Nomadic Cattle Breeders and Dairy Policy in India

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INTRODUCTION

The study of nomadic peoples tends to concentrate -- understandably-- on countries where nomadic groups constitute a noticeable segment of the population. In a parallel manner, official efforts to recruit the skills of nomads seem more enthusiastic where such groups bulk significantly in the population of a country. India can be cited as an example of a country where nomadic groups are numerically insignificant, where the study of nomads is not particularly organised or extensive or popular, and where development planning and policy have paid little attention to nomadic peoples.

This paper argues that at least one group of nomads, viz. nomadic cattle breeders, have a vital contribution to make to the Indian economy. It is therefore not written in a spirit of let's-be-kind-to-the-nomads-and-find-them-something-to-do. The paper expresses developmental pragmatism rather than pseudo-anthropological sentiment, and hardheaded planning for an uncertain future instead of nostalgic preservation of a quaint past. Indeed, this paper was inspired not by the study of nomadic peoples but by the analysis of Indian dairy policy, which policy contains a lacuna that nomadic breeders can best fill.

It is for this reason that the next two sections of the paper deal with dairy development as such -- one section discussing the imperatives of Indian dairy policy and the other the alternative to nomadic breeders that present policy favours -- before going on to the breeders themselves.

An initial brief introduction to these nomadic breeders is required, although the paper's focus is on argument rather than description. In India, all nomads are not breeders and all breeders are not nomads. (A well-known example of sedentary breeders is the family of the Pattegar of Palaiyakottai, near Coimbatore, who rears the Kangyam breed of strong draught cattle and who once owned considerable pasture.[1] However, some breeders are nomads and they are responsible for many of the best Indian breeds. In fact it has been said that although "there has always been a certain amount of cattle breeding going on among the cultivators themselves . . . except in certain tracts like Nagaur where breeding by cultivators has become a tradition, the quality of cattle has depended very largely on the nearness of a pastoral tract". (Kulkarni:1953:64) wherein nomadic breeders can operate. Their specialisation of function results from an agro-economic division of activity between densely populated agricultural areas concentrating on the production of crops, and hinterland thinly-peopled grass lands suitable for the breeding of livestock, with a corresponding division of labour between sedentary agriculturists and nomadic breeders. In Karnataka state for example the cattle breeding castes of the Kuruba, Idaiyan and Yadava supply local agriculturists with youngstock.[2] Not only are particular groups of cattle breeders connected with certain regions, they are linked to particular bovine breeds: to take examples this time from Gujarat state, the Rabari nomadic breeders

are associated with the Kankreji breed and the Maldharis with Gir cattle and Jaffarabadi buffaloes. Indeed, the inherent expertise of these groups is such that in villages where Rabaris have settled, the yield per milch cow attained in their households is favourable even when compared with other households that are affiliated to Gujarat's well-known dairy cooperatives and thereby benefit from modern inputs into milk production.[3]

Approaching the issue of nomadic breeders from the viewpoint of policy analysis, as this paper does, rather than from ethnographic study, the sources on which we base our discussion are mainly policy documents. We find frequent and flattering mention of breeder nomads in policy discussions of the early twentieth century. "If inquiry were to be made into the history of such breeds . . . we believe it would be found, in most cases, that their excellence was due to the care bestowed upon them by the professional cattle breeders, usually nomadic . . . they usually worked under unfavourable conditions, but their skill in selecting and tending cattle was . . . considerable" (Royal Commission on Agriculture:1928:345). ". . . professional breeders . . . pursue their business with considerable skill and knowledge. They are most careful about mating, practice early castration, herd their animals separately and take them to the best grazing grounds at the best seasons, producing excellent cattle with an expenditure that could hardly be lowered" (Keatinge:1917:17,31).

> These breeders have usually been nomadic tribes who raised their cattle by migrating from place to place according to the abundance of food and water. The year for these breeding tribes usually commences with the Diwali festival which occurs in the latter part of October or early November. At this time each breeder and his family left the place where they had been settled during the monsoon with the herd of cows headed by a selected bull in search of good grazing and water . . . One bull headed each herd so there was little chance of cows being crossed by any other than the bull intended for the purpose. By this wandering, the cattle obtained different kinds of grass and fodder and on the whole, obtained a fairly useful and balanced ration. . . At the end of a year's wandering. . . the breeders returned to dispose of the young. . . stock (Kulkarni:1953:64).

However, in more recent policy documents nomadic breeders are referred to cursorily, if at all. In our concluding section, we shall consider this alteration in policy in more detail.

