

BASIC CONCEPT OF ANIMAL BREEDING: SOME CONSIDERATIONS IN GENETIC IMPROVEMENT

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RINGKASAN

Tersedia beberapa metode untuk meningkatkan sumber sari hayati ternak, yaitu seleksi terhadap bangsa-bangsa lokal yang tersedia, dan mengembangkan tipe ternak unggul melalui persilangan ataupun perpindahan gen. Pemuliabiakan ternak seharusnya tidak berpegangan adanya isolasi terhadap aspek-aspek lingkungan. Seringkali, suatu perbaikan stok menuntut adanya beberapa pakan tambahan ataupun beberapa masukan lainnya. Suatu tinjauan (review) mengenai konsep dasar perbibitan ternak dengan penekanan beberapa hal penting pada pemuliabiakan ternak yaitu: masalah-masalah terhadap impor ternak unggul ke daerah Tropik dan Subtropik untuk pure breeding; peluang alternatif penerapan seperti ternak unggul dalam kawin silang; dan seleksi terhadap bangsa-bangsa local dan penerapan bangsa-bangsa impor akan dipaparkan pada tulisan ini.

Key words: perbibitan ternak, pemuliabiakan ternak

INTRODUCTION

The general aim in the management of an animal production unit is to increase the productivity of the unit and the efficiency of that production. This goal may be achieved by one of, or as a combination of, two approaches. These are: (1) to improve average production by improving one or more aspects of management so that the genetics potential of the animals may be expressed as fully as possible. Such an approach may involved changes in feeding practice, parasite control or improving survival of the newborn; and (2) to change the production potential of the animal

population of the animal population by the introduction of new genotypes or by setting up a breeding programme that involves selection for production characters in the local population.

The low level of performance of the animal population in the Tropics and Subtropics and the necessity to improve the performance lead to considerations on transferring genes of European and American breeds to the Tropics and Subtropics. Within the range of this topics the following point are to be discussed: (1) Problem of import of high performance animals into the Tropics and Subtropics for pure breeding; (2) Possible ways of applying such high performance in cross breeding; and (3) Selection within local breeds and eventually

applying imported breed from areas of environment conditions similar to the local conditions.

Problem of Import of High Performance Animals into the Tropics and Subtropics for Pure Breeding

The possible advantage of applying animals from temperate zones is the intensification of the performance, but it is only possible under optimal environmental conditions. These methods are not only very expensive, but lead to negative results as shown in many experiments. These factors limiting the rearing of animals from temperate zones in the Tropics can be summarized as follows:

- a. Very little acclimatisation to adverse climate conditions. They have little tolerance of heat as compared to native breeds.
- b. Their exposure to numerous diseases in the Tropics and Subtropics and
- c. The high demand of good feeding and rearing conditions

These environmental factors and the interactions between them lead to the fact that the imported breeds in the Tropics and Subtropics do not produce expected results.

The possibility of keeping pure imported breeds in warm climates is limited to allocation of no infectious diseases and of course where sufficient feeding for these highly efficient animals is available. Even the few good results of high efficiency of

temperate breeds in the Tropics have been due to favourable rearing conditions and good management. The results of these experiment are on no account to be applied to indigenous farmers where such favourable conditions are more or less impossible.

Over the last few years there has been intensive farming near the big cities where good marketing conditions are available for animal products. These farm are in the position to feed European breeds intensively and they obtain good results. These farms produce well but they wholly depend on the import of both animal fodder and the animals themselves. In the light of this, such farms could not be classified under breeding to improve animal husbandry in their area. An example for that is the intensive import of poultry hybrids in many areas. These reasons lead more or less to joint breeding programmes.

Possible Ways of Applying High Performance Animals in the Tropics and Subtropics In Crossbreeding

The purposes of crossing between high performance animals and the local breeds is to combine the high efficiency of the imported animals with the adaptation ability of the local breed to their rough environmental conditions. With the foregoing observation in mind, the next step is to consider some means whereby breeding programmes may be implemented. Recommendations are based on the premise that for any system to be effective some governmental participation and research work will be

required especially in guidance of programmes.

