

STOCK-KEEPING IN RELATION TO ENVIRONMENT

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ENVIRONMENT describes one's surroundings in all directions and includes climate, soil, and vegetation. If we consider living things, then, unless they suit the environment in which they are placed they cannot survive. Should the environment change, either the living things must change, or in other words, adapt themselves to suit the altered conditions or they must die out altogether. If for instance, the climate of the low-country of Ceylon changed for some reason and became colder with a winter during which snow fell and there were frosts, the familiar vegetation would die out altogether if the change were so sudden that some of the plants did not have the time to adapt themselves to the new conditions. If the change were very gradual it might be possible for some adaptation to take place, but the characteristics of the changed plants would become so different that there would be little, if any, resemblance to the vegetation with which we are familiar.

I believe it is true that environment will not directly cause any modification, but unless there is special suitability or adaptability existence in a particular environment is impossible. For instance, the absence of herbage at a low level did not cause the giraffe to develop a long neck; the possession of a long neck enabled the giraffe to live where there was no herbage at a low level.

In the case of soil, where it is fertile and contains all the necessary plant food and adequate moisture, the vegetation will thrive. If the soil became deficient in any of the ingredients of plant food or moisture, the vegetation must change or die out. There are certain elements in soil which, although, certain plants can exist without them, are taken up by the plants and stored in their tissues. The animals that eat these plants benefit from their presence, but languish in their absence. One of these elements is calcium which is essential in the formation of bone in animals. *Plants that grow in a soil deficient in calcium may be eaten readily by animals, but they cannot sustain adequately animals that have large skeletons.*

There is another feature that is worthy of consideration. There are a number of diseases to be found in certain localities. Living things, in such localities must either adapt themselves and become immune or else die out. For instance, the leaf disease that attacked coffee and caused such disaster in Ceylon, wiping out the whole industry, was present in the jungles. One variety of coffee, *coffea robusta*, was immune and continued to exist; the other varieties such *coffea arabica* which were introduced were susceptible and died out. The tick borne fevers, Piraplasmosis and Anaplasmosis, are widespread in Ceylon. The local cattle are immune and do not suffer; most of the imported animals are susceptible and the mortality among these is heavy.

Enough has been said to show that environment plays a vital role in the existence of living things. It would indeed be difficult to exaggerate its importance, an importance which, unfortunately, is either overlooked or not appreciated.

Let us now turn to the cattle in Ceylon and make some attempt to learn the effects on them of their environment. There are a few things that we know; there are many that we do not. We know that the climate of Ceylon varies considerably in different areas. It is hot and humid in that part of the Low-Country affected by both monsoons; it is hot and dry for the greater part of the year where only the north-east monsoon brings the rains. It is cool and humid on the west-

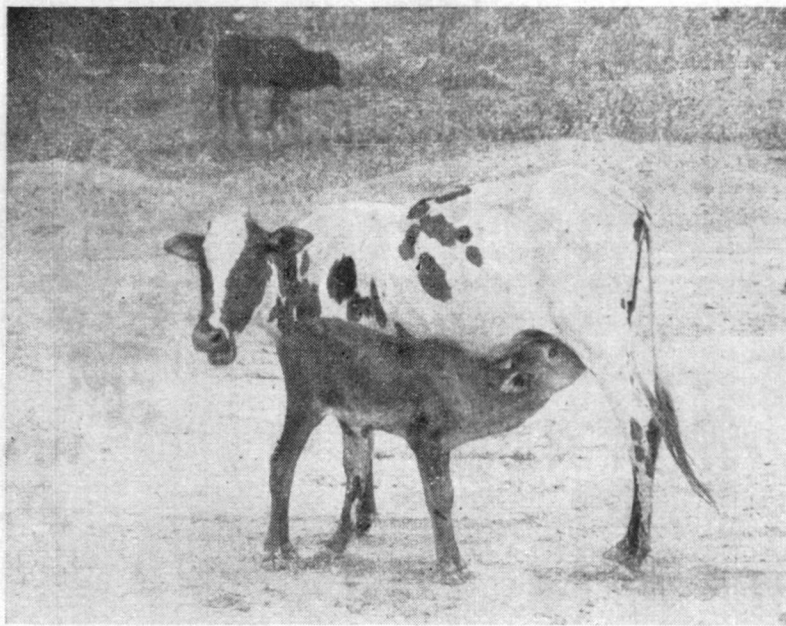
ern slopes of the hills and cool and dry on the eastern slopes. The soils vary and we have sands, sandy loams, clay loams, clays and laterites. The soil fertility varies both with type of soil and rainfall, and so soil fertility and temperature result in variations in the vegetation. It would be unreasonable not to infer that all these variations have their effects on the cattle in the different areas.

