CC/NUMBER 31
AUGUST 4, 1986

This Week's Citation Classic®

Lofgreen G P & Garrett W N. A system for expressing net energy requirements and feed values for growing and finishing beef cattle. *J. Anim. Sci.* 27:793-806, 1968.
[Department of Animal Science, University of California, Davis, CA]

A system for expressing net energy (NE) values for beef cattle is presented in which one expression, NE_m, represents NE requirements and feed values when used for maintenance and a second one, NE_g, represents the requirements and feed values when used for deposition of weight gain. [The *SCI*® indicates that this paper has been cited in over 140 publications.]

Glen P. Lofgreen
Clayton Livestock Research Center
New Mexico State University
Clayton, NM 88415

May 28, 1986

In the late 1950s J.H. Meyer and I attended a series of meetings in California also attended by cattle feeders, extension specialists, and nutrition consultants. One of the most frequently mentioned areas in which research was needed was the reevaluation of the energy content of commonly available feeds used in the cattle feeding industry of California. It was obvious that there was dissatisfaction with current values based on total digestible nutrients (TDN).

Scientists had recognized for some time that TDN had serious errors. Now it appeared private industry was also expressing dissatisfaction. The time had come for us to make a concerted effort to replace TDN with a more scientific, accurate, and meaningful term for expressing energy requirements and feed values.

We were fortunate to have W.N. Garrett come to us as a graduate student with an interest in this field. He presented a thesis that served as a springboard to development of the proposed net energy (NE) system.[1] One of his major contributions was the description of a method of resolving body composition from specific gravity measurements of carcasses of beef cattle. This resulted in the development of a comparative slaughter technique to measure energy deposition in the bodies of cattle without the use of costly and tedious respiration trials.

As the energy literature was reviewed, it became apparent that the primary reason NE had not been adopted as a practical energy measure was that NE values differed depending on the proportion of energy used for maintenance and for gain. The simplest way to solve this problem appeared to be the adoption of one value, NE_m, for maintenance and another, NE_g, for weight gain. Armed with Garrett's prediction equations for energy deposition and the theory of separate expressions for maintenance and for gain, the experiments described in the paper were conducted to establish the necessary database.

The proposed method was presented to private industry in 1963 for testing under practical conditions. After five years of successful use and the addition of further data, the paper was submitted to the *Journal of Animal Science*. It came close to being rejected. The first two reviews were almost completely opposite in their recommendations. Fortunately for us (and hopefully for the industry and nutritional science), the third review was favorable, and we won by a split decision!

Perhaps the main reasons the paper has been cited frequently are that the cattle feeding industry and nutritional scientists were ready for the change and that the proposed system worked under applied conditions. We happened to come along at the right time!

In addition to its influence on research on energy requirements and feed values, this paper has had an impact on related research, such as the influence of nitrogen and metabolizable protein levels on partitioning of energy into NE_m and NE_g.[2]

Those interested in a more detailed discussion of the method and of its derivation, verification, and use are referred to a 1976 visiting scholar lecture given at the University of Arkansas.[3]

1. **Garrett W N.** *The comparative energy requirements of sheep and cattle for maintenance and gain.* PhD dissertation, University of California, Davis, 1958.
2. **Tritschler J P II, Shirley R L & Bertrand J E.** Tissue protein and energy deposition in steers fed isocaloric diets with different levels of nitrogen. *J. Anim. Sci.* 58:444-51, 1984.
3. **Lofgreen G P.** Current trends in ruminant nutrition: development and application of the net energy system to beef feedlot nutrition. *Ark. Agr. Exp. Sta. Spec. Rep.* (50):15-41, 1977.

 ©1986 by ISI® CURRENT CONTENTS®

2-10