In numerous countries, individual breeders have initiated successful programmes of genetic improvement. They have not, however, been as judicious in consideration of their peers resulting often in dispersion of rather inferior stocks. Individual breeders frequently emphasis traits that may or many not be of the highest economics significance or contribute to the improvement in the general population. Furthermore, for a programme to be effective it should be closely allied to a research programme, which is another important reason for involvement of universities and research institute.

In order to raise a new population which can adapt itself to the local environment there must be series of crossing procedures with different shares of genes of imported breeds measured on the environmental conditions.

The illustration in Fig. 1 is for grading up local population commonly practiced in many tropical areas, frequently with disappointing results. This involves the importation of sires, semen or even groups of males and females, which are employed in a grading up scheme on local stocks. The major advantage as normally applied has been the same numbers of animals or semen imported. Nevertheless, this system has met in some places with reasonable success.

In this system the local stock is gradually in independence in the environment replaced, but unless the environment is good the first generation cross may be the only group that perform satisfactorily. Disappointing late generations may results in a loss of confidence by villagers and confidence is a critical feature in livestock improvement. This system should, therefore, be recommended on a broad scale only when managers understand all factors involved.

Fig. 2 illustrates a seemingly more appropriate approach than the previous one for widescale use. In this plan, the government agency initiates the programme by establishing a herds or flock of indigenous females, which are crossed with imported males to produce F1 males and females. The herds could be carried on either by continuous replenishment of the local type females from the general population or by inter se rating of the crosses coupled with selection. Both methods have advantages. This system is more suitable in many respects than one in Fig. 1 in that the first generation village animal would contain theoretically only 25% imported blood and 75% of its native breeding.

In subsequent generations, the infusions of imported stock would be 12 and 6%, respectively. Grading up could proceed for 4 to 5 generations before approaching the 50% level. By the time this stage is reached, either the stocks and managers should be good enough to go on with the scheme or the managers should be encourages to take up some other type of enterprise.

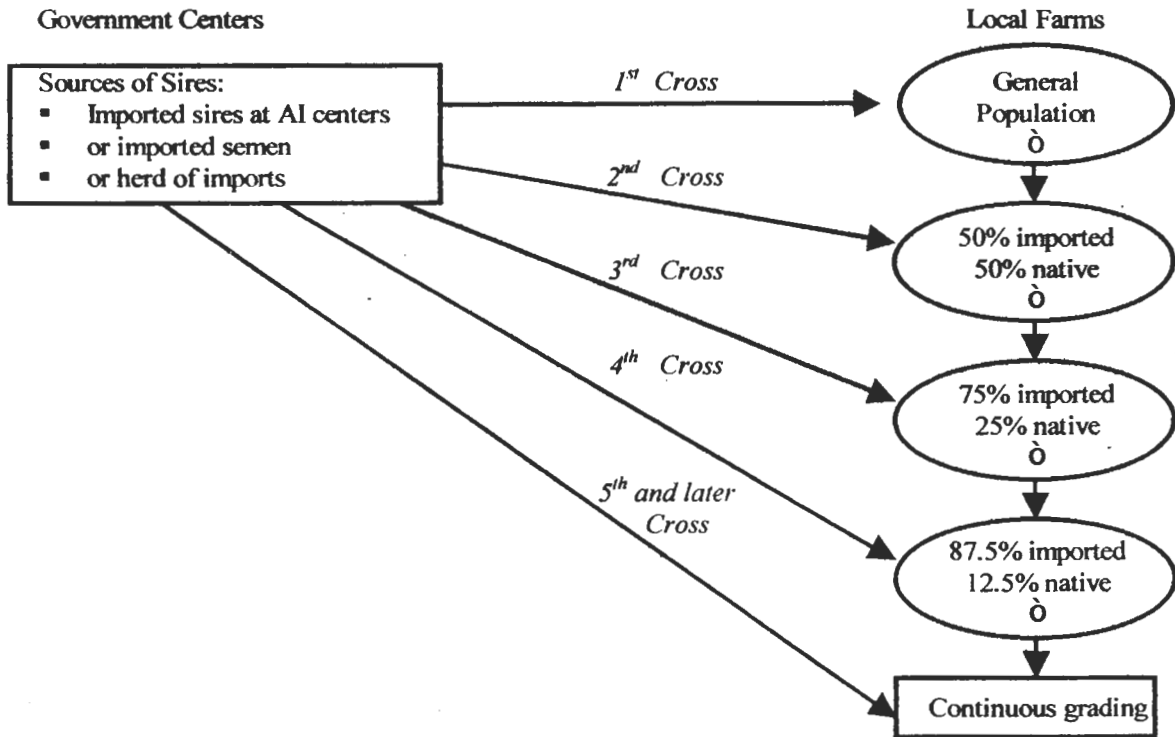


Fig. 1. Plan for Grading Up Local Stock with Imported Stock Through Importation of Sires, or Semen, or From Seedstock Herd of Imports.