Calcium Deficiency

It so often happens that, in our efforts to improve our livestock, we introduce a "superior" type of animal into an area for which it is not naturally suited. It is nothing but natural that the animals in succeeding generations should adapt themselves to their environment. Where the soil is deficient in calcium, the skeletons of the offspring will begin to reduce in size until a balance is reached and, the bony structure is no bigger than the quantity of calcium can sustain. *Thus where the herbage is of poor quality and incapable of nourishing a heavy animal, the size will be reduced until, once again, the nutrition value and body weight are balanced.*

Both calcium and the nutrition value of fodder have much to do in milk production which, in turn, bears vitally on the growth of young stock. Given a soil that is deficient in lime and of poor fertility, neither good growth nor a heavy milk yield is possible whatever the breeding of the animal may be. The cow in Plate I is obviously of Indian descent. She is very small, very little bigger than a Jamnapari goat, but she is able to exist and feed a calf on poor land in the Puttalam District. A balance had been struck between the animal and the herbage on which it lives. The introduction of a bigger animal here can have only one possible result—death through starvation.

PLATE I.

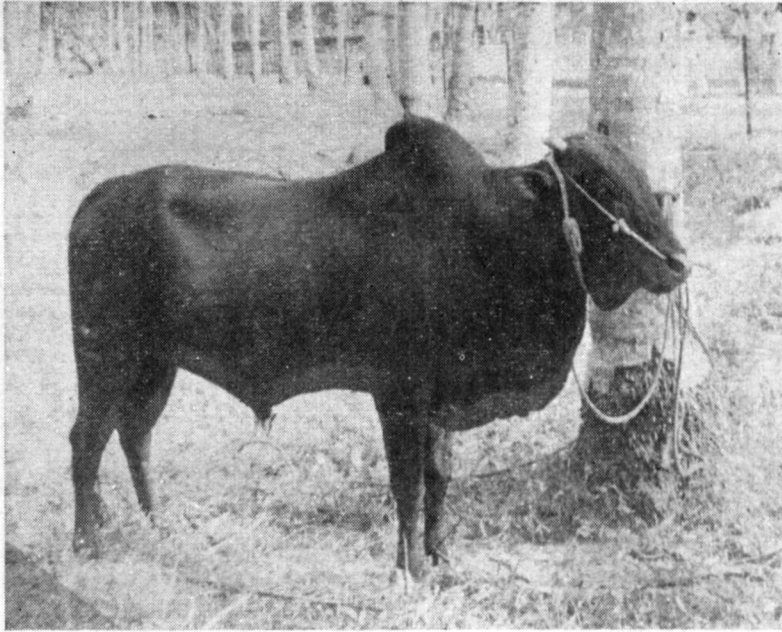


Cow of obvious Indian descent, probably Kilhari. Puttalam District.

Note: . Small size; fine, small bones; thin, fine tail; under-developed horns and hump; no dewlap; weak, "staggy" legs; poor condition.

INDIGENOUS CEYLON CATTLE

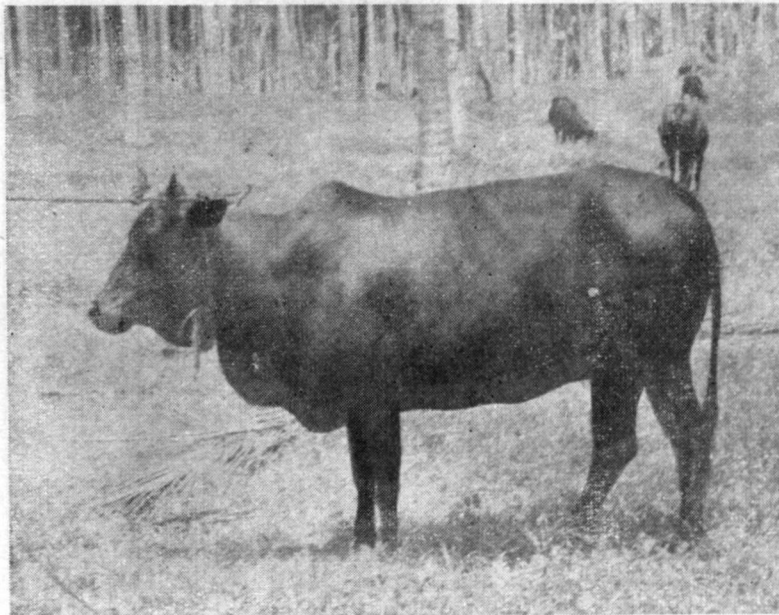
PLATE II.



Young "SINHALA" Bull at Coconut Research Institute, procured from Government Farm, Nikaweratiya.

Note: Improvement in development in hump and dewlap; depth of barrel combined with short, sturdy legs; upright stance; splendid condition.

PLATE III.



Young "SINHALA" Cow at Coconut Research Institute, procured at a village in Ratnapura District.

