# LIVESTOCK AND COCONUT CULTIVATION

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THE Coconut Research Institute, by establishing an Animal Husbandry Section, is breaking entirely new ground, because the interaction between Stock and Soil is a matter that has never been thoroughly investigated in Ceylon before. In drawing up a scheme of work, therefore, the greatest care must be taken to decide, at the very commencement, what problems require investigation, and the lines to be followed. These notes are submitted purely in the hope that they may serve as a basis for the discussion from which a sound scheme may result.

It may be desirable, as an introduction, to review the methods usually employed on coconut estates where cattle are kept for what is euphemistically called " Cattle Manuring," and the effects of these methods on both the soil and the stock.

The common practice is to keep a herd of nondescript cattle ; the sexes are not segregated, and the young bulls, too young to be trained to the cart but quite mature enough to serve cows, are not castrated. The animals are not herded, but are allowed to wander over the whole estate at will. In order to prevent straying, two heads are yoked together. These miserable animals are then tethered in pairs, in a shallow trench, to the palms for ten nights. They are given neither concentrates nor straw, their sole food being what they can find to eat on the land during the day. They are not regularly watered and, if a pool or ditch of stagnant water is not available, the quantity given will depend on the distance the water has to be carried to them.

Wandering about the land at will, the animals will eat to the point of complete destruction only such herbage as they find palatable. The unwanted herbage is allowed to spread unchecked over the land, and reduces the area that can be covered by plants that the animals will eat. It may well be (and this is a matter for investigation) that the varieties that succeed at the expense of the palatable herbage are deleterious to both soil and coconut palm. Through lack of control, the land becomes overgrazed and patches of bare soil begin to make their appearance between the clumps of unwanted shrubs. Sunlight on these bare patches causes oxidation of whatever humus there may be ; rain may cause erosion.

The manure dropped by these animals has no greater value in plant food than is contained in the plants eaten. Increased crop due to " cattle manuring " is due solely to the concentration in one spot of plant food collected over a wide area. It is highly probable (and this, again, is a matter for investigation) that the extraction of plant food over a wide area in order that it should be concentrated in a restricted area round the foot of the palm, results in the impoverishment of the wide area, which, in turn, results in a reduction of both quantity and nutritive value of the herbage that grows on it.

It is obvious to anyone who sees these herds kept for "cattle manuring," that the effect on the animals is disastrous. Since no proper pasturage is provided and grazing is uncontrolled, owing both to overgrazing and the preponderance of unpalatable shrubs, the quantity of green food, small at the best of times, diminishes progressively. Because two heads are yoked together, two animals are compelled to cover ground that is barely sufficient to provide food for one. When to both these is added the failure to provide straw or concentrates, the inevitable result is malnutrition. To malnutrition must be added the sort of promiscuous mating that is so common, due to under-sized, under-nourished, uncastrated males being permitted to run with the herd. Is it at all surprising that Ceylon cattle are what they are?

When the question of improving the local cattle is raised, the only solution ever considered is the importation into the herd of a big, brave stud bull. And Government are expected to supply an unlimited number of these, dotting them about all over the countryside.

I think the above is a fair description of conditions as they exist today on coconut plantations. And if, by demonstrating that, with correct management, both soil and stock improve, any change in this pernicious system of keeping cattle can be effected, the C.R.I. will have achieved much.

It is obvious that the first question that must be decided is whether the C.R.I. is to show the small man what he can do with the limited resources at his command, or whether it is to set up a model establishment which the majority cannot afford to emulate. If the C.R.I. were to begin with the type of animal that the small man already has, or can afford to buy, and if the buildings are such that the small man can erect them without straining his resources, then all the big man, who can afford the capital outlay, has to do is to buy better cattle and erect better buildings. If, on the other hand, the C.R.I. were to begin with superior cattle and elaborate buildings, nothing on earth will convince the small man that he can adapt these to suit his purse. The real point is that the method of management is of supreme importance; both the type of animal and the buildings are in comparison, of minor importance. The model we require to set up is the method of management; neither the buildings nor the animals are models.

Many factors must be considered before the type of animal is selected. Either we must create conditions to suit these superior animals, or we must buy animals that will suit the existing conditions. If we decide on the former course, we shall be involved in heavy expense and we shall have to face many difficulties, the chief of which will be to keep the animals in good health and condition, and to prevent degeneracy in their offspring. There are many diseases to which the local animals, and to some extent, Indian breeds, are either completely immune or very highly resistant, and to which other animals are highly susceptible.