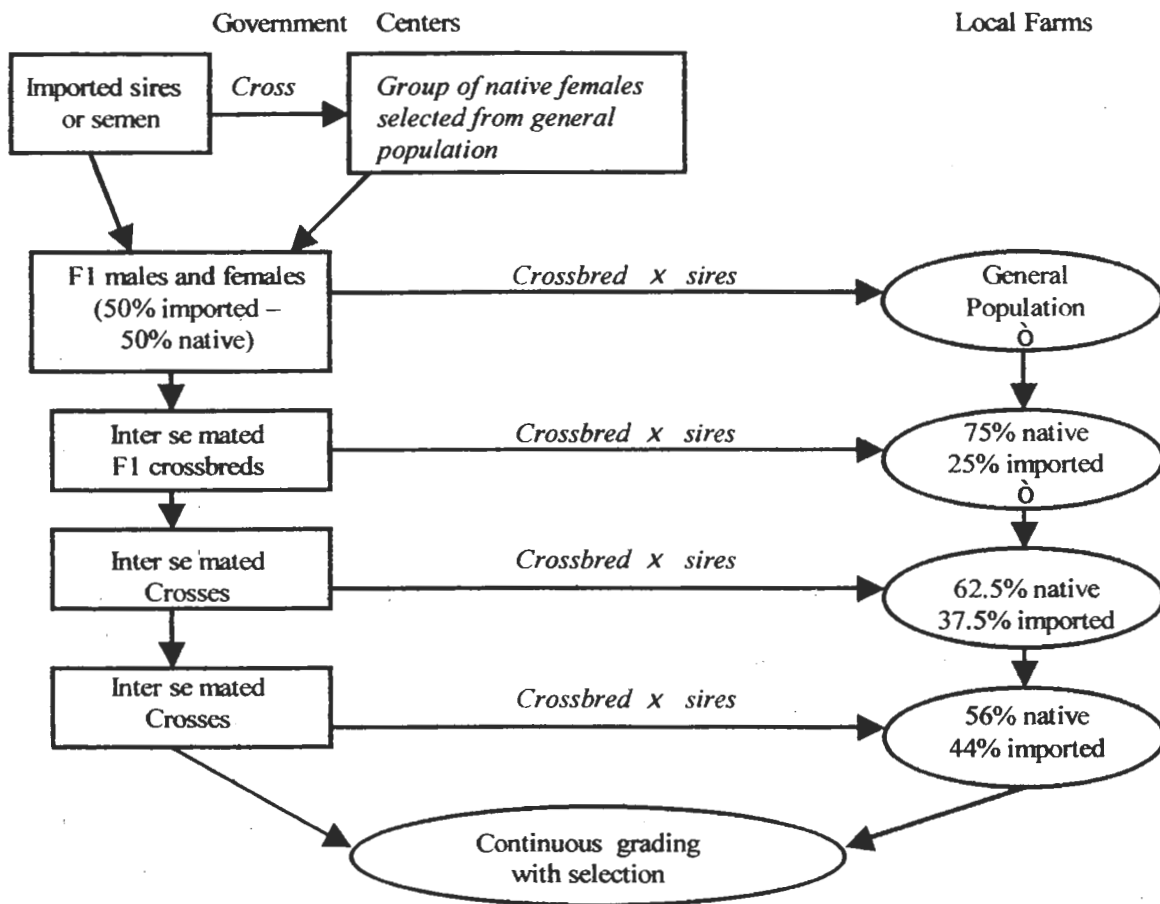


Fig. 2. Plan for Grading Up Local Stock With Crossbred Sires Produced From Seedstock Herds.

