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THE LIMITATIONS OF CROSS BREEDING FOR IMPROVEMENT OF CATTLE IN BANGLADESH

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THE LIMITATIONS OF CROSS BREEDING FOR IMPROVEMENT OF CATTLE IN BANGLADESH[1]

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I. INTRODUCTION

According to the latest census of agriculture and livestock, there were 21.5 million cattle in the country in 1983-84, of which only 122,523 or 0.57 percent were of 'improved variety' (BBS 1986, p.60). This is a disappointing picture in view of the fact that efforts to improve local zebu cattle through cross-breeding and grading were started in India by the British in the middle of the last century. The contention of this paper is that ther are two main reasons for this poor state: (a) the cross-breeding programme has been pursued without any specific persistent aim to be fulfilled, and the programme, though quite old, has never been pursued at any significant scale; (b) in recent years, use of a large number of cows for draft purposes has had an adverse effect on the expansion of the cross-breeding programme.

In Section II, the history of cross-breeding and artificial insemination is discussed. In Section III, the reasons for increased use of cows for draft are briefly described. In Section IV, empirical evidence on

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adoption of cross-breeding and fertility and reproductive performance of local and cross-bred cows are presented. The lessons for policy are drawn at the end.

II. CROSS BREEDING IN HISTORICAL PERSPECTIVE

The best Indian breeds, e.g. Hariana, Tharparker, Red Sindhi, developed through long periods of natural and farmer selection, were good for both milk and draft under the prevailing climatic conditions, extreme feed constraint and disease incidence. These breeds could be further developed through application of scientific breeding principles, the same way the European breeds were developed. Instead the British effort to improve local cattle was started by cross breeding local with European breeds - mainly in order to increase milk production, giving no attention to draft power. It may be noted that in Europe horses had almost replaced cattle as a source of power long ago. So European cattle breeders put less emphasis on the draft quality as an element in their scientific breeding programme. However, the British effort met with little success. About forty years after the cross breeding programme was launched, a Scottish professor of Agriculture observed:

> "Many different breeds have been taken to districts representative of all varieties of Indian climatic conditions. In no case have the efforts to establish European blood, either in its pure form or crossed with native cattle, met with that success which would warrant those who have gained experience in the matter to continue their efforts on anything but what one might term a 'hobby' scale. ..... English cattle live and even thrive if properly cared for and sheltered, but they must be pronounced a failure when left to the natural influences of climate, such as the native cattle are enabled to withstand. In saying they thrive it is not implied that they retain all their good qualities, as when kept in the best possible way European cows cannot be got to yield anything like the

> quantity of milk that they give at home, and their crosses, which are only middling milkers at the best, unless highly fed and carefully nutured, are very poor indeed. .... Local breeds could only be improved by selection of good specimens from among themselves, as no imported cattle could possess the qualities of endurance and long-suffering attained in the local breed by generations of semi-starvation."
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> (Wallace, 1888, pp.52-59).

Similar views were expressed by Edwards (1932), Hammond (1932), Phillips (1944 and 1948) for the Indian situation in general and more recently by Nasim (1953 and 1959) and Kelley (1959) for the Bangladesh situation. But to this day, selective breeding of improved indigenous cattle never found any place in breeding research or cattle breeding programmes in British Bengal, former East Pakistan and present Bangladesh. A breeding strategy more appropriate for specialized commercial cattle/dairy farming was not likely to succeed in a situation where small scale producers maintained few cattle on crop residues.

The British cross breeding programme was introduced in Bengal many years after it was done in other parts of India. Possibly because of more severe feed constraint and smaller size of cattle in Bengal and also possibly because of experiences in poor performance of European breeds in other parts of India, Haryana breed developed in North West India was used for cross breeding programme in Bengal. Haryana bulls were distributed free to Union Boards in the districts of Dhaka, Mymensingh, Faridpur, Pabna, Rajshahi, Nadia, Murshidabad and Midnapur. The Union Boards were supposed to maintain the bulls but because of lack of adequate care and feeds, the bulls soon became weak and some prematurely died. Subsequently, the bulls were distributed and maintained in fewer special locations in those districts. Significant improvements occurred in two to three decades but

the partition of India in 1947 stopped the momentum of progress in the districts that became part of East Pakistan. Trade links with India were restricted, so Haryana bulls were unavailable. However, a vigorous selective breeding programme could carry forward the improvements that had already been made but neither the Animal Breeders at the East Pakistan Veterinary College nor in the Directorate of Livestock Services cared to adopt such a strategy. Instead, both the institutions started working with Red Sindhi and Shahiwal bulls brought from West Pakistan. From 1958, artificial insemination (AI) centres were established in district headquarters and Red Sindhi and Shahiwal bulls were supplied to these centres each of which served a radius of five miles.