DAIRY BREEDING IMPERATIVES

India is today the venue of the world's largest dairy development program, viz. Operation Flood.[4] This focus on milk may well appear inappropriate in a country where the majority is insufficiently provided with grain, but certain justifications can be found. On the supply side, India with 18% of the world's cattle stocks produces less than 6% of the world's milk and uptapped potential should surely be developed.[5] From the viewpoint of demand, man cannot live by rice or chapatti alone but requires protein. Although inexpensive protein can be extracted from vegetable sources, a certain amount of animal protein is necessary, and in India this is more economically derived from milk than meat, especially in a country where a third of the population is vegetarian.[6]

Dairy development in India must be cautious, judicious and balanced. For example, the obvious booster to milk production from quantitatively and qualitatively

improved nutrition for milchstock is almost automatically ruled out by the danger of diverting foodstuffs, and the agricultural resources involved in producing them, from humans to animals, and by the limited resources of the average milk producer. Similarly, the other apparent strategy of a drastic culling of cattle numbers in order to have fewer but better milch animals is precluded by the need for other cattle products such as draught power, dung and leather, and the consideration that the animals most likely to be eliminated under such a program would belong to poorer producers.[7]

It is for these reasons that breeding has emerged as a crucial variable in Indian dairy development, allowing hope that through genetic manipulation other constraints on the production of milk can be bypassed or mitigated or overcome. In fact the Royal Commission on Agriculture neatly summarised the state of affairs more than half a century ago: "It follows that the efforts of a breeder. . . offer the one possibility of improvement which is not dependent either on an increase in food supply or a decrease in the number of cattle to be fed" (RCA:1928:35).

Once breeding has been identified as the key variable, the next question naturally concerns the criteria for designing a suitable dairy breeding strategy.

India's dairy breeding policy should be climate-appropriate. As "the physical environment in the hot tropics has a direct effect on the animal" (Acharya and Singh:1978:77), milchstock in India must be bred to withstand climatic rigours. Desirable qualities include endurance of prolonged exposure to the sun's heat, and mechanisms to store moisture and energy within the body as both water and food supply fluctuate unpredictably. Climatic suitability particularly implies resistance to the air-borne, water-borne and tick-borne diseases that abound in the tropics. Not only should a milch animal survive these environmental pressures, it should be able to yield well under such conditions.

India's dairy breeding policy should be region-appropriate. India is less a country than a sub-continent, and regional diversity is well illustrated by ecology. Dairy breeding policy must vary between the Himalayan mountains and foothills, the Indo-Gangetic plain, the arid and semi-arid areas of the North West, the Deccan plateau, the flooded rice fields of eastern and southern India, as well as between sub-regions in these areas. And insofar as ecology interacts with economy and culture, dairy breeding policy should be attuned to regional variations in these as well.

India's dairy breeding policy should be nutrition-appropriate. In India some things surmount regional diversity -- and one such is malnutrition. According to sixth plan estimates, more than half the population lives below the poverty line.[8] Only in two states, viz. Punjab and Madhya Pradesh, do residents receive an average minimum of their calorie requirements, and even in these areas malnutrition is widespread. India has 15.5% of the world's population, but only 2.4% of the world's land mass.[10] Thus it is vital that domesticated animals do not compete with humans for food and that these animals as far as possible be fed on agricultural waste and byproducts, encroaching minimally on foodstuffs fit for human consumption. Dairy breeding policy should therefore strive to produce animals that can subsist and yield well on low-grade feed and fodder, producing milk in addition to and not at the expense of producing grain.

India's dairy breeding policy should be technology-appropriate. Unlike temperate zone dairying where cattle specialise in the provision of such objects of consumption as milk and meat, Indian cattle play a multifarious role in the agricultural and

agro-industrial economy. Particularly notable is their contribution to draught, tractive and transport activity. They meet two-thirds of the country's power requirements and carry 96% of the goods brought to regional markets, usually over the poorest of roads.[11] It has been calculated that India would have to spend about a thousand million U.S. dollars annually on petrol to substitute for animal power.[12] Cattle are therefore agents of production and transportation as well as providers of objects of consumption. In so much as breeding for milk and breeding for work can be competitive, dairy breeding policy must safeguard draught capacity. "A breeding strategy which does not take into account the importance of draught power could turn out, in the long run, to be quite detrimental to the sustenance of agricultural production in India and in other countries of South Asia" (Nair;1982:A17).

India's dairy breeding policy should be owner-appropriate. Many of the constraints described above do not seem insurmountable. Milch animals can be kept in air-conditioned barns, protected with veterinary care against disease, stall-fed on green fodder and compounded feed, maintained in conjunction with tractors so that the need for draught power is eliminated, . . We come up however against the basic constraint, viz. the fact that 70% of India's farmers are smallholders who find it difficult to provide essential shelter, medical care and food for their children, let alone luxuries for their mulch animals.[13] Still worse off are the marginal cultivators and agricultural labourers who constitute the rural poorest. Dairy breeding policy must cater to this majority by developing milchstock that can survive and produce under the far-from-ideal conditions wherein the average producer operates.