This system also has the advantage that if anywhere along the way part of the producers are capable of handling better quality stock, a direct cross can be made with the imported types. It also has flexibility and affords an opportunity to broaden the sampling of combinations of imported and local types.

Selection Within the Local Breed

Although the selection within the local breed is slow, it is however a surer way to improve the animal material. This way has advantage that because of natural and artificial selection the animals are adapted themselves to the raising conditions in their area.

The importation of breeding material from other tropical or subtropical areas similar to environmental conditions could be a possible method of improving the animals under the condition that there are no specific diseases in the area of breeding. The scheme in Fig. 3 shows an example for the selection within the local breed.

The simplest and least expensive system would be for the government or its agencies to initiate a recording system whereby representatives would go periodically to the village or individual farm and measure milk yield, in the case of dairy production, or weigh calves or lambs as a means of identifying females giving the best performance. The better producing females identified

through these records would be earmarked so that their sons would be saved. The sons would be brought to a central location and reared in a common environment, where information could be obtained on rate of growth and development for use in making further selections among the males. Males selected from these groups could then be redistributed for natural service or artificial breeding (AI) for use among the general population of females. This system is illustrated in Fig. 3. The plan shows that the procedure would be repeated periodically, preferably on an annual basis, with the intent of genetic improvement. This would give primary emphasis to the use of superior dams. If use for milk yield in cattle, it would permit up to 33% of the total opportunity for genetic gain. In later years the rate of genetic improvement could be enhanced by progeny test information becoming available in the sires distributed in earlier years.

A second system, illustrated in Fig. 4, provides for the establishment of a breeding research institute as a seedstock herd or flock under intensive selection. Selected males could be distributed according to the previous plan for use among the general population. This procedure has often been applied but without very satisfactory results. The inadequacy has resulted from too few animals and too low selection differentials, mainly because the institute confined its base population to an original group of animals chosen principally on a phenotypic basis in one period of the year.