In 1959, the Directorate of Livestock Services established the Savar Farm near Dhaka mainly to supply milk to the capital city, but breeding stock production was incorporated as another main function in 1969 with German Technical Assistance. The main objective of this project was (and still is) to work for genetic improvement of local non-descript cattle through infusion of exotic blood for more draught power, milk and meat production.

After 10 years of operation as a development project, the management of the Savar Farm, now called the Central Cattle Breeding Station (CCBS), has again been vested in the Directorate of Livestock Services.[3] The

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[3]. The status of the station has become a centre of controversy after the establishment of the Bangladesh Livestock Research Institute in 1984. While the World Bank-BARC sponsored BLRI project proposal suggested that the CCBS should be an integral part of BLRI, the Directorate of Livestock Services is of the opinion that the CCBS should remain under its control. Personal conflict, vested interests within the Directorate and in the relevant Ministries are sources of this controversy. This controversy in combination with the controversy about the status of Animal Husbandry and veterinary education in BAU are seriously hindering the education, research and extension activities related to livestock development.

station maintains about 3000 cattle heads. The main breeding activities of the station were centred on:

(1) testing adaptability of exotic breeds to local conditions,

(2) production and distribution of cross bred bulls and semen to AI centres around the country,

(3) provision of AI service to farmers in the surrounding areas of the station along with an extension programme to encourage farmers to produce fodder and a disease control programme in addition to that provided by the Directorate of Livestock Services.

In addition to Red Sindhi and Shahiwal breeds earlier brought from Pakistan, Jersey, Holstein and Friesian breeds were imported to conduct adaptability tests. These tests were conducted under direct supervision of the German scientists and local scientists had no access to the core technical data, so little is known about the results.

In 1983-84, the CCBS had 26 bulls of which 10 were pure breeds and 16 others were cross bred belonging to 10 different breeding lines. During 1980-84, the CCBS distributed 87 bulls to 19 district AI centres. Six of these bulls were pure breeds and 81 were cross bred belonging to 18 different breeding lines some of which are not maintained at the CCBS (Table 1). It is not clear which of these lines are promoted for draught, meat or milk production. Each AI centre received 2-7 different breeds of bulls. Each district AI centre provides AI services to farmers within its 5 miles radius and it also supplies refrigerated semen to AI sub-centres and AI points operating at the Upazila level. There are over 300 AI centres and 120 AI points in the country. Cows brought to these centres are serviced with available semen in store.

The German Project maintained some record of performance of some cross bred cattle managed by villagers around the CCBS but AI centres around the country have record of only the number of inseminations performed and have no record essential for measuring breeding performance. For example, unpublished data available at the CCBS suggest that during 1980-83 AI centres throughout the country performed 915,671 inseminations, i.e. 228,918 per year.[4] Monthwise distribution of yearly totals were available but the actual number of cows inseminated, number of repeat inseminations, number of inseminations according to breeding lines and such other information were not available to measure performance of inseminated cows. Such data would be unnecessary if a clear choice about breeds or breeding lines had been already made by the CCBS but no such choice has yet been made. Thus, it appears that grading and cross breeding practices are haphazardly used without any specific aim to be fulfilled.

Higher education and research in the animal sciences at the Bangladesh Agricultural University (BAU) has a sufficiently long history but unfortunately the institution has failed to provide a sense of direction in breeding policy and research. BAU maintains a dairy farm and an AI laboratory administered respectively by the Departments of Dairy Science and Animal Breeding and Genetics, for teaching, research and extension purposes. The AI laboratory services the cows of the dairy farm and of the farmers in

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4. The number of reported inseminations might have been exaggerated. Assuming that, on average, 2 inseminations were required to produce a calf and that 40 percent of calves had died at different ages, then at the end of 1983 there should have been over 275,000 cross bred cattle in the country. The 1983/84 census recorded only 122,523 improved cattle (BBS 1986, p.60).

