

SELECTED ARTICLE

LIVE-STOCK IMPROVEMENT IN INDIA*

SINCE His Excellency the Marquis of Linlithgow became Viceroy of India, there has been a great awakening of interest in the improvement of live-stock and cattle in particular. The matter has been repeatedly discussed with provincial representatives, and this note is intended to put together in comprehensive form recommendations and conclusions as to the lines along which it seems that the development of live-stock and live-stock industry should proceed in India.

GENERAL CONDITIONS

From the discussions which have taken place it is evidently agreed that as far as cattle are concerned, the only sound policy for the plains of India is to improve the best indigenous breeds, by systematic selection and proper feeding and management, since European breeds have proved generally unable, even under the best conditions, to maintain themselves satisfactorily within the tropics. This general principle has been found to apply in the case of milch goats also, but in the case of poultry imported, European breeds thrive well and seem on the whole to be less susceptible to disease than the ordinary village fowl. In the case of sheep, it has generally been found difficult to maintain European breeds in the plains, though some success has been obtained in establishing cross-bred merino sheep for the production of better wool. In horses, the improvement effected by imported stock has been very great, though the expense of rearing high-grade stock is generally beyond the means of the ordinary breeder. In the case of donkeys, the imported jack has done much to improve village stock.

IMPROVEMENT OF CATTLE

It is now abundantly clear that the efforts which were made in the past to improve cattle by breeding limited numbers on provincial farms has, in most provinces, had little lasting effect on the bulk of the relatively enormous numbers to be dealt with. The reasons for this are not difficult to understand for it is obvious that the numbers of suitable sires which could be produced, on ordinary Government farms of limited extent, could never be sufficient directly to affect more than an almost infinitesimal proportion of the huge numbers which exist. Moreover, fatal changes of policy, or change of control for financial or other reasons have intervened to dash any hope of

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achieving the extensive results which might have been obtained by skilful handling, on a definite programme, of such limited numbers of sires as were generally available.

On the other hand, in provinces where systematic measures for the improvement of live-stock have been carried on generation after generation by animal husbandry organisations, such as the Veterinary Department of the Punjab, and to a limited extent the live-stock sections of certain Provinces and States, steady improvement has been effected corresponding with the extent to which the Department concerned has been expert in animal husbandry work and devoted to the care and development of live-stock.

Furthermore, where due attention has been paid to purity of blood the improvement has been maintained and an interest in pedigree stock aroused, which augurs well for the future ; provided that adequate measures are taken to maintain proper pedigree registration.

In view, however, of the steady reduction which is taking place in grazing areas, and the circumstances in which breeding is generally carried on in India, it seems clear that degeneration of stock is likely to continue unless more adequate steps are taken and a larger proportion of funds are allotted for their better care and development. At present, for the whole of India, including the Punjab, the total allotment for animal husbandry, including veterinary work of all kinds, is only about half of the total allotted for plant husbandry, and it seems clear that the first essential for the systematic improvement of live-stock in India is an adequate animal husbandry organisation, in each Province or State, with no other interests to consider than the welfare and economic exploitation of stock, and with a more adequate share of the total amount of money allocated for the development of agriculture as a whole. Indeed it does not seem reasonable to expect adequate or lasting results in the improvement of live-stock or in the profitable development of animal industry unless and until such organisations are everywhere available.

The constitution and control of such organisations, and the powers and funds to be placed at their disposal, are thus matters of vital importance, which need to be very carefully considered by Provinces and States. It is not merely a question of veterinary or agricultural control, but it seems obvious that to develop live-stock properly such departments should be under the control of suitably trained specialists in such work, devoted solely to the interest of live-stock.

