

THE RATE OF PASSAGE OF FOOD RESIDUES THROUGH THE DIGESTIVE TRACT OF THE HORSE

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INTRODUCTION

In view of the complexity of the equine digestive tract considerable interest has been aroused in the time taken for food residues to traverse it. This phenomenon has been studied in man and the common laboratory animals by a variety of methods, but, excepting the observation of Fish (1923), no similar studies appear to have been carried out on the horse. The methods so far employed have depended on the addition of small coloured beads to the food (Elliot and Barclay-Smith, 1904), the admixture of an inert insoluble colouring matter (Guernsey and Evvard, 1913), or roentgenological studies

TABLE I
THE FAECAL EXCRETION OF INGESTED CARBON GRANULES

Horse	Observation No.	Time of appearance of indicator in faeces	
		Beginning	End
Chestnut mare ...	1	18.5 hours	44.5 hours
	2	19.0 "	
	3	25.0 "	58.0 "
	4	22.0 "	44.0 "
	5	23.0 "	39.0 "
	Mean	21.5 "	46.4 "
Bay mare ...	1	18.5 hours	68.5 hours
	2	18.0 "	50.0 "
	3	44.0 "	67.0 "
	4	22.5 "	40.0 "
	5	18.0 "	40.0 "
	6	22.0 "	44.0 "
	Mean	23.8 "	51.6 "
Bay mare (2) ...	1	21.0 hours	48.0 hours
Black mare ...	1	23.0 hours	47.0 hours
	2	23.0 "	55.0 "
	3	24.0 "	46.0 "
	4	21.0 "	39.0 "
	5	21.5 "	39.5 "
	Mean	22.5 "	45.3 "
Chestnut gelding ...	1	22.0 hours	37.0 hours
Mean of all observations ...		22.6 ± 1.32 (S.E.)	47.4 ± 2.26 (S.E.)

of the rate of passage through the gut of a barium meal. In the experiments described here carbon particles were mixed with the food and the rate of their excretion in the faeces observed.

METHODS

The method employed in these experiments was to keep the animals on a maintenance diet of oats 6 lb., bran 2 lb., and hay 12 lb. One hundred gm. of granular carbon were mixed with a normal feed of oats and bran and the time of feeding noted. All faeces passed after this feed were carefully examined for the presence of carbon. The granules used were of about the size of a mustard seed and could easily be seen with the naked eye. The examination was facilitated by shaking the faeces with water in a cylinder when much of the fibrous matter floated off.

Carmine, ferric oxide, kaolin and beads were tried as markers but proved unsatisfactory. The first three substances were difficult to detect, whilst the last was not recovered even by the end of one week.

RESULTS

The results of these experiments are tabulated in Table 1.

DISCUSSION

The paucity of data about the progress of food residues through the equine digestive tract prompted further investigation, using granules of carbon as the indicator. This substance fulfilled the criteria of Alvarez (1940) in that it had little bulk compared to the total amount of the meal, it mixed intimately with the usual food, and was easy to detect. Furthermore, in view of the observations of Hoelzel (1930) that substances with a high specific gravity tend to lag behind the food residue, it was important to choose a material having a density similar to the normal food constituents. It was found that granular carbon met this requirement. Roentgenological studies were, of course, impracticable.

The results of these experiments show that the time taken for the food residue of a normal meal to traverse the equine digestive tract is approximately the same as Burnett (1923) and Alvarez (1940) have found for man. In view of the great disparity between the human and equine digestive tracts in both their relative lengths and complexities this observation is striking and the explanation not obvious.

SUMMARY

Carbon granules mixed in a feed of oats and bran and fed to horses appeared in the faeces in 22.6 (± 1.32) hours and continued up to 47.4 (± 2.26) hours after feeding.

The figures were the means of seventeen separate observations.

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