Table 1 : Breeds of Cattle maintained at the Central Cattle Breeding Station and District AI Centres

Breed	CCBS 1983-1984	District AI Centres 1980-1984
Jersey (J)	2	-
Friesian (F)	5	1
Red Sindhi (S)	1	2
Shahiwal (Sh)	1	2
Sh x Sh	1	1
Local (L) x F	4	12
F x Sh	2	4
S x Sh	1	5
S x Shahiwal-Kenia (Sh K)	2	4
L x H x F	1	6
S x Sh x Sh K	1	1
(L x F) x (L x F)	1	14
(L x J) x (L x J)	2	5
(L x F) x (Sh x F)	1	2
(L x F) x (L x H x F)	1	2
L x J	-	7
F x S	-	6
Sh x Sh K	-	4
F x S x Tharparker (T)	-	2
S x Sh x F	-	1
S x ShK x F	-	1
(L x F) x (S x F)	-	3
(S x Sh) x (ShK x F)	-	1
Total	26	87

Source: CCBS unpublished data.

the surrounding villages for a fee.[5] There are also 4 AI extension centres in four villages where refrigerated semen is supplied every week. The laboratory and the dairy farm have a breeding policy history similar to that of the CCBS. Initially improved Pabna and Chittagong cows were maintained for further improvement but later cross breeding with Red Sindhi, and Jersey and Holstein has been adopted as the policy. At present the AI laboratory has 10 bulls - 2 Red Sindhi, 3 Shahiwal, one Jersey, one Friesian, one Local x Friesian and 2 Local x Shahiwal. The quality of management of the dairy farm and the AI laboratory has deteriorated over the years and now has reached a miserable condition to say the least. The farm and the AI laboratory do not have adequate records to measure the performance of their breeding policy and activities. This poor state has a lot to do with the overall management of the University and a discussion on that is beyond the scope of this paper.

III. REASONS FOR DRAFT USE OF COWS

India is one of the oldest crop growing areas in the world where use of animals for draft and transportation made crop production easier. As the human population had increased, crop production had also been extended to less fertile hard soils requiring more draft power. The natural growth rate of animals was probably inadequate to meet the increased need. The problem was solved by banning slaughter of cattle and by making beef eating a religious taboo. The cow was given the status of a mother, because she

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5. During 1962/63-1983/84, the AI laboratory performed 2437 inseminations to cows of the dairy farm i.e. 111 inseminations per year, and 22,315 inseminations to farmers' cows, i.e. 1060 inseminations per year. While the numbe of yearly inseminations performed to dairy farm cows decreased in recent years, those performed to farmers' cows increased consistently. The overall size of the activity remains rather small.

gives milk, and was exempted from hard work (Mukherjee 1938, p.125; Crotty 1980, p.167).

In the middle ages, Islam spread to the Indian sub-continent. Although a small proportion of the population embraced Islam, there are a number of pockets where majority of the population embraced Islam; Bangladesh is one such pocket. In Islam pig meat rather than beef eating is a taboo. Thus slaughter of cattle for meat once again started but its impact on growth of cattle numbers was marginal because Muslim majority areas were scattered throughout the sub-continent and any shortage in those areas would be replenished by import from neighbouring areas. Bengal obtained its replacement cattle from neighbouring Bihar, Assam, Orissa and Tripura States. After the partition of India in 1947, this natural source of supply for newly created East Pakistan, which became Bangladesh in 1971, virtually stopped because no legal trading of animals was established with India. Some animals used to be (and still is) smuggled into the country but no estimate is available. Until 1947, only barren cows were used for draft by Muslim farmers, Hindus did not use them. But absence of the natural flow of replacement farmers in Bangladesh were forced to find an alternative in milk cows. Population pressure and reduction in size of land holdings accelerated the process of bringing cows to draft use. By 1960, females constituted 30 percent of the draft cattle. Although 1977 and 1983/84 censuses show nearly similar proportions of female draft cattle, the number of such cattle has increased over the years.

Jabbar and Green (1983) has shown by analysing the 1977 census data that districts with higher population and cattle densities (and smaller holdings) also had higher proportion of females in the cattle herd and used higher proportion of cows for draft purposes. Analysis by size of holding

has shown that as the size of farm increased, a significantly smaller proportion of their draft animals were female. This phenomena is explained by the fact that draft cattle is the most important capital for farming in Bangladesh. Since animals are indivisible, the number and sex of draft cattle to be kept by a farmer depends mostly on the requirement of draft services, draught capacity of the animals and the amount of capital available. Small farms keep female draft cattle because their smaller power requirements can be obtained from females which are generally less powerful than males. Females are also cheaper than males, so farms with capital constraint may be able to keep draft cattle if they choose to keep females rather than males.

Farmers solve their short-run problems of power needed to produce crops by using cows for draft but the long-run adverse consequences on the society of using cows for draft are far greater. Jabbar and Green (1983) and Mettrick (1981) have shown, on the basis of farm level data, that draft use adversely affect fertility and reproduction rate, and also milk production. This was evident in about 25 percent decline of young cattle between 1960 and 1977.