SELECTION OF BREED AND TYPE

Given a suitable animal husbandry department, the first thing to be done is to consider what kind of stock is to be raised, and it is essential at the outset to arrive at sound decisions as to the particular breeds and types which are likely to suit the circumstances and localities in which breeding is to be carried on. At the risk of stating the obvious, it must be pointed out that

nowhere in the world is it sound policy to attempt to produce a type of stock which is not naturally suited to the local conditions of soil, climate and environment. The high-class stock can be produced in areas which are not naturally suitable for them, there is no question, but the cost of doing so is prohibitive for the ordinary breeder and, apart from the constant struggle against adverse circumstances which would be entailed, there is the difficulty that—if of a breed or type different from the local stock—the male progeny, when used as sires, would be likely to do more harm than good. Moreover, to obtain fresh blood and to maintain type in the parent herd, it would be necessary constantly to import sires from elsewhere.

TYPE

The decision as to the particular type to be bred, *e.g.*, working type or milch type, is another matter which requires very careful consideration since, in all breeding work, strict breeding to a type and unbroken continuity of policy are all-important. In this connection, the question whether it is feasible to produce cattle which will breed true for a combination—in high degree—of working capacity with a capacity for milk production, is one of the matters which have to be considered. This question has already been discussed at length in my note “The Inadequacy of Dual-Purpose Cattle as the Goal in Cattle Breeding in India,” the point of which appears to have been missed by many. In that note it was not intended to deny that it was possible for an expert breeder to achieve duality of purpose—up to a certain point—provided that he is at liberty to select freely and to discard animals which do not show the desired combination of factors. But it seems obvious that the Indian peasant, who is not in any way an expert breeder of pedigree stock and who maintains usually not more than one or two cows in a village herd, to meet his own requirements, cannot hope to be in this position. He is not permitted by his religion to slaughter cattle and can only hope at best to be able to mate his cow with a sire of the type he wishes to emphasize in the progeny. If he wants more milk, he would like to be able to mate his cow to a milking-type bull, and would have a much better chance of getting a high yielding heifer than if only dual-purpose sires were available. If he requires more powerful work cattle, he would naturally prefer a sire of pure working type. Ordinary commercial stock are commonly bred on these lines even in advanced countries, but it is a truism that to make and maintain progress, the breeder of the pedigree stock must specialise all the time on one particular type.

For dairying in particular it is necessary to specialise, since if the milk producer is to have a fair chance of making a financial success of his business, he must have high-grade milch-cattle, and for that reason, in areas where dairy stock are largely bred, it is essential to develop high-milking strains. Where the sale of bullocks is the traditional policy, breeding specially for work is likely still to be carried on by semi-nomadic professional breeders so long as suitable grazing remains available at low cost.

Between these extremes lie the great majority of cultivators who keep one or two cows and produce less specialised 'general utility' stock which, though useful for their requirements, cannot in view of their heterogeneous origin, be relied upon to breed true and therefore cannot be described as 'dual-purpose' stock in its strict sense. To develop and maintain Indian village cattle as true breeding dual-purpose stock would moreover be a colossal undertaking.

Furthermore, though much is said of the breeding of dual-purpose cattle in this country, the method usually adopted appears to be to pay strict attention to milk recording and to retain the best-milking strains until such time as definite signs of unsuitability for draught purposes appear in the progeny. When that time comes the breeder will be faced with a decision whether to retain any high-yielding milk-strains thus evolved, or to destroy the advance thus achieved by crossing back to a working-type bull. What the answer must be in the interest of progress is not difficult to foresee and in the meantime more milk is being bred into the stock. Along this line so long as promising dairy strains are not crossed back to a work-type bull there need be no objection to so-called dual-purpose breeding but high capacity for work and for milk production is physiologically incompatible, and instances are not wanting in India where attempts to retain these factors, in equal degree, in one and same strain, have led to marked deterioration of previously valuable stock. For, beyond a certain point any marked advance in either direction must be cancelled out and the work must to that extent become Sisyphean while any progress towards fixation of a type which should breed true for either factor in high degree must constantly be vitiated.

Even the combination of milking capacity with meat production, qualities which are not incompatible as are capacity for work and milk production, has been given up in other countries, and it seems certain that a similar policy must eventually fail in India since it will not produce that definite segregation of types which has been found essential in every progressive country in the world.