Indian dairy policy should be infrastructure-appropriate. As we have already noted, India is more a sub-continent than a country, and transport and communications facilities are underdeveloped or lacking in many areas, particularly the rural hinterland. "Many of the areas with the highest potential for expanding milk production are also those which are very poorly supplied with roads communication" (GOM:1974:25). Transport and communication, being essential elements in the dissemination and implementation of policy, should be kept in mind at the time a policy is framed. An appropriate dairy breeding policy should not require a communications infrastructure that is elaborate and complicated. If expensive, the infrastructure will eat into the funds of the program. If time-consuming to set up, the infrastructure will delay the implementation of the policy. Ideally, dairy breeding policy should be administrable over the existing infrastructure, or require extensions that can be added inexpensively and quickly.

INDIA'S DAIRY BREEDING STRATEGY: WHAT IT IS

India's current large-scale, high-speed, resource-intensive, tradition-shattering dairy development program, Operation Flood, has in both its phases placed heavy emphasis on the breeding factor. Whatever may be said in criticism of the program, considerable importance has been given to breeding projects, a definite stand has been taken and a policy has been unanimously endorsed. Implementation now proceeds with no sign of dwindling enthusiasm.

This policy involves crossing the Indian zebu cow, Bos Indicus, with various strains of Bos Taurus such as the Jersey, the Holstein-Friesian, the Brown Swiss and the Red Dane, mainly through artificial insemination, in order to combine the substantial milk yields of the latter with the ruggedness and disease resistance of the former. The crossbreeding program will concentrate its funds and efforts on the one hundred and fifty-five districts of India covered by Phase Two of Operation Flood,

with the goal of building up a National Milch Herd of some ten million animals, one-sixth of the country's milchstock that is to provide one-fourth of the country's milk.[14] Let us weigh this dairy breeding policy in terms of criteria already established in our discussion, viz. appropriateness to climate, region, nutrition, technology, owner and infrastructure.

The cross-breeding policy and climate. The fact that nomenclature refers to locale (whether in the case of the Taurean Red "Dane" or the zebu Red "Sindhi") illustrates the adaptation of cattle to their native agro-climate, and suggests that maladaptation to other environments would increase with the difference between climates. What happens then when genes suited to the climes of Jersey and Holstein-Friesian are introduced into the heat and dust of India?

Such crossing has immediate adverse effects on bovine external features necessary for survival in the Indian climate, darkening the light skin colour of the zebu that repels heat, shortening the long tail and ears that keep away insects (and disease), reducing the dewlap whose extra epidermal surface enhances heat tolerance, and flattening the hump wherein muscular fat is stored.[15] Further, resistance to disease is drastically lowered, whether transmitted through insects or water. For this reason a crossbred cow should not be taken out to graze or be given water from the village pond, but an impoverished owner has no alternative to these practices.[16] The inadequacy of veterinary infrastructure renders vulnerability to disease still more disadvantageous.

Finally, the climatic stress consequent on exposure to unfamiliar levels of heat and humidity critically affects conception, reproduction and lactation, thus questioning the very grounds of reproductive efficiency on which crossbreeding was introduced. One authority has contrasted the relative comfort of crossbred stock in the cooler months of the year with their miserable condition in July and August, describing large-scale crossbreeding as feasible only "if the agro-climatic conditions of January to March can be maintained throughout the year" (Singh:1978:228).

The crossbreeding policy and region. Does the cross-breeding program carefully demarcate shifts in ecology and economy in different areas of the subcontinent and accordingly prescribe various levels of suitably selected exotic genes? Perusal of dairy development documents and the proceedings of the National Conference on Crossbreeding is in this matter quite futile. All that one comes across are admissions that there is still as yet no adequate definition of agro-climate -- let alone identification and classification -- and such blanket prescriptions as "Use the Holstein everywhere in India except drought-prone areas, and here the Jersey". (A suggestion that is just as useful as prescribing fruit cake for hungry people everywhere in India except drought-prone areas, and there plain cake).[17] Thoughtful, data-based analyses are available of regional responses to the crossbreeding program, pinpointing areas such as Kerala where the program has been successful and states like Meghalaya suitable for rearing crossbred stock, as well as clear specifications of regions where the introduction of the program would be unwise, but seem to have little impact on a region-insensitive crossbreeding program.[18]

The crossbreeding policy and nutrition. The central consideration in dairy breeding must be to minimize competition for feedstuffs between man and milch animal, ensuring that milchstock nutrition draws mainly on agricultural waste and other humanly inedible commodities. The diet prescribed for high-yielding crossbred stock consists in large part of green fodder. Such a diet cannot and should not be supplied from the present resources of the Indian agricultural economy, for green

fodder cultivation would divert land, water and fertilizer from the production of foodcrops, and would be out of the question in the many areas of India where water is a scarce resource. Scientists who suggest that crossbred milchstock be fed on coarse grains and inferior pulses forget that such "coarse", "inferior" foodstuffs are the only diet within the purchasing power of many Indians and should not be channelled away from them to milch animals.[19]

Indeed the dietary requirements of crossbred milch-stock are such as to render the crossbreeding program self-defeating, "First, even in the absence of Operation Flood there will be a big gap between the requirements and availability of feeds and forages though the gap will be narrower. Secondly. . . the introduction of the crossbreeding program will greatly widen the gap. . . continuously underfed milch cattle of exotic breed are qualitatively not superior to indigenous ones. . . They will be an additional burden on the economy" (Singh:1979:71-74). Given the present shortage of feedstuffs, "the upgrading of cattle will not be matched by adequate feeding and this will lead to low productivity and possible breed deterioration" (Huria & Acharya:1980:1936).