IV. FERTILITY AND REPRODUCTIVE PERFORMANCE OF CROSS BRED AND LOCAL COWS

Source of Data

A survey was conducted among 200 cattle owning households purposively selected in two clusters of 100 households each from Boyra and Shimla villages in Mymensingh district. Boyra is a peri-urban village located on the southern side of BAU so has easy access to the BAU AI laboratory and the veterinary clinic since their inception in the late 1950s. Shimla is

located about 30 km away from BAU and about 12 km away from the nearest veterinary clinic. BAU AI laboratory has been operating an AI extension centre in the village since 1974 when the villagers were helped by the Department of Cooperation and Marketing of BAU to organise themselves into a Cooperative Farming Society. Refrigerated semen is supplied to the centre every week.

The inseminator at the Shimla AI centre only provides the services and maintains virtually no record. The BAU AI laboratory maintains some record but that is insufficient to make any detailed analysis. So it was necessary to depend on a farm survey which was conducted over a period of six months. Some of the information related to lifetime characteristics of the cows had to be collected from the farmers' memory, so some amount of error was inevitable.

Some General Characteristics of the Sample

Distribution of the sample farms according to size of farm shows that Boyra is a more densely populated village than Shimla (Table 2). The average size of cultivated holding was 3.19 acres in Shimla and 1.71 acres in Boyra. Thus, cattle density was also higher in Boyra.[6] In both the villages, cattle density decreased with farm size but cattle density as a concept may bear little meaning in view of the fact that landless households also had a good number of cattle and virtually no fodder is produced in either village. Cattle are generally raised on crop residues so land ownership has a clear advantage but cattle owners of both the villages under consideration have illegal access to public grazing land. Farmers of Shimla take their cattle to the nearby forest and farmers of Boyra take their

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6. This is a micro region based confirmation of earlier findings that population and cattle densities have positive correlation, se (Mukherjee 1938, p.130; Jabbar and Green 1983, pp.12-15).

Table 2 : Composition of the cattle herd according to size of farm in two villages

Village and size of farm[a]	No. of farms[b]	No. of cattle per farm					No. of cattle per/acre
		Bullock	Draft cow	Milk cow	Young cattle	Total	
Shimla:							
Landless	5	-	-	1.00	1.40	2.40	α
Small	49	0.80	0.98	0.18	1.67	3.63	2.65
Medium	28	1.39	1.07	0.14	1.78	4.38	1.34
Large	18	2.78	1.00	0.50	1.72	6.00	0.75
All Farms	100	1.28[c]	0.96	0.27	1.70	4.21	1.32
Boyra:							
Landless	19	0.21	0.05	1.11	1.57	2.94	α
Small	65	1.02	0.65	0.48	1.47	3.62	2.92
Medium	12	2.00	0.92	0.50	1.67	5.09	2.18
Large	4	2.00	1.00	1.25	3.00	7.25	1.56
All Farms	100	1.02[c]	0.58	0.63	1.58	3.81	2.22

Source: Field Survey 1984-85.

(a) Landless - have no cultivable land but may have homestead; small, medium, large - own cultivable land up to 2.49 acres, 2.5 - 4.99 acres and 5 acres or over respectively.

(b) Actual size distribution in the villages may be slightly different because households not owning cattle were not included in the sample.

(c) Respectively two out of 128 and 6 out of 102 bullocks were bulls used mainly for breeding but also for ploughing.

cattle to the BAU Campus. A significant number of farmers living in Boyra lost their land during the establishment of BAU in 1961. For the majority of these farmers, raising one or two milk cows and selling milk is a supplementary source of income (Table 3).

Thirty-seven percent of the farms in Shimla had cross-bred cattle compared to 45 percent in Boyra (Table 4). In Boyra, 28 percent of the cattle were cross-bred compared to 17 percent in Shimla. These figures are considerably higher than the national average but this is rather poor given the long period of cross-breeding practice in the two villages. In both the villages, a higher proportion of larger farms owned cross-bred cattle. Very few cross-bred bullocks were found and none of the cross-bred cows were used for draft purposes. Thus it appears that the cross-breeds produced in these two villages may not be good for draft, the growing young males are possibly sold to the butchers.

Fertility and reproductive performance was measured for 247 cows for which lifetime information could be collected.[7] Some basic characteristics of these cows are given in Table 5. Proportion of draft cows was smaller in Boyra because some cow owners in Boyra did not raise crops. Farmers in Boyra homebred a small proportion of their cows compared to those in Shimla. This was also true for cross-bred cows inspite of their longer experience of cross-breeding. The most plausible reason is that Boyra with higher cattle density faces a greater nutritional scarcity compared to Shimla. So farmers in Boyra maintain fewer young replacement cattle (Table 2). Replacements are purchased at about the age of puberty, cross-bred heifers are purchased

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7. Local cows have been divided into milk and draft cows because earlier findings of Jabbar and Green (1983) have shown that draft use has significant negative influence on fertility and reproductive performance.

