban and milk pocket areas with 50% Friesian and 50% Sahiwal / indigenous bulls and (ii) breed females in rural areas with 50% Friesian and 50% indigenous bulls (Bhuiyan 1997). However, some commercial farms used 100 % Friesian bulls. The result of the breeding program was not satisfactory and was revised in late 1999. The main change was the extension of traditional farming and the use of semen of improved germplasm of indigenous cattle through the CCBS. Recently, BMPCUL has started their own breeding policy to improve the milk yield of their member's cattle.

There is a great shortage of milk and meat production in Bangladesh. The yearly milk and meat production in Bangladesh is 2.15 and 0.62 million tonnes but the national demand is about 11.04 and 6.4 million tonnes respectively (DLS 2000). This deficit could be overcome through proper and efficient planning of the whole industry and requires consistent and objective breeding decisions.

The objectives of this paper are to review the results of purebreeding and crossbreeding for cattle in Bangladesh and to estimate through deterministic simulation the profitability of these systems.

REVIEW OF CROSSBREEDING STUDIES

A review of dairy cattle productive and reproductive performance in Bangladesh is summarized in Table 1. This indicates that local crossbred cows have lower milk production, longer calving intervals and later sexual maturity compared to Holstein-Friesian and Holstein-Friesian crosses. However, low survivability of temperate breeds has been reported relative to crosses involving tropical breeds like Sahiwal and Red-Shindhi with local cattle in tropical environment (McDowell (1985); Cunningham and Syrstad 1987).

Table1. Productive and reproductive performance of different cattle breeds in Bangladesh

Traits	Genetic group								
	L	Pab	S	RS	HF	S × L	S×Pab	RS×L	HF×L
Birth weight (kg)	14[3] 16[6]				27[3]	18[4]	21[9]	16[4]	17[3] 21[4]
Age at sexual maturity (days)	1140[5]	687[5]	1080[5]		659[5]	1059[4]	1118[8] 1156[9]	1057[4]	920[4]
Calving interval (Cl) (days)	484[5]	450[5]	502[5]		493[5]	479[4]	-	486[5]	470[4]
Gestation period (days)	279[5]	283[5] 286[8]	279[5]		283[5]	279[5] 280[4]	286[8] 285[9]	280[5] 280[4]	279[1] 280[4]
Service per conception	1.76[5]	1.29[5] 1.20[8]	1.90[5]		1.27[5]		1.08[8] 1.09[9]		
Mature live weight (kg)	234[6]		295[7]	282[7]	395[7]				
Daily milk yield (kg)	2.4[2] 2.93[3] 1.8[6]	3.5[5]	3.24[2]	3.24[2]	10.3[3]	3.18 [2] 2.9[4]	8.0[8] 8.37[9]	3.83[2] 3.6[4]	6.5[3] 5.5[4]
Lactation production (kg)	540[2] 386[6]	735[5]	877[2]	859[2]	2900[2]	726[2] 870[4]	1738[8] 2018[9]	1146[2] 949[4]	1703[4]
Lactation length (days)	222[2] 214[6]	209[8] 210[5]	254[2]	245[2]	290 [2]	235[2] 296[4]	214[8] 217[9]	278[2] 264[4]	330[4]

L= Local Bangladesh, S = Sahiwal, RS= RedShindhi and HF= Holstein Friesian, Pab = Pabna cattle
[1]Islam *et al.* 2004 [2]Hossain *et al.* 2002 [3]Hirooka and Bhuiyan 1995 [4] Nahar *et al.* 1992 [5] Majid *et al.*1998 [6] Khan *et al.* 2000 [7] Ahmed and Islam 1987 [8] Khan and Khatun 1998 [9] Bhuiyan *et al.*1998.

