

1983

Average Heat of Combustion and Available Energy of Carbohydrate, Fat and Protein

H. I. Feinstein

Follow this and additional works at: <https://scholarworks.uni.edu/istj>



Part of the Science and Mathematics Education Commons

Let us know how access to this document benefits you

Copyright © Copyright 1983 by the Iowa Academy of Science

Recommended Citation

Feinstein, H. I. (1983) "Average Heat of Combustion and Available Energy of Carbohydrate, Fat and Protein," *Iowa Science Teachers Journal*: Vol. 20: No. 2, Article 9.

Available at: <https://scholarworks.uni.edu/istj/vol20/iss2/9>

This Article is brought to you for free and open access by the IAS Journals & Newsletters at UNI ScholarWorks. It has been accepted for inclusion in Iowa Science Teachers Journal by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.

Offensive Materials Statement: Materials located in UNI ScholarWorks come from a broad range of sources and time periods. Some of these materials may contain offensive stereotypes, ideas, visuals, or language.

Synopsis

The MAP survey data for the earth science teachers showed that 75 percent or more of those teachers identified 13 need statements. Ten of the 13 need statements were associated directly with the planning and implementation of science instruction. The other three needs were in the closely related areas of better understanding students and use of instructional materials. Inservice activities planned around the 13 need statements presented in this report should be well accepted by large numbers of junior high school and high school earth science teachers. Still, those who arrange inservice activities for earth science teachers should not forget the cardinal principle of inservice education — plan inservice activities based upon the specific needs of participating teachers.

References

- Moore, Kenneth D. 1977. Development and validation of a science teacher needs assessment profile. *Journal of Research in Science Teaching*. 14(2): 145-149.
- Rubba, Peter A. 1981. A survey of Illinois secondary school science teacher needs. *Science Education* 65(3): 271-276.

AVERAGE HEAT OF COMBUSTION AND AVAILABLE ENERGY OF CARBOHYDRATE, FAT AND PROTEIN

H. I. Feinstein
10411 Forest Avenue
Fairfax, VA 22030

The food energy of carbohydrate, fat and protein recorded in many nutrition tables is the net available energy. It is equal to 16.7, 37.7, and 16.7 kilojoules per gram respectively. These are not the same as the heat of combustion determined calorimetrically. The relationships between them is shown in the table.

	Calorimetric Heat of Combustion		Available to Body		Atwater Factor*	Net Available Energy or Body Fuel Value	
	kJ/g (kcal/g)		kJ/g (kcal/g)			kJ/g (kcal/g)	
Carbohydrate	17.2	(4.1)	17.2	(4.1)	0.97	16.7	(4.0)
Fat	39.8	(9.5)	39.8	(9.5)	0.95	37.7	(9.0)
Protein	23.9	(5.7)	18.4	(4.4)**	0.92	16.7	(4.0)

* The Atwater factor is the fraction absorbed from the alimentary canal in a mixed diet.

** The oxidation of protein by the body is incomplete as shown by the presence of certain nitrogen compounds in the urine (e.g. urea, creatinine, uric acid). This is equivalent to 5.4 kJ/g (1.3 kcal/g) of protein. Therefore, $23.8_6 - 5.4_1 = 18.4$ kJ/g ($5.7 - 1.3 = 4.4$ kcal/g).