The crossbreeding program and technology. Having noted the heavy dependence of rural India on bullock power, the suitability for draught and transport of the crossbred bullock is naturally an important issue. Despite reassurances about the crossbred bullock's performance[20], field data appears adverse. One village study tells us: "The Jersey (crossbred) bullock was not favoured because villagers believed that it had less capacity for doing hard work in the fields. These bullocks did not develop a hump which is essential for keeping the plough" (Batra:1981:157). The crossbred is in fact low in both physical and economic efficiency, working one-third less but eating twice as much as the native ox.[21]

Can the poor performance of the crossbred bullock be compensated for if crossbred cows are introduced along with tractors? No, for the following reasons. It has been calculated that a thirty acre farm is necessary for cost-effective tractor use in India, but the majority of cultivators operate less than five acres.[22] Also, if tractors were to substitute for bullocks, fuel costs would be prohibitive both for individual farmers and the country as a whole. Again, it is questionable whether tractors could entirely substitute for the multipurpose role played by bullocks: there has been little decrease in the bullock population of Punjab over the last twenty years despite substantial tractorisation, and in Haryana farmers with tractors keep bullocks for agricultural functions for which the machines are unsuited.[23]

The crossbreeding policy and the average owner. The crossbreeding of cattle is stated to be intended as a solution to some part of the poverty of rural India, providing employment and income from dairying to those who are in the greatest need of both. However, the problems faced by a smallholder, a marginal cultivator or an agricultural labourer in acquiring a crossbred milch animal are immense: problems of mustering the sizeable finance required, when commercial banks shy away from such poor credit risks and even public sector and cooperative banks are not enthusiastic about financing them, and problems of repaying this.[24] That the proportion of exotic blood varies from 25% (and even 12 1/2%) among the crossbred stock of smallholders to 93 3/4% in the hybrid cows of largeholders -- with consequent variation in yields and returns -- illustrates how the crossbred program reinforces rather than reduces inequality in rural society. Indeed, variation in the ownership and yields of the milchstock of large and small holders were less marked in the case of native cattle than crossbred, since native cattle do not require such an expensive diet.[25]

Once a crossbred cow is attained, problems escalate rather than decline. As a director of animal husbandry in Gujarat state tells us: "In order to obtain a satisfactory level of production from a crossbred cow, it is necessary that she receives sufficient quantity of succulent fodder of leguminous nature . . . This should be supplemented with hay and concentrates. . . This feeding schedule would be a liability to an average farmer. . . If he is not able to provide feeding inputs appropriately, then he will not get the expected level of production from his cow. . . if he has obtained a loan from the bank on the basis of level of production from his cow, then either he will be left with very little money after adjusting his loan instalments or in some cases he will not be in a position to repay the loan. In such an event our intention to help him by taking up crossbreeding program has done more harm than good to him" (Vaishnav:1978:108-9). Underfeeding leads inevitably to delayed maturity, a later age at first calving, longer calving intervals, lower yields -- and in certain cases to infertility, morbidity and mortality.[26]

The crossbreeding policy and its infrastructure. Although crossbreeding has been unanimously decided upon by dairy development agencies, the details and design of a National Breeding Policy have not been finalised: "Scientists with extraordinary zeal have been changing the breeding design at the slightest occasion without considering its lingering impact" (Bhat:1978:286). Similarly, breeding plans for the major cattle tracts and milkshed areas are not yet ready. From the early days of crossbreeding programs in India, the following cavalier attitude to the preparation of breeding plans has been evinced: "It is realised in India that the genetic potential of cattle must be improved if dairying is to progress. . . . The problem is to introduce crossbred females by mating exotic sires with indigenous females. . . Therefore there is no valid reason to await complete breeding plans before implementing the project" (FAO:1970:6, emphasis added). This imprudent haste to crossbreed without scientific breeding plans cannot be too strongly condemned.

What of the organisational edifice erected on this unscientific foundation? First, the exotic bulls who are the proud fathers of the National Milch Herd: "The exotics selected for the program were originally gathered unscientifically. The criterion was the willingness of foreign countries to gift the bulls to us. Barring certain honourable exceptions, the bulk of the material so imported was without a proper pedigree. There was no science in the program" (Sivaram:1978:5). Second, even given good quality semen for artificial insemination, the problems of preserving, transporting and applying such a delicate input are truly formidable in a huge country where electricity for refrigeration, adequate roads, vehicles, equipment and personnel are all scarce resources.[27] These infrastructural inadequacies are clearly reflected in the small percentage of successful conceptions after artificial insemination, even in areas where the artificial insemination program is stated to be successful: in Andhra Pradesh, 25,000 heifers were identified from 600,000 inseminations,[28] and in Kerala the success rate of crossbreeding is "30%, which is significantly higher than the figures reported in other regions of the country" (Nair:1982:A16).