Table 3 : Proportion of farms consuming and selling milk according to farm size in two villages *

Size of Farm	Shimla			Boyra		
	Consume entire output	Sell entire output	Sell Part of output	Consume entire output	Sell entire output	Sell Part of output
	% of farms by size					
Landless and small	9.7	62.9	27.4	16.0	58.0	26.0
Medium	20.6	14.7	64.7	25.0	25.0	50.0
Large	61.5	-	38.5	77.8	22.2	-
All Farms	23.8	36.1	40.2	21.6	51.2	27.2

Table 4 : Proportion of cross bred cattle according to size of farm in two villages *

Village and farm size	% of farms owning cross bred cattle	% of cattle graded by type of cattle				
		Bullock	Milk cow	Male young	Female young	All Cattle
Shimla:						
Landless	20	+	-	33	50	25
Small	27	3	78	14	30	15
Medium	39	13	50	39	19	17
Large	61	14	44	31	28	19
All farms	37	10	48	27	27	17
Boyra:						
Landless	79	-	38	62	71	50
Small	45	-	32	45	45	23
Medium	67	4	50	64	56	26
Large	75	25	40	50	75	38
All farms	45	3	37	51	52	28

* Source: Field Survey 1984-85. + not applicable - None

Table 5 : Basic characteristics of sample cows in two villages

Village and Type of Cow	Number	%	% homebred	Average age at purchase (yrs)	Average age(yrs)	Average body wt. (kg)
Shimla:						
Cross-bred	14	11.5	71.4	2.6 (0.3)	7.6 (1.9)	224 (20)
Local-milk	13	10.7	69.2	3.3 (0.5)	7.6 (1.9)	174 (14)
Local-draft	95	77.8	77.9	3.2 (0.7)	8.2 (1.7)	169 (20)
All Cows	122	100.0	76.2	3.1 (0.7)	8.0 (1.8)	176 (26)
Boyra:						
Cross-bred	24	19.2	54.2	2.5 (0.4)	8.0 (2.1)	226 (12)
Local-milk	31	24.8	45.2	2.6 (0.4)	7.2 (1.3)	176 (17)
Local-draft	70	56.0	81.4	2.9 (0.6)	7.8 (1.7)	163 (25)
All Cows	125	100.0	67.2	2.7 (0.5)	7.7 (1.7)	178 (32)

Source: Field Survey 1984-85

Figures in the parentheses are standard deviations.

at a lower age compared to the local heifers.

Average age of the cows did not differ significantly between types of cows or between the villages but cross-bred cows weighed about 55 kg. more than local cows. The differences in weight between local milk and local draft cows were not significant.

Performance of Cross Bred and Local Cows

Ages at first heat and first calving

Local draft cows were found to come to first heat and give first calf at a significantly higher age compared to cross-bred and local-milk cows (Table 6). A smaller proportion of draft cows were serviced at first heat and their calving rate was also lower than those of local-milk and cross-bred cows. Cows in Shimla came to first heat and gave first calf at higher ages compared to those in Boyra. A smaller proportion of cows in Shimla were serviced at first heat possibly because of unavailability of bull or AI facility in time. Calving rate was slightly higher in Shimla compared to Boyra because of significantly low calving rate for draft cows in Boyra. This is an indication that draft use may result in loss of pregnancy. Age at first ploughing and age at first calving was found to be negatively correlated ($r = -0.44$, significant at 1 percent level).

Number of calves per cow's lifetime

In estimating number of calves in lifetime, appropriate fraction of a calf has been taken into account in case of pregnant cows, depending on the stage of pregnancy. Figures presented in Table 7 show that at average age, cross-bred cows gave more calves compared to local cows and that local-draft cows gave fewer calves than local-milk cows though draft cows were slightly older. Although cross-bred cows gave larger number of calves, standard deviation (SD) was also higher compared to local cows. In Boyra, such

Table 6 : Ages at first heat and first calving for cross bred and local cows in two villages

Type of Cow	Shimla				Boyra			
	Age at first heat months	% serviced at first heat	Calving rate[a] %	Age at first calving (months)	Age at first heat (months)	% serviced at first heat	Calving rate %	Age at first calving (months)
Cross bred	46 (8.6)	86	75	57 (8.4)	42 (6.1)	88	81	54 (6.0)
Local-milk	45 (6.7)	69	78	57 (7.2)	45 (6.7)	87	81	56 (7.2)
Local-draft	57 (9.6)	66	73	68 (9.6)	54 (10.2)	87	61	66 (9.6)
All	54 (10.2)	69	74	66 (9.6)	49 (10.1)	87	70	61 (9.6)

Source: Field Survey, 1984-85.