PROFITABILITY OF PUREBREEDING AND CROSSBREEDING SYSTEMS

In this study profitability of mating systems involving Bangladeshi local and both the tropical and temperate breeds was expressed as net income per cow per day of calving interval from the income and expenses per cow. Information on some traits was missing and assumed values were applied during the economic evaluation. Income is derived from sale of milk (20 Taka/kg milk) and the sale of calves. Usually farmers use their male calves for draught purpose and heifers are kept for

replacements. Price per calf = (Price of male calves at the end of calving interval + Price of heifers at the end of calving interval)/2 * survivability up to the end of calving interval. The farmers of Bangladesh feed their cattle mainly paddy straw, shrub, tree leaves and twigs. They graze their cattle during the day on natural pastures on non-arable land found around canals, rivers, roadsides and railways. The government farms and the farmers of commercial dairy farms and milk-pocket areas supplement their cattle with concentrate.

The concentrate mix includes rice polish, wheat bran, oilcakes and common salt. Metabolizible energy requirements were considered for maintenance, production and pregnancy (AFRC, 1993), assuming an energy density in the feed of 10.5 MJ of metabolizible energy/kg DM. Feed cost was

Table 2: Simulation of economic performance per calving interval of different breed groups of Bangladesh dairy cattle

Parameters	Genotypes								
	L	Pab	S	RS	HF	S×L	RS×L	HF×L	S×Pa
Birth weight (kg)	14	20	20	18	27	18	16	21	21
Mature liveweight (kg)	234	270	295	282	395	280	275	340	290
Total milk yield (kg)	540	735	877	859	2900	726	1146	1703	1734
Calving interval (CI) (days)	484	450	502	495	493	479	486	470	475
Survivability (%)	80	80	70	70	60	70	70	55	75
Income (Taka)									
Milk income	10800	14700	17540	17180	58000	14520	22920	34060	34680
Calf price	1800	1880	1925	1925	1500	1855	1855	1375	1875
Total income	12600	16580	19460	19105	59500	16375	24775	35435	36555
DM requirements/cow									
Maintenance (kg/CI)	1408	1448	1720	1642	2076	1581	1584	1780	1608
Lactation (kg)	263	360	433	424	1231	355	559	820	845
Gestation(kg)	82	102	102	92	137	92	81	107	107
DM Req. of calf (maint. &LWG (kg)	472	558	621	570	768	533	531	684	601
Total DM req.	2225	2468	2876	2728	4212	2561	2755	3391	3161
Expenses (Taka)									
Feed Cost	8900	9872	11504	10912	16848	10244	11020	13564	12644
Fixed Cost	1000	1500	3000	3000	5000	3000	3000	5000	3000
Total expenses	9900	11372	14504	13912	19848	13244	14020	18564	15644
Net income/day of CI (Taka)	5.60	11.57	9.87	10.50	80.43	6.54	22.13	35.90	44.02
Net income/day of CI, US$ (1US$= TK 58)	0.096	0.20	0.17	0.18	1.39	0.11	0.38	0.62	0.76

Genotype descriptions are in the footnote of table 1

assumed Taka 4.00 per kg DM of a representative mix of both roughages and concentrates. Other operational costs were assumed to be fixed (1000 Taka for local and 3000 Taka for tropical purebreds and crossbreds and 5000 Taka for temperate purebreds and crossbreds).

The economic evaluations of purebreeding and crossbreeding systems in Bangladesh are presented in Table 2. The purebred Holstein-Friesian showed higher profitability than other purebreds. Crossbred, Sahiwal × Pabna and Holstein-Friesian × Local showed higher profitability than Sahiwal and Red-Shindhi crosses. Here the profitability was calculated using first lactation yields. Although no in-depth study has been undertaken, it is widely accepted that temperate breeds and their crosses have lower survivability, poor reproductive rates and lower yields in later lactations. Further work is needed to collect this information and include it into an economic analysis.

CONCLUSIONS

The breeding strategy of Bangladesh has focussed mainly on biological rather than economic evaluation. From the work of different researchers it can be seen that Holstein-Friesian combinations are better for both productive and reproductive traits than the other breed combinations. From the above study, the profitability of these combinations is also higher than for tropical and local purebreds and so incorporation of crossbreeding may increase farm profit. Further work on survivability and economics is required to confirm this.

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