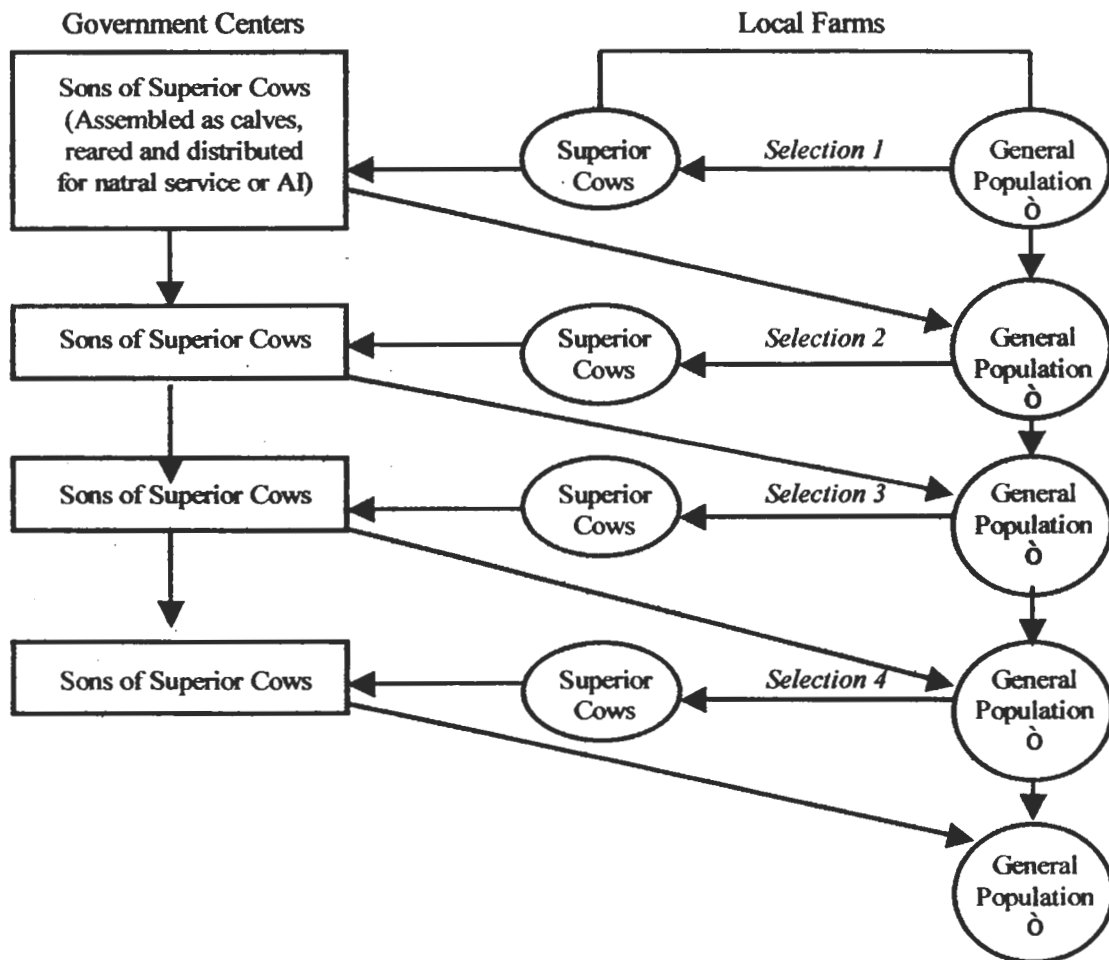


Fig. 3. Plan for Selective Improvement in Indigenous Stock Emphasizing Selection of Superior Dams from Among Village Owners for Producing Bulls.

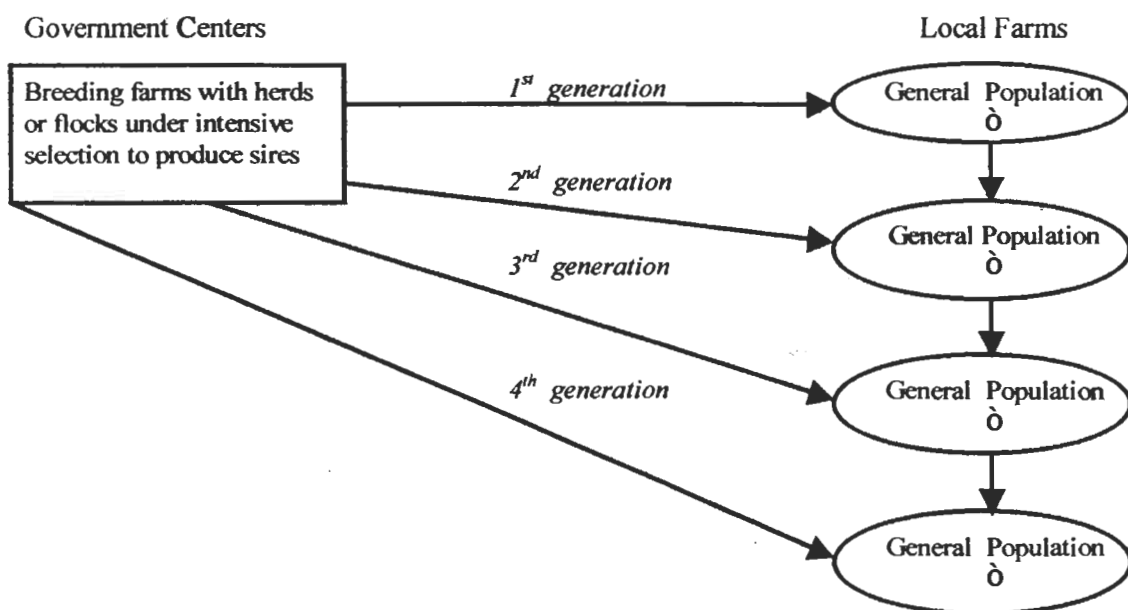


Fig. 4. Plan for Grading Up Local Stock Via A Seedstock Herd.

The males, and indirectly the females, selected in this rather inefficient fashion have a large influence on later generations. This system could be effective if a selected herd or flock represented the upper 30% of the general population. A more efficient system would be to select a group of animals from the general population and assemble them at the research institute or a commercial farm, where they could be observed through one production cycle – e.g. lactation or lambing. Following the first

“production period”, 50% or more of the females should be discarded. The procedure of female selection should be repeated for several years – at least three and preferably five. The “selected” herd could be developed as illustrated in Fig. 5. If the selection differential after arrival in the seedstock herd is 50% or higher, the basic group will be of much higher quality than a group produced by one selection period. This is not an expensive procedure as rental or condition of sale could be a part of the arrangements with the initial owners.