The prevention of degeneration is a matter of extreme difficulty, and something about which very little, if anything, is known. Dr. Norman Wright, Director of the Hannah Institute, Ayr, in his report on the Development of Cattle Breeding and Milk Production in Ceylon (Sessional Paper XX-1946) has pointed out that, so far as the two Indian breeds, the Sindhi and the Sahiwal, are concerned, on the Government Farms he inspected the same story was repeated—the offspring were inferior to the imported parents. He states (pp. 12 and 13) "Such evidence as is available indicates that, in many instances, Ceylon-bred animals have already deteriorated in both con-

stitution and yield. As regards yield, lactation records collected from Government Breeding Farms and Farm Schools provide the following disturbing figures :—

| | Average Yield per Lactation |
|---|---|
| Sindhi Cattle (at Hosur Cattle Breeding Farm, Madras) | 4,135 lb. |
| Imported Sindhi Cattle (in Ceylon) | 3,250 lb. |
| Ceylon-bred Sindhi Cattle— | |
| (*a*) 60 lactations at one centre | 2,175 lb. |
| (*b*) 52 lactations at six centres | 1,775 lb. |

" These figures are reinforced by the following comments made in reports from three of the Government Farms :—(i) ' Three imported Sindhi cows have given more milk than all nine of the locally-bred animals ' ; (ii) ' The daughters of the Sindhi cows are not up to the standard of their dams ' ; (iii) ' In all instances the yields of the Sindhi daughters have proved worse than their dams.'

" In regard to Sahiwal Cattle similar results have been reported. Thus, the recorded yields at one Government centre for some 35 animals have shown an average of some 2,550 lb. per lactation compared with averages varying from 3,000 lb. to as much as 7,000 lb. obtained at Government Farms in India."

It is obvious that we do not know enough, at present, to be able to prevent degeneration, even in the first generation. It is conceivable that the root of the trouble lies in the soil, for neither the exotic fodder grasses specially cultivated for the cattle, nor the concentrates with which they are fed, have been able to check it. This is a matter that cries for the most careful research ; until we are able to lay a finger on the exact cause for degeneracy, running a herd of imported cattle cannot prove economical.

We know very little about the nutritive value of the existing herbage and its palatability. It must be emphasised that nutritive value counts for nothing unless the animals find the herbage palatable and will eat it. Analyses of the various plants will not help to begin with ; it will be of the greatest use later, when we know what the animals eat with relish. Herbage which is palatable in one place may very well prove to be unpalatable in another. We do not know, if by treating the soil, it would be possible to improve palatability. The mineral content of the soil as reflected in the herbage is important, particularly the calcium and phosphorous contents, since calcium phosphate is the principal constituent in the skeleton of the animal. Until we have exact knowledge, it would be wisest to assume that the quality of the herbage is poor and the mineral content low.

It is a fact that the local cattle in the Tamankaduwa area, allowed as they are to wander about freely, are superior to the local cattle in other parts of Ceylon. The fact is accepted ; the reason, so far as I know, has never been a matter of research. It may well be that the soil in this part of the country lacks certain elements to be found in the soils of Tamankaduwa ; it may well be that, if these elements were supplied to the soils here, the local cattle will improve. The reason for my giving these facts is purely to show the extent of our ignorance, the vast field there is for research, and the crying need there is for the most careful and patient investigation.

Large animals require an abundance of highly nutritious herbage with a high mineral content. If this is not available, then they will starve and their skeletons develop a diseased condition. On the other hand, small animals require less food and, since their skeletons are small, their mineral requirements are less. If large animals are put on land with poor herbage of a low mineral content, degeneration due to malnutrition is an inevitable consequence. If, on the other hand, small animals are put on land carrying rich herbage of a high mineral content, the natural tendency is for improvement in size and condition to take place generation after generation.

Climatic conditions play a vital part and high temperatures have a very important bearing on the condition of cattle. It is an elementary fact that, in the act of breathing, animals inhale oxygen and exhale carbon dioxide. The carbon is derived from the carbohydrates, the chief of which is fat, in the animal's body. The rate of breathing, in tropical animals, is normal, since, for many generations, they have adapted themselves to high temperatures. In the case of temperate zone animals, however, no such adaptation has taken place, and in a hot climate the rate of breathing becomes greatly accelerated. In other words, in the case of the tropical animal, the rate at which the carbo-hydrates in its body are used up is normal, and both intake and output are balanced. In the case of the temperate zone animal, however, since the rate of breathing is accelerated, more carbo-hydrates are used up than are taken in with the food, and the reserves become depleted, resulting in serious loss of condition. Further, while the tropical animal, perfectly accustomed to the sun, will continue to graze in the heat of the day, the other will seek shelter, and will lie in any shady spot available, further unbalancing the carbo-hydrate intake output ratio.

Much work on this question of accelerated respiration and its effect on condition has been done in America by Rhoad ; in South Africa by Bonsma ; and in Australia by a number of research workers.