The choice as to which type of bull to use must however largely be influenced by local consideration and the aim of governments should be to provide the type most needed in the locality or, where possible and advisable, to make milking-type as well as working-type bulls available. Where the supply of liquid milk is a profitable undertaking and there are good facilities for the production of fodder crops, the choice would obviously fall on the dairy type, but the ordinary cultivator should as far as possible be in a position to choose the type of sire he considers the most suitable for his particular cows and for his requirements.

COW OR SHE-BUFFALO

Similarly, a choice has to be made as to whether cows or she-buffaloes are to be maintained. Here again there is some diversity of opinion and the

choice is likely ultimately to be governed by financial considerations ; though there is another aspect to be considered. Where abundance of coarse fodder is available, and where the production of ghee is a major consideration, or where liquid milk is produced for sale—usually by unscrupulous and uncontrolled hawkers—the she-buffalo is at present commonly preferred. But investigation has shown that pure-bred cows of certain Indian breeds of cattle can, in a comparatively few years, be improved by proper feeding and management to a point where they can compete successfully with the buffalo in economy of milk or butter-fat production. In view, therefore, of the greater general utility of cows, as compared with buffaloes, in that they produce better working animals as well as milk, and of the important fact that cows' milk is a much better food, particularly for children, than buffaloes' milk watered down to the same level of butter-fat, the question whether cows should not be bred and as well fed and maintained as are she-buffaloes is one which merits careful study.

THE BREEDING OF WORKING-TYPE CATTLE

In areas where the demand for milk and dairy products is limited and where facilities exist for raising cattle on extensive grazing, the breeding of working-type animals is the traditional policy and seems likely to continue because it is difficult to carry on dairying under the semi-nomadic conditions of life of such breeders. But it is perhaps not sufficiently known that even among breeders of working bullocks a great deal of their total income is derived from the sale of ghee, *e.g.*, we have recently shown, by representatives of large numbers of professional cattle dealers and breeders in western India, some of whom themselves breed and rear large numbers of working bullocks, that the income derived from their sale is not much more than one-fourth of that derived from the sale of ghee and other dairy products. The position is somewhat similar in other parts of India and owing to the growing realisation of the essential importance of milk in human diet, it seems likely that market for liquid milk will improve, while already in certain large areas, milk collection for ghee or cream production is being organised on a big scale through the use of small cream separators. Thus, milk seems likely to become more and more an important consideration for the breeder of work cattle.

CAPABILITIES OF INDIGENOUS BREEDS AS MILCH-CATTLE

A careful analysis of available records has shown that in different parts of India there are breeds, of pure Indian cattle which respond readily to proper treatment and which possess considerable potentialities for milk production. But to ensure rapid progress it is obvious that milking strains must systematically be segregated out from the ordinary cattle of the country and mated with bulls, of known pedigree, from cows of high-milk-yields. In this way, in course of time, definite milking-type Indian cattle should become available which could be relied upon to breed true for milk and in view of the great

need for such cattle, the Imperial Council of Agricultural Research is now engaged in instituting official herd books for seven of the best known milch breeds of India.

CROSS-BRED INDO-EUROPEAN CATTLE

For years past it has been demonstrated by organisations such as the Military Dairy Farms that cross-bred cattle from Indian cows by sires of European blood, in spite of the heavy capital and recurring expenditure involved, are generally, under their special conditions of management, more profitable dairy animals than ordinary Indian cows. On the other hand, there is ample evidence to show that where control is inadequate or inexpert the pursuit of such a policy leads to immediate loss of type, rapid degeneration and high susceptibility to disease.

But a policy of cross-breeding with European cattle is not in any case within the reach of the ordinary Indian milk producer, who is not at liberty to discard freely animals which do not reach the required standard. Moreover, since a long time is required to see the results of such a policy and there is a natural tendency of individual breeders to repeat breeding experiments—in spite of previous failures of which they may not be aware—it is necessary to emphasize as strongly as possible that systematic improvement of the best indigenous breeds of Indian cattle is the only practicable policy for the generality of the people.

