

This Week's Citation Classic

Van Soest P J & Wine R H. Use of detergents in the analysis of fibrous feeds. IV.

Determination of plant cell-wall constituents. *J. Assn. Offic. Anal. Chem.* 50:50-5, 1967.

Van Soest P J. Development of a comprehensive system of feed analyses and its application to forages. *J. Anim. Sci.* 26:119-28, 1967. Van Soest P J. *Nutritional ecology of the ruminant.* (Corvallis, OR: O & B, 1982. 375 p.) Ithaca, NY: Comstock-Cornell University Press, 1987. [US Department of Agriculture, Agriculture Research Service, Beltsville, MD; and, Department of Animal Science and Division of Nutritional Sciences, Cornell University, Ithaca, NY.]

These publications represent the developments of a lifetime. Originating with improved methods for the analyses of dietary fibers, the methods have been widely applied in agronomy, ruminant, nonruminant, and human nutrition, and the foraging ecology of wild herbivores. The information has led to modeling of animal digestive processes and strategies. [The SC® indicates that these publications have been cited more than 915,320, and 730 times, respectively.]

Fiber in the Diets of Animals and Man

P.J. Van Soest

Department of Animal Science and
Division of Nutritional Sciences
Cornell University
Ithaca, NY 14853

This work began when I was hired as a chemist by the Agriculture Research Service in 1957 to study dietary fiber and its components. The results were new methods dealing with insoluble fiber (neutral-detergent fiber), the acid-detergent fiber,¹ cellulose, and lignin. While these papers are still widely cited, the methodologies have been revised and improved. Current users of these methods should cite the updated procedures.^{2,3} The whole idea was that of the late Lane A. Moore, then chief of the Dairy Nutrition Group at Beltsville, who believed fiber to be a badly neglected aspect of diets. Fiber was held by many nutritionists to have little dietary importance, except for cows, and had no future. I was even told by some visiting scientists at the time that I was wasting my career. The same experience has been related to me by Martin Eastwood, Western General Hospital, University of Edinburgh, Scotland, who was probably the first to use my methods in Europe. Dietary fiber became fashionable research in the 1970s after

Dennis P. Burkitt and others⁴ pointed out the epidemiological evidence of dietary fiber in human diseases, particularly colon cancer, cardiovascular disease, and diabetes.

After I moved to Cornell University in 1968, I was more in contact with international agricultural work, wildlife, and ecological sciences, and I became involved in developing nutritional models of the gastrointestinal digestion in the rumen in ruminants, and the colon and cecum of nonruminants. We also conducted two human nutrition-relation studies. All told, I have been involved with students and other collaborators with the measurement of passage rate and digestion in more than 50 species of animals, including our own students.⁵ During this time, I was teaching the "fiber" course at Cornell. The interpretation of method and theory led to the publication, in 1982, of the *Nutritional Ecology of the Ruminant*. Further applications were in the areas of feeding behavior and problems of body size. With the collaboration of Montague W. Detriment, now at the University of California, Davis, we developed a model relationship of dietary fiber, body size, and sexual dimorphism.⁶

During the last few years, feeding studies have waned, and my interest has gone back to some of the remaining problems in the chemistry of plant fiber, particularly pectin, tannins, and the so-called "soluble fiber." Also, a major effort has been the revision of the *Nutritional Ecology* for a second edition, to appear in 1993 (Cornell University Press). In it, the spectrum of information has been greatly widened through the application of rumen gut metabolism to other nonruminant herbivores, with the relevant interaction of fibrous substrate, gut microbes, and capture of the available energy in cellulosic carbohydrate through the microbial intermediary and its production of volatile fatty acids. This concept is a basis for current hypotheses regarding colon cancer.⁷

1. Van Soest P J. Use of detergents in the analyses of fibrous feeds. [I. A rapid method for the determination of fiber and lignin. *J. Assn. Offic. Agr. Chem.* 46:829-351, 1963. (Cited 980 times.) [See also: Van Soest P J. Citation Classic. *Current Contents/Agriculture, Biology & Environmental Sciences* 10(16): 12. 16 April 1979. Reprinted in: *Contemporary classics in plant, animal, and environmental sciences.* (Barrett J T. comp.) Philadelphia: ISI Press, 1986. p. 275.]
2. Robertson J B & Van Soest P J. The detergent system of analysis and its application to human foods. (James W P T & Theander O. eds.) *The analysis of dietary fiber in food.* New York: Marcel Dekker, 1981. p. 123-58. (Cited 135 times.)
3. Van Soest P J, Robertson J B & Lewis B A. Methods for dietary fiber, neutral detergent fiber, and nonstarch polysaccharides in relation to animal nutrition. *J. Dairy Sci.* 74:3583-97, 1991.
4. Burkitt D P, Walter A R P & Painter N S. Effect of dietary fiber on stools and transit times and its role in the causation of diseases. *Lancet* 2:1408-11, 1972. (Cited 405 times.)
5. Van Soest P J. Fibre in the diet. (Blaxter K & Macdonald I. eds.) *Comparative nutrition.* New York: Libbey, 1988. p. 215-25.
6. Demment M W & Van Soest P J. A nutritional explanation for body-size patterns of ruminant and non-ruminant herbivores. *Amer. Naturalist* 125:640-72, 1985.
7. McBurney M I, Van Soest P J & Jeraci J L. Colonic carcinogenesis: the microbial feast or famine syndrome. *Nutr. Cancer* 10:23-8, 1987.

Received February 24, 1992