(a) Number of calves born in relation to number of cows serviced.

Figures in the parentheses are standard deviations.

Table 7 : Number of calves in lifetime and calf mortality for local and cross bred cows in two villages

Type of Cow	Shimla		Boyra	
	No. of calves in lifetime	% calf died before one year	No. of calves in lifetime	% calf died before one year
Cross bred	2.21 (1.63)	13.9	2.62 (1.21)	22.8
Local-milk	2.15 (1.40)	2.6	2.03 (1.02)	11.3
Local-draft	1.85 (1.15)	10.2	1.74 (0.93)	16.6
All	1.93 (1.23)	9.8	1.98 (1.06)	16.5

Source: Field Survey, 1984-85

Figures in the parentheses are standard deviations.

larger SD could be partly explained by larger SD in age but factors other than age was responsible for high SD in number of calves of cross-bred cows in Shimla.[8]

Mortality of calves under one year of age was much higher in Boyra than in Shimla and calf mortality was significantly higher in the case of cross-bred cows. Again mortality was higher for draft cows compared to milk cows. Eighty-one percent of the dead calves in Shimla died due to some disease compared to 73 percent in Boyra. Among others shortage of milk was an important reason for calf mortality and more deaths in Boyra occurred due to this reason compared to those in Shimla. This might have happened because farmers in Boyra might have overmilked their cows in order to maximize cash income giving inadequate attention to the welfare of the calves.

Degree of Adoption of Cross breeding

Forty-four percent of the calves born to the sample cows in Boyra were graded compared to 22 percent in Shimla (Table 8). Nineteen percent of the calves born to cross-bred cows in Shimla resulted from crossing with local bulls. These calves were not considered graded because cross-bred cows were expected to be crossed with graded bulls for continuous improvement. However, genetically speaking, these calves could be considered graded in the same sense as a calf born to a local cow crossed with a graded bull.

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8. Monthly distribution of AI services performed at AI centres throughout the country during 1980-83 show that number of cows coming to ovulation was the highest during December to March, then started falling reaching the lowest during July to September then rising again. July-September is the period of puddling for Aman paddy transplantation requiring intensive labour and this is also the period of feed shortage, high temperature and humidity. It is plausible that a combination of hard work and other factors reduce secretion of gonodotropic hormones in draft cows resulting in fewer cows being ovulated.

Table 8 : Distribution of cows according to number of calves in lifetime and proportion of calves graded according to type of cow in two villages

Village and Type of cow	Number of calves in lifetime						All Cows
	1	2	3	4	5	6	
	number of cows						
Shimla:							
Cross-bred	6	5	-	1	1	1	14
	(83)	(80)		(100)	(100)	(33)	(81)
Local-milk	5	4	3	-	-	1	13
	-	(63)	(56)	-	-	(17)	(33)
Local-draft	45	31	13	1	-	4	94
	(7)	(11)	(23)	-	-	(29)	(11)
All Cows	56	40	16	2	1	6	121
	(14)	(25)	(29)	(50)	(100)	(28)	(22)
Boyra:							
Cross-bred	3	11	5	2	3	-	24
	(100)	(96)	(100)	(100)	(100)	-	(98)
Local-milk	11	11	7	1	1	-	31
	(46)	(50)	(19)	(100)	(60)	-	(43)
Local-draft	35	23	8	3	1	-	70
	(20)	(41)	(13)	(17)	(60)	-	(27)
All Cows	49	45	20	6	5	-	125
	(38)	(57)	(37)	(58)	(84)		(44)

Source: Field Survey, 1984-85

Figures in the parentheses indicate percentage of graded calf in total calf given in lifetime.

The reason for crossing cross-bred cows with local bull will be explained later.

In both the villages, a significantly smaller proportion of calves born to local-draft cows were graded compared to those born to local-milk cows (Table 8). Thus, it appears that draft use of a large number of the cows in the country has an adverse effect on the growth of cattle population through reduced fertility and on the improvement of cattle through lower adoption of cross breeding practices.