Our conclusion therefore can only be that India's presently favoured dairy breeding policy of crossing with exotics leaves much to be desired. It interferes with the climatic adaptation of milchstock, lowers their resistance to tropical disease, does not take account of regional diversity, brings milch animals into competition with humans for scarce foodstuffs, adulterates the performance of work animals, is not sensitive to the needs of poor producers, widens the gap between large and small holders, and requires too complicated and expensive an infrastructure to implement.

INDIA'S DAIRY BREEDING STRATEGY: WHAT IT COULD BE

Let us now turn to another set of dairy breeding activities in modern India, viz. that of nomadic cattle breeders, and consider the appropriateness of their activities with reference to climate, region, nutrition, technology, owner and infrastructure.

Nomadic breeders and climate. The fact that the world's finest tropical breeds of dairy cattle are found in India testifies clearly to the climatic adaptation of the stock raised by nomadic breeders. The rugged endurance of the zebu is almost legendary. A veterinarian attached to a major American research centre performed field autopsies on cattle working normally a few hours before their death and found that their vital organs were damaged by huge leisons.[29] Such toughness of fibre is developed through a rigorous ordeal of breeding: "The herd was taken through all parts of the country, through thick jungle and sandy wastes, and as cattle were of little value when sick or weak and lame, they were left behind and either died or were devoured. The whole method led unconsciously to the survival of the fittest and disease was stamped out" (Kulkarni:1953:63).

A paper presented at the National Conference on Crossbreeding identified the plus points of native breeds as their survival capacity, ability to reproduce under conditions of great strain, heat tolerance and resistance to tropical disease.[30] As the deputy director of military farms remarked on that occasion: "It may perhaps have taken many thousand years for our forefathers to evolve the best draught and dairy breeds of cow and buffalo for the tropics. . . a cow who could be kept under a tree in hot summer, who could drink village pond water, could stand up to fly and mosquito nuisance and tropical diseases, and who could live on grazing of monsoonic grass or on roughages. . . Should we not preserve such superior germ plasm?" (Singh:1978:223-29).

Nomadic breeders and region. As nomadic breeders are found in various parts of the country, different groups raise particular kinds of cattle with reference to the characteristic conditions of an area. To give some examples, the Kankreji breed has long legs to move over the sandy roads and deep ruts of Gujarat's terrain, the Khillari has flint-like hooves to negotiate the stony plateau of the Deccan, and the Dangi can work in flooded rice fields for long periods with no adverse consequences from the soaking. Similarly, diminutive cattle are bred for hilly areas, and these animals can be handsome and well-bred, suitable both for milk and work. Some of the best dairy breeds are in fact found in drought-prone areas: one such is the Tharparkar, a first class milch animal, exported in large numbers to the arid climes of Mesopotamia during the first world war in order to supply the dairy requirements of British troops. Further, some native breeds are versatilely suited to a range of environments, even dichotomously different ones, such as that superb milker, the Red Sindhi, which does equally well in the extreme heat of North Sind and the extreme cold of Quetta, being bred in ravines to ensure ruggedness.[31] It is worth mentioning that nomadic breeders raise herds of goats, asses or camels in harsh environments where hardier milch animals than cattle are required.[32]

Nomadic breeders and nutrition. Having already marked that competition between men and milchstock for scarce agricultural resources should be minimised, let us note that nomadic breeders observe this safeguard by carrying on their activities in grassland areas that are sparsely populated and uncultivated. "It is this fact that enables the cultivators of our richer lands to dispense with cattle breeding and to devote their energies to producing. . . crops" (Keatinge:1917:31). What is more, the animals produced by these breeders can lead productive lives on grazing,

coarse fodder, and agricultural waste and byproducts, thus reducing encroachment on foodstocks for humans. The Royal Commission on Agriculture remarked: "As compared with the cattle of other countries, the best Indian cattle excel as "foragers", that is their capacity to maintain themselves in good condition on the scanty grazing to which they have access. . . It follows that the efforts of a breeder who made foraging qualities his goal offer the one possibility of improvement which is not dependent. . . on an increase in food supply" (RCA:1928:357). Nomadic breeders illustrate such efforts to increase milk production without detracting from food supplies in a country where too many people go hungry. It is not surprising then that the Royal Commission on Agriculture urged that the skills of these breeders be pressed into the service of livestock development programs.

Nomadic breeders and technology. Unlike cattle on European and American farms that provide mainly milk and meat, the agro-economic contribution of Indian bovines include draught and tractive power and manure in addition to milk and carcass products. The dairy breeding activities of nomadic herders enhance the production of these other goods and services.