BREEDING UNDER GOVERNMENT CONTROL

It seems generally agreed also that in India it is essential to make provision for organised breeding control in the villages, and that in all breeding under Government control a definite long range policy for improving local breeds should be laid down and suitable provision made to ensure that it shall not be changed, except after full consideration of the issues involved.

Such a matter, in which irreparable harm may easily be done, should not in short be left to the personal predilection of a director who, in present circumstances, may not be a specialist in any branch of animal husbandry or devoted solely to the interest of live-stock. Moreover, seeing that it is an impossibility to produce on Government farms the very large numbers of pedigree bulls which are required for mass improvement of cattle, it seems that the ordinary provincial cattle farm of limited extent should as a rule be utilised primarily for preserving outstanding strains of the best indigenous breeds and for the systematic development and recording of pedigree milch animals rather than in attempting to produce dual-purpose stock.

It is agreed that for the improvement of the generality of stock of a Province or State reliance must be placed upon systematic breeding control in the villages, at first concentrated in areas where the best cattle exist, and later extended, as circumstances permit, into less forward areas. As time goes on and a type becomes established, good animals from selected stock should be

registered as pure-bred, while all inferior males should be castrated and the services of approved bulls recorded. In the case of dairy cattle, strict recording of milk yields is necessary wherever possible in order that, in course of time, breeders wishing to purchase high-grade dairy stock may be able to obtain reasonably accurate data as to the performance of their ancestors. Indeed, the lack of bulls of known pedigree has been one of the greatest difficulties encountered in carrying out the campaign of live-stock improvement instituted by the present Viceroy.

INOCULATION AND CASTRATION

Simultaneously with and complementary to selected breeding along the above lines it is essential to make arrangements for protective inoculation against contagious disease ; while the systematic castration of inferior males, before they can perpetuate the species, is obviously one of the most potent factors in any programme of live-stock improvement. It is in fact now generally recommended that Provincial or State legislation should be undertaken for compulsory castration in selected areas.

At the second meeting of the Animal Husbandry Wing of the Board of Agriculture, held in December, 1936, this matter was discussed and it was decided to recommend that such legislation should be of a permissive nature and confined at first to small selective areas which could gradually be extended. But it was felt that the greatest tact would in any case be needed in the administration of such an act.

GRAZING CONTROL AND FODDER PRODUCTION AND CONSERVATION

In present circumstances the main factor in the production of moderate-priced work cattle is the availability of suitable grazing, since fodder crops are seldom specially grown for such stock. Experience has, however, shown that to rear and maintain the more valuable grades of stock, whether for work or for milk production, it is necessary to make provision for an adequate supply of fodder crops or other highly-nutritious cattle food ; depending on whether the young stock are sold at an early age, to be reared by cultivators under semi-stall-fed conditions, or are reared by the dealer with his nomadic herd. In either case it is necessary that some succulent food of suitable composition shall be available throughout the year, particularly for young stock, but also for breeding females.

The best means of providing such a diet is a matter for local study, but when the revenue obtainable from forests is compared with that from high-grade stock, reared at least partly on cultivated fodder or semi-fodder crops, specially grown to supplement or replace the available grazing, it seems clear that it will pay Provincial and State Governments to give every facility for the production of such crops in areas which are at present under forest of low value.

To deal with this question adequately it seems essential that special committees should be formed as soon as possible on the lines which were recommended by the Animal Husbandry Wing of the Board of Agriculture at its second meeting, held in Madras in December, 1936, after discussing the Report of the Special Forest Grazing Committee, which met during the previous week.

Such committees should obviously be thoroughly representative of all live-stock interests as well as the interests of forestry and crop production, and if on a permanent basis should be able to develop a co-ordinated long-range policy in such matters as the control of forest and other grazing, the devotion of more land to fodder and semi-crop production, the conservation of grass and other fodder as hay or silage, and to advise as to possible measures to restrict the numbers on uneconomic cattle which at present overcrowd the available grazing, and are an ever-present source of infection.

