

CARTAS AL EDITOR

¹⁴C-PEG-4000 as Indicator of the Digestive Tract Motility in Chickens

¹⁴C-polyethylene glycol (PEG), molecular weight 4000, has been used as a non-absorbable tracer marker in a wide variety of *in vivo* studies of intestinal transport (1, 4-6, 8, 9). However, this radioisotope was not used in nonmammalian vertebrates. The aim of this communication is to report data on the viability of ¹⁴C-PEG-4000 as indicator of gastrointestinal (GI) transit and emptying in chickens.

Broilers of both sexes, *Arbor Acres* strain (hybrid of ♂ *Cornish* × ♀ *White Rock*), 43-44 g, and 24 h old were used. From hatching, they were maintained under controlled conditions of temperature (34 °C), relative humidity (75 %), and photoperiod (12 h/12 h dark-light schedule), receiving water and food (standard commercial diet) *ad libitum*.

To control changes in GI motility produced by the marker itself, two groups of 20 animals received through oral cannula 1 ml of 2 % methyl-cellulose in phosphate buffer (PO₄H₂Na/PO₄HNa₂, pH 7.26). The control group received only the mentioned solution, while the experimental group received additionally 0.768 mg/ml of ¹⁴C-PEG-4000 (Specific Activity = 0.42 μCi/mg, Radiochemical Centre, Amersham, UK). After the marker administration, each animal was maintained isolated in a cage with grid floor over filter paper, allowing easy quantifi-

cation of defecation in the period of time considered.

To test the tracer absorption or metabolism, 4 groups of 5 animals each received, through oral cannula, 1 ml of the mentioned radioactive solution. After 0.5, 1, 2 and 4 hrs, the animals were killed by chloroform inhalation, and then the liver and a sample of blood were homogenized with 10 ml of distilled water, centrifuged at 3500 rpm, 20 min (1200 g approx.), and 1 ml of the supernatant was submitted to 80 °C to dryness into a scintillation vial. This dry extract was diluted in 15 ml of liquid scintillation cocktail, and its radioactivity was measured. The results were compared with system background activity.

To obtain measures of the chick GI motility by means of ¹⁴C-PEG-4000, a group of 10 animals received, through oral cannula, 1 ml of the mentioned radioactive solution. After 2 h, the animals were killed by chloroform inhalation. The digestive tract was dissected and eight sections were made according to the procedure of Goñalons *et al.* (3), and its radioactivity was determined. The radioactivity present in each digestive segment was expressed as a percentage of the total radioactivity recuperated from the entire GI tract.

Table I. Cumulative number of defecations as influenced by ^{14}C -PEG-4000. Number of animals per group: 20.

Time (h)	Control	^{14}C -PEG-4000 *
0.5	7	9
1	18	16
2	40	39
4	63	62

* $p < 0.01$, as compared to the control group (Mann-Whitney U-test).

Nonparametric statistics (Mann-Whitney U-test) were used for defecation analysis, and parametric statistics (Student t-test) for absorption studies.

The lack of statistical differences between the defecation indexes of control group (with no marker) and experimental group (with ^{14}C -PEG-4000), is demonstrative of no marker effects on the global digestive tract motility (table I). In the same way, the lack of significant differences between measured radioactivity (DPM) in liver (36.69 ± 1.33), blood

(39.83 ± 2.65), and system background (35.3 ± 0.36), show the gut incapability to absorb or metabolize ^{14}C -PEG-4000. In addition, 85-90 % was recuperated from the total administered radioactivity.

Finally, the results obtained from the different digestive segments (fig. 1) are similar to those obtained in the same animal using dyes (2, 3), or electromyographically (7). Therefore, the obtained results confirm the usefulness of ^{14}C -PEG-4000 to measure quantitatively the progression rate of intraluminal content in chickens, allowing quantitative distinction between motilities of the different digestive segments.

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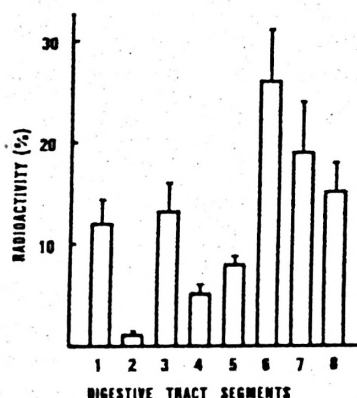


Fig. 1. Radioactive percentages found along the chick gastrointestinal segments.

(1) Oesophagus-crop; (2) proventriculus; (3) muscular stomach; (4) duodenal loop; (5) small intestine I (jejunum); (6) small intestine II (ileum); (7) terminal ileum-caeca-rectum; (8) cloaca and feces. Results are mean values ($\pm$ S.E.M.) of ten chicks.