This Week's Citation Classic™

CC/NUMBER 52
DECEMBER 26, 1983

Jenness R & Koops J. Preparation and properties of a salt solution which simulates milk ultrafiltrate. *Neth. Milk Dairy J.* **16**:153-64, 1962.
[Netherlands Institute for Dairy Research, Ede, the Netherlands]

A solution having the salt composition of ultrafiltrate of cow's milk was prepared from common laboratory chemicals. It closely resembled ultrafiltrate in pH, conductivity, calcium ion activity, and titration curve. [The SCI® indicates that this paper has been cited in over 145 publications since 1962.]

Robert Jenness
Department of Biochemistry
University of Minnesota
St. Paul, MN 55108

August 25, 1983

"This work was done and the paper written during a sabbatical, supported by a Fulbright award, that I spent at the Netherlands Institute for Dairy Research (NIZO) in Ede in 1961-1962. It was not the principal project on which I worked that year but certainly it has become the most widely known.

"Prior to going to NIZO, I had been studying the variability among milks of individual cows in susceptibility to coagulation of the caseinate by heat. I had thought that a sort of standard or control would be a dispersion of caseinate in a salt solution formulated to represent the average composition of the dissolved salts of milk. Previous attempts by other workers to prepare such a solution with chemicals from the shelf had not entirely duplicated the natural system. In early 1961, before I went to NIZO, I had some success in calculating a recipe and preparing a salt solution that seemed rather satisfactory. Thus, when my co-workers at NIZO, J. Koops and P.J. de Koning, suggested that such a solution would be useful, I responded that I had one already worked out. They quickly showed me a serious error in my formulation; I had a fine stable solution but the composition didn't match that of milk salts! After a flurry of recalculation and rechecking, Koops and I arrived at the formulation and the two methods of preparation reported in the paper. de Koning used the solution immediately in preparation of a lactose-free milk for research.[1] A couple of physicians at the University of Utrecht expressed interest in the possible use of the solution as a source of minerals as a dietary base for patients recovering from surgery of the intestinal tract; that application was never developed so far as I know.

"I coined the acronym 'NIZOUT' for the salt mixture from NIZO and the Dutch word for salt—*zout*—and we usually referred to it around the laboratory by that name. We decided, however, not to use the term in the publication. Later, some of my associates at Minnesota called it 'SMUF' for 'simulated milk ultrafiltrate' but I never liked that designation very much either. Personally, I usually call it 'J-K buffer.'

"In our haste to get the paper published before I left NIZO ('crazy haste,' according to the then director, J.W. Pette) we managed to omit mention of a 1958 paper from Wisconsin[2] which was the nearest previous approach to a satisfactory milk solution. We tried to rectify that omission by an erratum published in the journal and attached to reprints.[3]

"The frequency of citation of this paper merely reflects the widespread use of our salt solution in various studies of interactions among milk constituents. It is a standard, reproducible solution in which to disperse other constituents. I do not consider it my most important publication by any means. In the field of milk salts I consider several others[4,5] more important. I doubt that Koops considers this his most important work either."

1. **de Koning P J.** Gel filtration, a new method for the preparation of lactose-free milk. *Neth. Milk Dairy J.* **16**:210-16, 1962.
2. **Verma I S & Sommer H H.** Influence of pasteurization and cool-aging on the behavior of pure salt solutions prepared in accordance with the composition and concentrations in milk. *J. Dairy Sci.* **41**:611-66, 1958.
3. **Jenness R & Koops J.** Rectification. *Neth. Milk Dairy J.* **16**:323, 1962.
4. **Christiansen G, Jenness R & Coulter S T.** Determination of ionized calcium and magnesium in milk. *Anal. Chem.* **26**:1923-7, 1954.
5. **Holt C, Dalgleish D G & Jenness R.** Calculation of the ion equilibria in milk diffusate and comparison with experiment. *Anal. Biochem.* **113**:154-63, 1981.