DISEASE CONTROL, FEEDING AND MANAGEMENT

It must never be overlooked that correct feeding and proper management are most important in securing lasting improvement of stock. But it is now very clear from the work of veterinary investigation officers that expert investigation will constantly be needed of the myriad problems of disease, ill-health and unsatisfactory development due to faulty nutrition, the proper study of which entails continual veterinary and animal nutrition investigation and research carried out in collaboration.

At present breeders suffer even more from insidious loss due to parasites or nutritional deficiencies than from the outbreaks of the major plagues of stock, for some of the most important of which improved and cheap methods of control have recently become available. It seems clear, therefore, that in a country like India where a stamping out policy is impracticable and there is constant danger of infection, adequate staff should be provided for the continuous field investigation of such problems all over the country, in collaboration with veterinary and animal nutrition research workers. This would be in addition to the ordinary provincial veterinary staff which is required for the prompt control of epizootics and the treatment of sick animals, as well as for routine work such as systematic preventive inoculation and castration and the inspection of markets, fairs, abattoirs and dairies.

MARKETING

Marketing is another general factor which has immense potentialities in the improvement of live-stock.

Indeed, it is obvious that unless and until satisfactory markets are provided, for improved live-stock and live-stock products, few stock-owners can afford to spend money on the improvement of stock. On the other hand, there is ample evidence that the establishment of a satisfactory market, *e.g.*, for milk or eggs, in any locality, immediately gives a great impetus to the better care and development of the class or stock concerned.

More detailed conclusions of certain live-stock committees which have been formed from time to time to consider measures for the improvement of live-stock are given in the appendix.

GENERAL CONCLUSIONS

Thus it seems clear that more adequate provision is necessary, in most Provinces and States, for the systematic development of live-stock and animal industry.

Moreover, it is generally agreed by all authorities on human diet that a more adequate and better supply of milk is an outstanding need of India today—better not only as regards cleanliness, but also in its content of protein and mineral salts which are now recognised to be of first rate dietetic importance ; particularly for growing children and in a diet which is otherwise mainly vegetarian.

It has in fact recently been shown, by practical feeding tests in India and in all progressive countries, that nothing can replace the protein of high biological value, and mineral salts which are contained in undiluted milk.

To ensure a better supply of milk it is necessary however (1) to provide for proper control of marketing of this vital commodity—which at present is usually sold by insanitary, unscrupulous and inadequately controlled hawkers, (2) to produce better milch animals, (3) to furnish better facilities to enable the milk required for cities to be produced in suitable areas outside city limits, and brought in for sale under satisfactory sanitary conditions, (4) to make better provision for milk produced in the villages throughout the country, to be collected at suitable centres, and after suitable processing, to be marketed as such or in the form of ghee, cream, etc. and (5) to make use of skimmed milk to the fullest possible extent, in human diet and particularly in the feeding of growing children, since in it is contained the whole of the most valuable dietetic constituents of milk, *viz.*, the body-building proteins and mineral salts.

At present, in many parts of India, the she-buffalo is for a variety of reasons preferred to the cow as a milch animal, but it would not be practicable in any event to provide from buffaloes alone, the greatly increased supply of milk which is needed. Moreover, there are points of considerable dietetic importance in this connection which should not be overlooked, *viz.*, owing to its very high though variable butter-fat content, undiluted buffalo's milk is not usually suitable for human consumption. To make it suitable it needs to have fifty per cent. or more of the cream removed and, since undiluted cow's and buffalo's milk have about the same percentage of protein and mineral salts, if both are watered down to a suitable level of butter-fat (say 3·5 per cent.), buffalo's milk becomes of much less feeding value, particularly for growing children, because the protein and salts thereby become much more heavily diluted.

Thus, while nothing must be done to interfere with the production of useful work-cattle, it appears that the production of more and better milch cattle is a matter of great importance and urgency for the welfare of the people of India.

But to make satisfactory progress and to provide really efficient milkers, it will be necessary to concentrate on high milk production in particular strains regardless of what the effect may eventually be on the capacity for work of the bullocks bred from these particular strains.