In a country where some 350 million tonnes of cattle dung are used annually to enrich the soil,[33] where intensive green revolution agriculture has decreased soil potency, where fertilizer is a scarce commodity and where the ecological dysfunctions of widespread use of synthetic fertiliser should be avoided,[34] it is encouraging to know that the mineral value of the dung and urine excreted by the native cattle reared by nomadic breeders is superior to that of exotic cattle.[35]

As animal power is a key resource in India's agricultural economy and, we have seen, unlikely to be replaced by motor power, the contribution of nomadic breeders is valuable in that they produce not only draught breeds as well as dairy breeds, but also dual-purpose breeds that provide both commodities. An official document published around the time of Independence identified twelve dual-purpose Indian breeds, plus another seven with dual-purpose potential. For example, the Tharparkar cow already identified as a prime milker produces bullocks that are good for both ploughing and transport.[36]

Nomadic breeders and the owner. Nomadic cattle breeders are not overtly socialistic in the manner of dairy development agencies -- although the socialism of the latter pertains to word rather than deed -- in that the activities of such breeders do not directly benefit the rural poor, who lack the means to purchase the cattle produced by these breeders. But insofar as nomadic breeders live on the edge of subsistence, they themselves can be numbered among the rural poor and their efforts therefore are even more deserving of recognition and encouragement.

Further, the nomadic breeder supplies the stock holder with an animal that is climatically adapted, disease resistant and capable of yielding well on inferior rations, thus reducing expenditure on shelter, veterinary care and feed. If milch animals and dairy development are to be enlisted in the battle against rural poverty, surely such milchstock is more appropriate than delicate and demanding crossbred cows?

Nomadic breeders and infrastructure. The problem does not arise of making the products and expertise of nomadic cattle breeders available to stockholders in the rural hinterlands of India, simply because it is in these very hinterlands that nomadic breeders operate. As they move from place to place, contact is maintained with livestock owners at various points in the area they cover. In addition, regular cattle fairs, like the Friday market that serves the districts of Kaira and Ahmedabad,

facilitate the exchange of stock between regions and groups.[37] Stockholders are prepared to traverse long distances to acquire good animals.[38] Active in linking the demand of cultivators and the supply by nomadic breeders are intermediary castes like the Waghiris of western India.[39] There is a tradition in some areas of breeder castes allowing their prize bulls to service the cows of cultivators free of charge, as they consider the charging of fees for this purpose to be immoral.[40]

Today, the infrastructural problems of nomadic breeders are the converse of those of the dairy development agencies described in the preceding section. Official agencies are centralised, visible and vocal, possessing both resources and power, but unable to reach stockholders who are dispersed all over the country. On the other hand, nomadic breeders are suitably decentralised and dispersed to benefit livestock owners, but they lack the network (necessitated by the comparatively recent unification of India) to facilitate communication between different groups of breeders, to channel information that would allow them to extend their activities to greater benefit, and to articulate their problems and requirements.

Clearly the activities of nomadic cattle breeders are efficient with regard to climatic, regional, nutritional, technological, infrastructural and management constraints. However, it may be argued that as far as essential dairy qualities are concerned, crossbred milchstock score higher than the breeds raised by nomadic groups. Under experimental and model farm conditions -- particularly where green fodder constitutes a large part of the diet fed -- crossbred cattle evince an earlier date at first calving, shorter intercalving periods and higher yields than pure native breeds like the Red Sindhi and the Tharparkar.[41] Yet few farms in India are model farms: and studies of "real" farm situations show very different results. Here are the findings of an experiment that tested the performance of crossbred and zebu milch cattle under field conditions:

> The diet pertained to crossbred cows that belonged to an average stock owner. . , The managerial practices were in accordance with what an average stock owner could provide. . . Data on age at first calving and interval between calvings for individual cows was obtained and analysed by standard methods. . . The average age of first calving or the length of calving interval observed in the present study was more close to the estimates reported for major Zebu breeds of dairy cattle. . . Crossbreeding with exotic Jersey bulls was not found to result in appreciable decrease in age of first calving or length of calving interval in crossbred cows (Sharma:1978:98-99).

When debating the comparative milch merits of native and crossbred stock, official dairy development documents are strangely silent on the subject of the quality of the milk produced. Other studies inform us however that the milk of Indian dairy breeds is richer in fat, total solids, nitrogen, casein and sugar content than that of most breeds of Bos Taurus.[42]

Perhaps the most flattering tribute to the skills of nomadic cattle breeders is the steady and sizeable export of the cattle they have produced to other areas of the tropics, in order to render local cattle hardier and more disease-resistant. This export has been going on for over two centuries and continues today. In the early decades of the twentieth century, writers complained bitterly about the cattle drain, as colonial officials from countries like Java, Sumatra and Brazil bought hundreds of fine cattle from Gujarat, Madras and Punjab to transport away for breeding operations.[43] The products of such breeding include cattle like the "Gyr" of South

America (derived from the Indian "Gir"), the Indubrazil strain of disease-resistant Brazilian cattle and the "Brahman" bulls found in the United States and southern Africa.[44] Yet India who supplied these other countries with rugged breeding stock is today herself reducing the hardiness of her own bovines through crossbreeding with exotic strains from temperate climes.