Note: Improvement in development of hump and dewlap; depth of barrel combined with short, sturdy legs; upright stance; splendid condition and alert look.

Temperature & Respiration

The temperature in any district has important effects on the condition of animals. It is elementary knowledge that in the act of breathing, oxygen is inhaled from the atmosphere and carbon dioxide exhaled. The carbon in the latter comes from the breaking down of carbo-hydrates, of which fatty tissue is one, in the animal's body. Naturally, the quicker the rate of respiration, the quicker the breaking down process. Rhoad and other workers have made a study of this question and have observed that, in the tropics, the rate in animals introduced from temperate climates is about double the rate in the local animals, which have adapted themselves to high temperature.

J. E. Nichols, Director, Imperial Bureau of Animal Breeding and Genetics, Edinburgh, writes in *Livestock Improvement* (p. 46): "Kaskanor (1940) quotes evidence from the Ukraine that at temperatures of 34-35°C Karakul sheep had 60-120 respirations per minute, Lincolns had 120-210; In Lincoln, Romney Marsh and East Friesian sheep, respiration at high temperatures was so accelerated and carbon-dioxide losses were so high that a pathological condition followed, leading to death." He then discusses the effects of high temperatures on grazing habits in cattle in experiments, carried out in Louisiana by Rhoad in 1938 and 1939, involving Aberdeen Angus and Zebu Cattle and three-fourth and half herds of these where it has been noted that the Zebus and the half herds on hot windy days will graze and rest in the open, while the Aberdeen angus and the three-fourth herds (*i.e.*, three parts A.A. : one part Zebu) soon tended to seek shade and rest. Similar observations have been made in South Africa (Bisschop, 1940) where, among cattle compared under the same conditions, the sequence of starting to graze in the mornings was according to herd: Afrikaner, Sussex, Friesian (=Fresica) and Red Poll. The American experiments just quoted revealed other physiological herd differences; for example, while the four types all showed increased respiration rates and body temperatures, as atmospheric temperatures increased, the Aberdeen-Angus were most affected, the Zebus least. Again, in South Africa, at Messina in the Transvaal, the Afrikaner was found to be more resistant to heat than the Hereford, Shorthorn or Aberdeen-Angus, and when it was very hot the British types stopped ruminating sooner than the Afrikaner (J. C. Bonsma, 1940)."

Improvement in relation to Environment

It is not possible for human beings to alter the climatic conditions in any area, but in some other respects, changes in the environment may be effected and soil fertility (with which is combined the capacity for retaining moisture) may be improved. Improvement in fertility will result in a better type of herbage and this, in turn, will be followed by a superior type of cattle. The bull, in Plate II, was procured by the Coconut Research Institute from the herd of Ceylon village cattle on the Government farm at Nikaweratiya. The cow in Plate III was from a village in the Ratnapura District. It is difficult to recognise these as specimens of the Sinhala herd from which both have sprung. The change for the better in their condition is due in part to good management, but chiefly to improved environment. On the other hand, as depicted in Plate I, a cow of Indian descent, has degenerated to enable her to exist in a poorer environment.

The imported herds are considered to be superior and the local cattle inferior and this leads to the question whether such superiority and inferiority can apply away from the natural environment. From the point of view of milk production, the Ayrshire is superior to the local cow; but only under a certain set of conditions. If a herd of high yielding, pure-bred Ayrshires were to be run on a coconut estate under the same conditions as a herd of mongrel local cattle, would they produce as much milk as the latter? It is indeed, almost certain that the Ayrshire would perish.

Where, then does their superiority lie? The truth is that, under one set of conditions, the Ayrshires are superior to the local cattle and under our conditions, the local cattle are superior to the Ayrshires, and a standard of quality cannot be set arbitrarily and without reference to the conditions under which the animals have to exist. To quote Hagedon :

“I repeat, there is only one real measure of superiority in domestic animals, *i.e.*, adaptation to the conditions of agriculture into which the herd must fit.”—(*Animal Breeding*, p. 82).

The improved European herds that we find today are the result of about two hundred years of selective breeding. That due regard has been given to environment is clear, both from the number of breeds and their names, which are based on the localities where they have been developed. In no case have the stock-breeders deviated from their policy of selection. To introduce these improved breeds into a totally different environment and imagine that they will maintain their quality would be a mistake of the first magnitude. The earliest stock-breeders knew the direction in which they were going, but they could not have envisaged how long it would take to reach the goal for which they were striving. Each was content to go as far along the road as he could, certain that one day someone would reach the goal. If our livestock are to be improved permanently we could do well to emulate their example. We cannot hope to reach the goal in our lifetime, but is that any reason why we should not step out along the road that leads to a sound and improved breed of Sinhala Cattle.

The value of Goonesekera's work with Ceylon village cattle is enormous. Observations with European cattle and their crosses will be useful for comparison.

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