Table 8 also shows graded calf as a proportion of calves born in lifetime. The proportions in the case of local-milk and local-draft cows indicate that cross-breeding (for that matter artificial insemination) has been adopted at various stages in the lifetime of a cow. The degree of adoption of AI at first pregnancy is still quite low although both the villages have had access to AI facility for at least 15 years. Examination of the breeding history of individual cows revealed that for a significant number of cows cross breeding has been temporarily or permanently discontinued after initial adoption. The main reported reason for accepting cross breeding was to get more milk and the main reason for not adopting cross-breeding at the first pregnancy or early pregnancies appear to be the small size and weak health of the local cows (Table 9). Unavailability of semen in time at the AI centre, death of cross-bred calf, failure of AI service are some of the reasons for temporary or permanent discontinuation of cross-breeding by some farmers. Thus, nutritional problems appear to be a serious constraint for the rapid adoption of cross-breeding by farmers.

Services Per Conception

Number of services required per conception for different types of cows are presented in Table 10. Two general patterns of the results are: (a)

Table 9 : Distribution of cows according to type of insemination used and related reasons

Type of Service used and reasons	% cows by village	
	Shimla	Boyra
1. AI, to get more milk	18.0	36.0
2. AI, because local bull not available	-	3.2
3. First calf local, then AI to get better animal and more milk	8.2	11.2
4. Local calf good/graded calf light, less resistent, difficult to maintain/AI spoils cow so used local bull	18.9	8.8
5. Local cow small/health poor so first local then AI. AI results bigger size calf, delivery creates problem, needs more milk, so used local bull	39.3	12.8
6. Own/locally available local bull used	4.1	24.8
7. AI service failed, so used local bull	3.3	0.8
8. Cow small/weak, at first, so used local bull, then AI for good breed but calf died, so local again/ service by local bull failed, so used AI	4.1	2.4
9. Semen not available in time at AI centre so local/could not bring cow to AI centre, so local/cow grazes with local bull, so serviced there	4.1	-
All	100	100

Source: Field Survey, 1984-85.

Table 10 : Services per conception according to number of conception and type of cow in two villages

Village and type of cow	Number of Conceptions						All Conceptions
	1st	2nd	3rd	4th	5th	6th	
	-------- services per conception ----------						
Shimla:							
Cross-bred	1.50 (0.76)	1.75 (0.71)	1.33 (0.58)	1.33 (0.58)	2.50 (0.71)	2.00	1.61 (0.52)
Local-milk	1.15 (0.38)	1.38 (0.52)	1.50 (0.58)	2.00	2.00	3.00	1.26 (0.30)
Local-draft	1.61 (0.67)	1.88 (0.79)	1.82 (0.64)	1.80 (0.84)	2.25 (0.96)	2.00 (0.0)	1.72 (0.59)
All Cows	1.54 (0.67)	1.80 (0.79)	1.71 (0.62)	1.67 (0.71)	2.29 (0.76)	2.17 (0.41)	1.66 (0.57)
Boyra:							
Cross-bred	1.29 (0.46)	1.57 (0.60)	1.90 (0.74)	2.20 (0.84)	1.67 (0.58)	-	1.62 (0.33)
Local-milk	1.32 (0.54)	1.45 (0.51)	1.56 (0.73)	1.50 (0.71)	2.00	-	1.44 (0.44)
Local-draft	1.60 (0.69)	1.81 (0.62)	2.01 (0.82)	2.00 (0.82)	2.00	-	1.81 (0.78)
All Cows	1.47 (0.63)	1.65 (0.60)	1.84 (0.77)	2.00 (0.78)	1.80 (0.45)		1.68 (0.66)

Source: Field Survey 1984-85.

Figures in the parentheses are standard deviations. No SD indicates only one cow.

Local-milk and local-draft cows required the lowest and the highest number of services per conception; (b) the number of services required per conception increased as the cow became older and the rate of increase was higher for local draft cows. On average, 1.3 to 1.6 services per conception are considered to be satisfactory and in large commercial cattle herds, up to 1.8 services per conception may be accepted without undue alarm (Payne 1970, p.264). The services required by cross bred and local draft cows and by older cows in general were higher than the acceptable limit. Moreover, these numbes are adequate provided cows come to heat within 60-90 days of an unsuccessful service. We do not have data on non-return rate but it seems plausible that most draft cows did not come to heat within 60-90 days of any unsuccessful service.

Milk Yield

Lifetime milk production of a cow depends on number of lactations, length of each lactation and daily milk yield in different lactations. Information on the length of lactation could be collected with adequate degree of confidence for cows having up to three lactations but data on daily and total milk yields for these lactations could not be collected with sufficient accuracy. However, data on highest daily milk yield for the latest lactations was available. This was expected to indicate the milk yielding potential of different types of cows. These are shown in Table 11. The following features emerge:

(a) For all types of cows the length of lactation gradually decreased as the cows became older and the rate of decline was higher in the case of local-draft cows.