INDIAN DIARY POLICY, INDIGENOUS BREEDS AND NOMADIC BREEDERS

In this concluding section, we answer two questions. First, how has Indian dairy policy made use of tough, multi-functional tropical breeds of cattle? Second, how has this policy utilised the expertise of nomadic cattle breeders?

In answering the first question, we take note of the wavering route traversed by Indian dairy policy, over the time span of a century, on the issue of milch breeding strategies. Pre-independence policy documents were unambiguously in favour of using native breeds as foundation stock, and as insistant that crossing with exotics would aggravate rather than solve the problems of India's agricultural economy. Dr. Norman Wright, who advised the Imperial Government on the direction that dairy development should take in India, expressed himself strongly on the subject of crossbreeding: "There is no doubt that the general adoption of a policy of crossbreeding to raise the milk yields of country stock would be fatal to the development of sound dairying in India" (Wright:1937:128). The reasons he put forward are echoed in some of our arguments above. Livestock experts of the time warned that any crossing with exotics should be "judicious and careful" (Knight and Horn:1913:8): they would have been appalled at the present precipitous launching of a nation-wide crossbreeding program without detailed preparation of breeding plans. Such statements were not made only by Englishmen in India. A sub-committee of Indians, planning ahead for Independence under the chairmanship of Shri Jawaharlal Nehru, expressed relief that good indigenous breeds of milch and draught cattle were available as foundation stock in breeding programs, and rejected crossbreeding strategies on the grounds of increased susceptibility to disease.[45]

The dairy breeding policy of independent India, as expressed in the country's five year plans, has gradually moved from an emphasis on native breeds to a passionate embrace of crossbreeding strategies. The first and second five year plans aimed to increase the number of dual-purpose animals by using the best tropical breeds to upgrade scrub cattle and to enhance the milch qualities of cows kept mainly to provide work animals.[46] It was in the third plan that crossbreeding programs first made an appearance, but then only as an experimental measure, in areas of high altitude and abundant rainfall more hospitable to breeds from the temperate zone.[47] The fourth, fifth and sixth five year plans make no more than a casual mention -- if that -- of native breeds, dual purpose animals and draught power imperatives. Crossing Indian milchstock with exotics in order to raise milk yields is their sole preoccupation, and this is to be done everywhere in the country and at exorbitant cost. It is during the period of these plans that Indian dairy policy has taken the form of Operation Flood.[48]

So much for the products. What of the producers? Inter-related as the two are, their treatment by Indian dairy breeding policy has been similar. As with native breeds, it was in pre-Independence documents that the capabilities of nomadic cattle breeders received recognition. The Royal Commission on Agriculture urged that their experience and expertise be recruited in all cattle breeding programs, both for draught and milch animals. Some efforts on these lines were made under the early five year

plans, particularly in states like Gujarat. Resettlement schemes were undertaken, as were cattle-breeding-cum-farming programs, and gopalak sanghs were established.[49]

These efforts were not always appropriate or successful. For example, the Maldharis of South Gujarat were targeted for sedentarisation by officials, although animal husbandry in their semi-arid environment required peripatetism and the proximity of the Gir forest as grazing area allowed it. A government dairy plant was optimistically set up at Rajkot on the assumption that the Maldharis would subsequently settle down around the plant and constitute its major source of milk supply. This plant incurred heavy losses when the Maldharis continued to be nomadic. These losses could have been avoided had dairy development officials learned from petty milk traders, who tailored their activities more suitably to the lifestyle of the Maldharis, procuring fluid milk from the nomads when in relatively accessible areas of the forest, and the less perishable milk product ghee from Maldharis more remote, thus efficiently linking nomadic producers to sedentary consumers.[50]

Misguided though such efforts might be, at least attempts were made by dairy policy in the early plans to encompass the activities of nomadic breeders. From the third plan onwards, little cognizance has been taken of these breeders. Indeed, insofar as the plans in the Operation Flood era are intent on crossbreeding and crossbreeding alone, no scope has been provided for nomadic breeders to exercise their skills -- and in any case no mention has been made of them as a source of expertise. Some state plans even seek to restrict the operations of gopalak sanghs in order to favour the officially propagated form of dairy cooperative.[51]

These breeders however need no mandate from official agencies, for their activities predated the appearance of these agencies by centuries. They continue to breed draught and dairy cattle simply because they have always done so, and because agriculturists and dairymen continue to require their products. "By and large it can be said that if there exist some excellent draught breeds. .., or buffaloes that provide rich milk, it is entirely due to the unstinted and unpublicised efforts made by the breeders themselves" (Khurody:1974:173). As a member of the Planning Commission has admitted: "Thirty years after Independence and twenty-five years after the start of the community development program, we see that nowhere in the country have the indigenous breeds been actually improved to any substantial extent by government effort. Any improvement is due to traditional cattle breeders in the desert areas of the country" (Sivaram:1978:5).