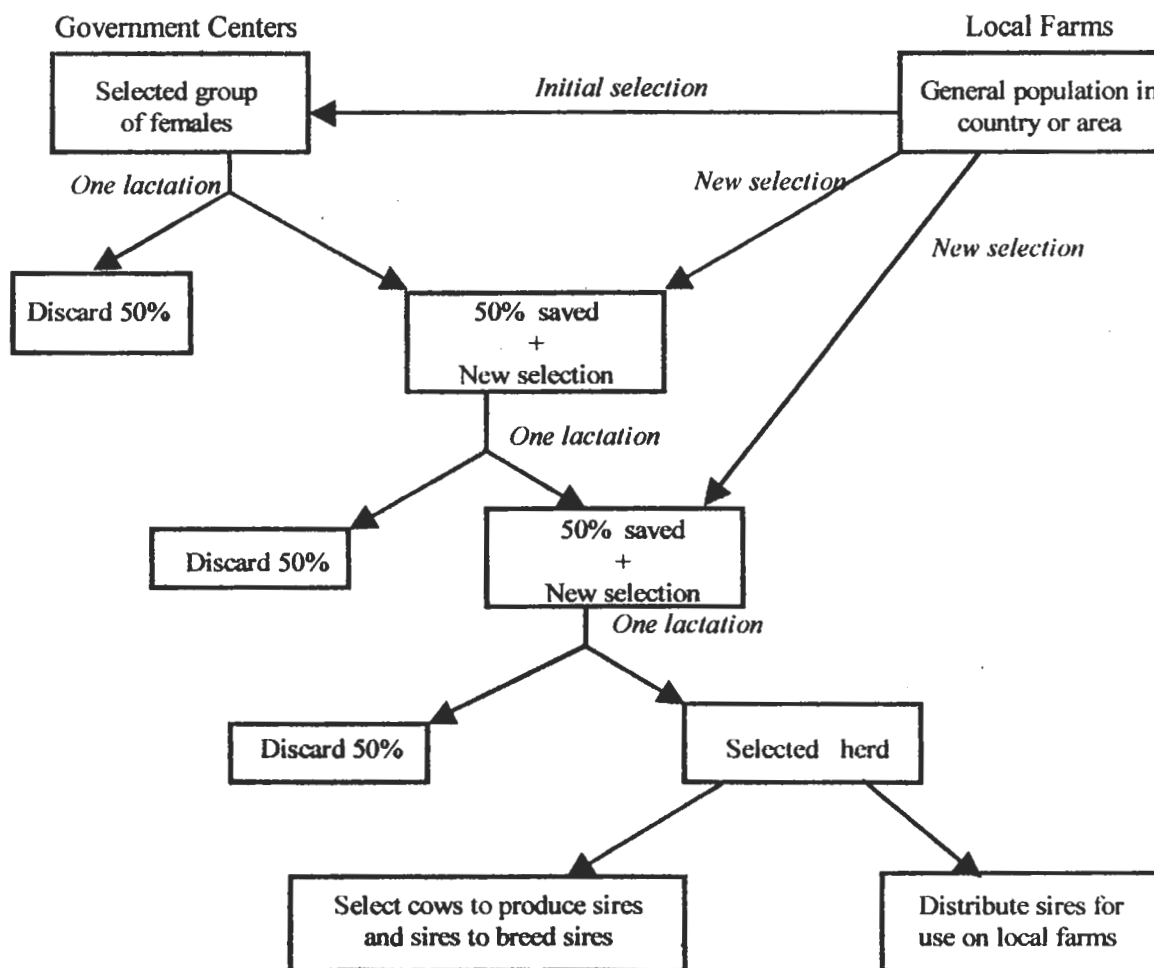


Fig. 5. Plan for Development of Selected Breeding Herd (Seedstock) from Among Native Stock

CONCLUSIONS

1. The use of pure breeds from temperate zones in the Tropics and Subtropics where the environment is severe, seems to be impossible.
2. The use of such imported breeds in a crossing programme with the local breeds is possible in different ways under the considerations of the local environment factors.
3. The selection within the local breeds is a long but sure way to improve the performance.

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