

GENERAL INTRODUCTION

In carrying out this programme of investigation set out in the ensuing paragraphs, it is not intended in the first place to establish a figure for the digestibility of various grasses in the Tropics, but rather to develop methods whereby such figures may be conveniently derived. Because of the particular factors acting in the Tropics, which must condition the results derived, and which have not been encountered during investigations in Temperate regions it is necessary to investigate methods already accepted elsewhere.

A digestion trial, as it has been understood in the past, involves a record of nutrients consumed, and of the amounts of these voided in the faeces. It is essential that the faeces collected represent quantitatively the undigested residue of the measured amount of food consumed. In the case of Omnivora and Carnivora the measured amount of food may be demarcated by means of an inert substance, clearly distinguishable in the faeces, this substance being known as a "Marker." With Herbivora, however, this "Marker" method is unsuitable, because of the larger and more complicated digestive tract. The undigested material need not, and usually does not, leave the digestive tract in chronological sequence. It is therefore customary to feed the prescribed ration over a "preliminary period" of a number of days, thus free-

ing the digestive tract from any indigestible material coming from feed consumed prior to the start of constant intakes, of the ration under study. Following this there is usually a "collection" period of a number of days, when faeces are collected.

This period ought to be as long as possible provided food continues to be consumed regularly and completely, as thus the effect of periodic fluctuations is minimised.

In this investigation our subject is the ruminant, and particularly the bovine. Furthermore, we will confine ourselves to a study of the "collection" period and what it involves.

From what has already been said it must be obvious that the experimenter, in charge of a digestion trial, such as is being considered here, has to be in the position of having the faeces collected completely and with a minimum of inconvenience, over a considerable period. Perhaps the most primitive method is to have someone at hand collecting faeces in a bucket at each defecation. This method is outlined in a paper dealing with an experiment on cows (Eheart et al., 1945). According to the authors, one attendant per cow is required, and these attendants must be supervised by a trained chemist. The advantages of the method, as given in this paper, are that sampling is accurate and representative and, the faeces sample being treated at once, there is no loss in Dry Matter, or Nitrogen. Of course there is one great disadvantage, in that the method is costly and time consuming in the extreme. Furthermore, it has no application in the field, and as grazed herbage plays such a prominent part in the feeding of the ruminant, it is at once evident that a less cumbersome method must be evolved.

An advancement on this technique has indeed been brought about by the attachment of the bucket, so to speak, to the animal. In actual fact the bucket is modified to a collection-bag, and attachment is accomplished by means of a harness. The faeces

is thus collected as it is passed, and the bag may be emptied at suitable times.

In its conception, the technique is crude. Obviously there is a high risk in breakages, and consequent loss of faeces, at once introducing an error which must be reflected, in greater or lesser degree, in the results. Another difficulty is to devise a method of carrying away the urine, without contaminating the faeces, when the apparatus is used on the female animal. An unfortunate consequence is the temptation to make preferential use of the male, but apply the findings to male and female indiscriminately. Aware of this absurd situation many workers sought to devise a means of getting over the problem. Although attended with some degree of success in most cases, their methods were costly in skill and materials. Furthermore, the problem of collection from the grazing female remains still without a satisfactory solution.

Conscious of an ever greater need, to get around this obstacle, experimenters began to appreciate that the problem had to be tackled from another stand-point. A technique had to be devised, which could parallel the more refined techniques for determining digestibility, particularly of grazed herbage, which are at present being evolved. The techniques referred to, are really transient stages in the development of a completely new idea; an idea borne of dissatisfaction with the old conventional methods.

Basically this idea depends on the use of an inert fraction of the herbage which throughout digestion remains intact and appears in the faeces, changed neither physically nor chemically. The concentrations of the inert material - the "indicator" - being known both in the consumed herbage and in the faeces voided, and assuming that it remains unaltered, it may be considered as a constant by which the digestibility coefficient may be derived.