What nomadic breeders urgently require is official assistance to cope with the contingencies of breeding cattle in twentieth century India, as grassland shrinks with the extension of cultivation and famine makes heavy inroads into their herds. Imaginative and innovative programs that involve nomadic breeders would only benefit dairy development agencies, providing them with ideal breeding stock for Indian conditions, and with breeders who have the experience and skills that are badly needed, even if they lack degrees behind their name and sponsorship by U.N. organizations.[52]

Dairy development in India is today in critical need of a sound breeding strategy. Contemporary nomadic breeders face critical problems of a dwindling grassland base. But since these breeders stand in the shadow of the entity that contemporary Indian dairy planners disdain, viz. "Tradition", they are excluded from participation in development programs -- to the deteriment of both breeders and programs.

It seems ironic in this context that the National Dairy Development Board has adopted as its crest, not an opulent crossbred, but an Indus Valley seal depicting a zebu complete with stylised hump, pleated dewlap and upcurved horns. Is this perhaps an eloquent expression of the Board's attitude towards Indian tradition? Something fit -- if for anything -- for ornament, not for use.

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NOTES

1. Kulkarni, 1953.

2. Nyholm et al., 1975.

3. Patel et al., 1975.

4. Operation Flood is an extremely controversial development program, as heated debates testify in both the popular press and social science journals. However, it is only the breeding policy of Operation Flood that this paper deals with, and only a certain aspect of breeding policy, viz. the exclusion of the indigenous expertise possessed by nomadic breeders. Another important aspect of dairy breeding in India is the neglect of the buffalo as the country's premier milch animal, neglect that results from Operation Flood's concentration on cross-breeding the zebu, but this cannot be entered into here. Similarly, indigenous institutions like panjarapoles and ganshalas that contribute substantially to cattle breeding do not come within the gambit of this paper.

5. Crotty, 1980.

6. Huria and Acharya, 1980.

7. Harris, 1974.

8. Government of India, 1978.

9. Shah, 1981.

10. National Dairy Development Board, 1982.

11. Kurukshetra, 1981.

12. Fitzhugh et al.

13. Huria and Acharya, 1980.

14. National Dairy Development Board, 1977 and 1982.

15. Khurody, 1974.

16. Sharma, 1978b.

17. Nagarcenkar et al., 1978.

18. Deb 1978; Nair, 1982.

19. Rajapurohit, 1979; Singh, 1979.

20. E.g. World Bank, 1978.

21. Rajapurohit, 1979.

22. Sharan et al., 1979.

23. Batra, 1981; Nair, 1982.

24. Apte, 1982.

25. Nyholm et al., 1975.

26. Patel, 1978; Singh, 1978.

27. Sivaram, 1978.

28. Sivaram, op. cit.

29. Harris, 1974.

30. Shah, 1978.

31. Kulkarni, 1953.

32. Government of Gujarat, 1962.

33. Harris, 1974.

34. Huria and Acharya, 1980.

35. Kulkarni, 1953.

36. Kulkarni, op. cit.

37. Joslen, 1905.

38. Nath, 1960.

39. Imperial Council, 1939; Nyholm et al., 1975.

40. Kulkarni, 1953.

41. E.g., Rekib et al., 1978; Shah, 1978.

42. Khurody, 1974; Kulkarni, 1953; Rangappa and Acharya, 1974; Ulrey, 1966.

43. "The export of cattle although going on in a small scale for the last hundred or hundred and fifty years has recently assumed serious proportions. . . Thus one gentleman from Brazil is said to have exported one thousand five hundred cattle from the Bombay Presidency and Guzrat in the course of a few months. . . It is reported that there are ten such agents from Brazil. . . The fine breeds of Nellore and Ongole cattle of the Madras Presidency and the superior cattle of the Punjab districts attract every year rich European merchants from Java and Batavia" (Chatterjee:1926:36).

44. Khurody, 1974.

45. Sub-Committee, 1948.

46. Government of India, 1952 and 1956.

47. Government of India, 1961.

48. Government of India, 1969, 1973 and 1978.

49. E.g., Government of Gujarat, 1962.

50. Food and Agricultural Organisation, 1965.

51. E.g., Government of Gujarat, 1972.

52. An example of a (rare) program utilising the skill of nomadic herders is found in the description of a non-governmental organisation that established a dairy cooperative society among Gamit tribals in Surat, Gujarat: "As most of the Gamits were new to buffalo keeping and dairying, the society hired a Bharwad at Rs. 200 per month to train the villagers. Bharwad is a caste of nomadic cattle-herders from the Saurashtra region of Gujarat. . . The Bharwad stayed in the village in a shed near the society's office with his family and cows. He instructed the villagers on how to feed buffaloes, how to milk them, and how to detect when they were in heat. Instead of an extension officer lecturing to the villagers on the upkeep of buffaloes, the practical demonstration by the Bharwad daily over a period of time proved to be much more useful" (Baviskar:1984:25).

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