(b) Length of lactation was the highest for cross-bred and the lowest for local-draft cows but the difference in the length between local-milk

Table 11 : Length of first three lactations and highest daily milk yield in the latest lactation of local and cross bred cows in two villages

Village and Type of Cow	Number of Lactations			Highest daily milk yield/cow
	1st	2nd	3rd	
	-------- days per lactation-----			kg.
Shimla:				
Cross-bred	362 (107)	361 (123)	340 (17)	4.89 (1.26)
Local-milk	325 (47)	330 (24)	300 -	2.42 (0.40)
Local-draft	231 (63)	208 (57)	194 (40)	1.40 (0.43)
All Cows	256 (83)	241 (88)	222 (66)	1.91 (1.26)
Boyra:				
Cross-bred	370 (63)	383 (57)	295 (123)	4.29 (0.87)
Local-milk	316 (44)	319 (69)	300 (24)	2.35 (0.51)
Local-draft	239 (44)	210 (43)	193 (26)	1.40 (0.39)
All	282 (71)	288 (92)	255 (91)	2.19 (1.23)

Source: Field Survey 1984-85.

Figures in the parentheses are standard deviations.

and local-draft cows was considerably larger than the difference between cross-bred and local-milk cows.

(c) Differences in highest daily milk yield was higher between local-milk and cross-bred cows than between local-milk and local-draft cows.

(d) Both length of lactation and highest daily milk yield of cross-bred cows had higher standard deviations, indicating higher instability in their performance.

V. CONCLUSIONS

Worldwide experience with attempts to adapt exotic breeds of temperate climate to tropical climate or to upgrade tropical breeds using temperate breeds have met with limited success. In addition to climate, feeds, disease control and management are serious limitations. In some cases, these problems have been overcome at great cost but the problems in Bangladesh are too serious for her to be able to control easily. An additional and rather serious problem is that a large number of small, unhealthy cows are used for draft purposes. Because of these problems, cross-breeding has made insignificant impact in the long period of its existence. The programme has been pursued at a small scale without any specific aim to be fulfilled. Cows are being used for draft to solve short-run problems of power shortage in crop production but the long-run consequences from the society's point of view is rather serious. Draft use of cows not only adversely affect fertility, reproduction and milk production, it also adversely affect the adoption and performance of cross-breeding practices. Compared to local cows, cross-bred cows give significantly higher milk, reach puberty at an earlier age, give larger

number of calves in lifetime but their performance is far from stable as indicated by higher standard deviation of the above parameters, higher calf mortality and larger number of services required per conception.

It has been suggested that in ideal conditions, environment accounts for 60-80 percent of variation in individual animal production, genetic characteristics account for the remaining 20-40 percent. In high stress conditions such as in Bangladesh environment and genetics respectively account for 85-95 and 5-15 percent of the variation. So major efforts in research for livestock development should be concentrated in the fields of nutrition, health and management and only after sufficient improvement in these fields should attention be given to genetic research (Dickey and Huque 1986, p.29). Such an ordering of priorities would seem rather misplaced because the technology of livestock production encompass both genetic and other factors, so all the elements should be pursued together though the degree of emphasis given to each factor may differ. However, it needs to be emphasized that efforts to improve Bangladeshi cattle should be based on a thorough appreciation of the genetic potential of local breeds because in the foreseeable future large scale commercial cattle farming is not going to happen and cattle will continue to be raised by small farmers under stress conditions.

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ABSTRACT

The Limitations of Cross Breeding for Improvement of Cattle in Bangladesh

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The origins of cross-breeding as an instrument of improvement are traced back to British India where a late start was made in Bengal, crossing local breeds with Harayana stock. The impact of the program recently may be assessed ex-post as about 1 per 8 inseminations which may have been over-reported (over 1980-3) at 229 thousand/year, with 122 thousand improved animals extant in 1983/4. Obstacles of longstanding have always hindered the cross-breeding program and these have probably increased due to an increasing use of cows for draft purposes. A sample of 200 households was used to check technical performance inter alia as between cross-bred, local/milk and local/draft cows. Feed problems are not studied in detail. The cross-bred cows definitely outyield the local cows and weigh heavier.

Calving and lactation length are mainly depressed by using cows as draft animals. Calf deaths are least frequent for local milk animals and the services per conception were lower. Generally those with smaller farms were more interested in selling milk. The authors consider that environmental conditions in the main affect performance rather than genetic condition, more especially in Bangladesh and that other measures of improvement should be given priority.