In view of all that has been stated above, it would seem clear that the only animal that will suit our purpose is the local animal. It is certainly the only animal that the small man can afford to buy and keep. It is absolutely acclimatised and, through innumerable generations, has adapted itself to existing conditions. It is quite safe to assume that degeneration will not, probably because it cannot, take place. If the conditions under which it is kept are improved, then it is equally safe to assume that improvement will take place.

One of the chief objects it is hoped to achieve is the establishment of a dairy industry on coconut estates. It is unlikely that object will be achieved in a short space of time by adopting the evolutionary method suggested. But evolution is a very sound foundation on which to build. We must surely face the fact that, although the only animals that will produce comparatively large quantities of milk are the imported cattle and their offspring, the tendency with them is steady deterioration, and we are left with the two alternatives :—

(*a*) We can make milk production the chief object and buy stock that will produce the milk. But we have the almost certain knowledge that, generation after generation there will be steady deterioration in the quality of the stock, and that, in order to keep the level of the milk yield high, we shall have to replace the stock periodically.

(*b*) We can buy local animals and seek to improve the quality of the stock, by improving the conditions in the soil, assuming (quite a safe assumption) that an increase in the milk yield will result from such improvement.

I can see no other alternative. Cross-breeding with a superior type of bull will definitely result in an increased milk yield in the first, and probably, in the second generation. Thereafter we shall again be faced with the same problem of degeneration. There is a tendency, in Ceylon, to over-estimate the effect of breeding and to pay too little attention to feeding and management, without which breeding is of no avail. When Dr. Wright came out to report on cattle in Ceylon, it was my good fortune to have him spend a day with me, and, among others, this was one of the problems we discussed. His evaluation of the three main factors in animal husbandry was :—

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|---|---|---|---|
| Feeding | ... | ... | 60% |
| Management | ... | ... | 25% |
| Breeding | ... | ... | 15% |

There can be no question that, with proper feeding and good management a herd of mongrel cattle will improve ; the best-bred cattle in the world cannot help but deteriorate with poor feeding and bad management.

If I am right in thinking that the chief reason for the establishment of an Animal Husbandry Section is that the C.R.I. should investigate thoroughly the effect on the soil, and consequently, on the coconut crop, of keeping livestock under proper management, then the improvement in the stock and the establishment of a dairy industry, vitally important to the country though they be, become subsidiary to the main object, which is the improvement of the soil in coconut plantations. I have dealt at length with the animal side of the question because, as the C.R.S. is embarking on something entirely new, there may be a danger that we should lose sight of the main object and give undue weight to the question of the type of stock, or the question of milk production. In my own mind, I have not the least doubt that both milk production and improvement in stock will follow, but they will follow naturally, in the course of evolution, if we devote ourselves to the proper management of both soil and stock.

The proper management of pasture has been a matter for special research in England for many years, and considerable work has been done by Sir George Stapledon and others. The cultivation of pasture and controlled grazing have long been recognized as a sound means of storing fertility in the soil. Very little, if anything, is known of pasture management in Ceylon. Where cattle are kept for any special purpose, such as milk production, it is usual to cultivate fodder grasses, such as Guinea, Napier, etc., for cutting and feeding to the stock. We have everything to learn about the management of pasture, its effect on the soil, and whether the coconut crop is affected in any way, adversely or beneficially.

The effect on the soil of feeding the cattle with concentrates, and whether intensive feeding will result in the production of heavy crop is one of the matters that require investigation. The fattening of steers by intensive feeding in order that increased crop may be obtained is regular farm practice in Britain. If adoption of these methods are not possible, it may be possible to adapt them to suit our requirements.

The proper manufacture of farmyard manure must form an essential part of our programme. Regular analyses of samples will establish a standard for the NPK content; regular application to the land will establish its value in maintaining soil fertility.

The field for research is enormously wide. While it must be appreciated that no research has been done before, it is clear that the C.R.I. cannot carry out research with the animals themselves and must limit its investigations to the effect on the soil and the coconut crop of keeping a well-managed herd of cattle. The effect on the animals, on their condition, on their capacity for producing milk, on the progeny, are all matters that will become apparent in the course of time. It will then be up to the Department of Agriculture to pursue the matter further, with the animals themselves.

To conclude this Memorandum with a quotation from R. H. Elliot's "The Clifton Park System of Farming": "It may not be uninteresting to notice that similar principles were laid down by M. Porcius Cato (born 234 B.C.) in his agricultural treatise, De Re Rustica. He was asked what was the most certain profit rising out of land. 'To feed stock well,' he replied. Being asked what was the next point of importance, he said, 'To feed with moderation.' Evidently meaning to the extent that paid best."

(This challenging article invites correspondence. It is not a statement of agreed policy.—*Ed.*)