The existing supply of working type cattle should in fact be more than ample if young stock and breeding females were better fed, but there is a great shortage of efficient milch cows all over India. On the other hand, it is now well known that there are pure Indian breeds of cattle which have good latent capacity for milk production and which respond readily and markedly to better feeding and management—much more so than buffaloes.

It seems clear, therefore, that the systematic development of high-yielding milch strains of suitable Indian breeds of cattle, as well as of buffaloes for ghee production, is a matter of great urgency and importance to India.

Owing to the high biological value of eggs in human diet, the development of poultry by systematic encouragement of pedigree breeding of selected European breeds, is another matter of great dietetic and economic importance to which far more attention needs to be given as a cottage industry.

APPENDIX

The question of live-stock improvement, with special reference to the pedigree bull scheme initiated by H.E. the Viceroy, was discussed in detail first by the Standing Cattle Breeding Committee of the Advisory Board of the Imperial Council of Agricultural Research held at Simla in July, 1936, and then by the Live-stock Improvement Committee of the Second Animal Husbandry Wing meeting of the Board of Agriculture and Animal Husbandry in India held at Madras in December, 1936. The following are the conclusions and recommendations arrived at by these Committees :—

1. In order to effect cattle improvement on a broad scale it is necessary greatly to extend controlled breeding in areas where definite types exist and that subsequently as large numbers as possible of selected bulls from these areas should be employed in areas where at present there is no definite type.

2. Where the cattle of an area are sufficiently pure the recording of approved stock in official herd-books should be taken up provincially. Such recording should be quite distinct from the official registration of pedigree stock of dairy breeds of all-India importance which is now being taken up by the Imperial Council of Agricultural Research.

3. In order to ensure a continuous supply of pedigree or approved bulls it is necessary to establish pedigree breeding in selected areas.

4. In order to carry on continuous improvement it is necessary to record accurately the services of all approved bulls and to register their accredited progeny. For this purpose it is necessary to employ extra staff at the rate of one suitably qualified inspector and subordinate staff per fifty bulls.

5. It is not possible at present to carry out strict registration of pedigree stock under village conditions of breeding, nor to undertake milk recording in villages without special staff.

6. It is felt that a great deal of good could be done if the herds maintained in jails, mental hospitals, etc., at Government expense, and at Pinjrapoles were more extensively utilised for the breeding of pedigree stock, and at such institutions strict milk recording should be feasible. It was also suggested that inducement might be given to the Military Dairy Farms to rear the best of their young male stock of indigenous breeds and to suit their breeding policy as far as practicable to the accepted policy of the country, *i.e.*, the improvement of indigenous breeds. It was also suggested that small herds of pure-bred indigenous dairy cattle should be maintained at Government Seed and Demonstration Farms.

7. For the maintenance of bulls it is necessary to establish funds, the proceeds of which should be spent partly for the purpose of bulls and partly for their maintenance.

8. Wherever bulls are provided by Provincial or District Cattle Breeding Associations it is essential that provision be made from the same source for their maintenance. Otherwise it may not be possible to accept them.

9. Arrangements should be made for the castration of inferior stock in areas where approved bulls are at work. In regard to compulsory castration it was decided that an enabling act would be an advantage in most Provinces and States, but that it would be very necessary to exercise tact in its application. It could only be applied where the great majority of breeders were agreeable and where arrangements could be made to supply an adequate number of suitable bulls to serve the cows in the area concerned.

10. Interest of the ryot in cattle improvement should be aroused by such measures as periodical cattle shows and the award of prizes and *sanads* to those who had taken special interest in cattle breeding. Provincial or State Cattle Breeding Societies would also help to arouse interest in cattle improvement but it was considered that such societies need be formed only where satisfactory breeding control does not already exist.

11. In order to encourage people to take interest in pedigree stock it is advisable to give permanent protection against rinderpest to all registered stock free of cost.

12. For the present, services of approved bulls should, as a rule, be given free of cost, but in certain provinces the system of charging fees should be developed.