Psychologic and Sociologic Aspects of Survival Ration Acceptability

By E. Paul Torrance, ph.d., and Raigh Mason*

Problems concerning emergency rations have stimulated a prolonged controversy. Pemmican, for example, a meat food product currently used in "Ration, Special Survival, RS-1" has been the center of much discussion. Some[1] heatedly maintain that pemmican is unsatisfactory as an emergency ration, much of the justification being based on its low acceptability rating. Others[2] just as heatedly contend that it is the most satisfactory Arctic ration known.

In studies conducted at the U.S.A.F. Survival Training School, no effort has been made to evaluate the adequacy of this product from a nutritional standpoint but to compare its acceptability in a simulated survival situation and what can be done in training to modify the acceptability of the ration. In this paper, we shall summarize the results of three studies thus far directed to this objective.

SUBJECTS

The subjects in all three studies were combat aircrewmen undergoing survival training; the subjects numbered 180, 543 and 429, respectively. Each sample represents a good cross-section of combat aircrew personnel in the U. S. Air Force and includes both officers and airmen.

PROCEDURES

All subjects received a double issue of "Ration, Special Survival, RS-1" supplemented by about 2 lb of beef and a small quantity of vegetables at the beginning of a nine-day simulated survival exercise, about four days of which were spent in a static situation and the remainder in traveling over difficult terrain. One ration included: five meat product bars (pemmican), chili and onion powder, a honey biscuit, a fruit cake bar, eight cubes of sugar, and four packets each of soluble coffee and tea. Subjects in the first and third studies were able to supplement these ratios with such native foods as wild onions, squaw potatoes, blue camus, trout, porcupine, mint, and other foods available in the spring in the Plumas National Forest. The second study, however, was conducted in the winter and little supplementary food was available. The mean temperatures, for the winter exercises were 18.8 and 32.9° Fahrenheit and the mean snow levels were 24.7 and 8.5 in., respectively.

Following the field exercises, all subjects were given a questionnaire to obtain measures of acceptability and provide additional information concerning psychologic, sociologic, and training factors affecting acceptability. The acceptability items included the traditional hedonic scale[3] (9-point in the first and third studies, and 7-point in the second) requiring the subject to indicate his reactions to each of three methods of preparing pemmican, the number of bars of pemmican eaten, reasons for not eating the remainder, and conditions under which the subject would use pemmican in the future.

* Captain, U.S.A.F.

From the Survival Research Field Unit, Air Force Personnel and Training Research Center, Stead Air Force Base, Reno, Nevada.

This report is based on work done under ARDC Project No. 7723, Task No. 77460, in support of the research and development program of the Air Force Personnel and Training Research Center, Lackland Air Force Base, Texas.

Presented at a Symposium on Nutrition and Behavior held at the Laboratory of Physiological Hygiene, University of Minnesota, April 27, 1956, with the cooperation of the National Vitamin Foundation, Inc., New York and under the sponsorship of the School of Public Health, University of Minnesota.

Acceptability indices were obtained according to the following formula:

$$H_1 + H_2 + H_3 + H_4 + P + R(P) + FU$$

where:

- H_1 = Rating on hedonic scale for pemmican eaten cold (1 point for "like extremely," etc.)
- H_2 = Rating on hedonic scale for pemmican heated with water only
- H_3 = Rating on hedonic scale for pemmican heated with water and chili powder
- H_4 = Rating on hedonic scale for pemmican heated with water and onion powder
- P = Number of bars of pemmican not eaten
- R(P) = Reasons for not eating remainder of pemmican (5 points for "made me sick" and one point each for "tasted bad, smelled bad, too hard or dry, or too greasy")
- FU = Condition under which subject would use pemmican in the future (0 for "whenever hungry," 5 for "only when extremely hungry," and 10 for "would not eat even if very hungry")

In the first and second studies, the "favorable" and "unfavorable" groups consisted of the upper and lower 27 per cents on this index. In the third study, the aversion sample was selected by the consensus of two judges and included only those having a clearly and distinctly unfavorable reaction to pemmican. A total of 93 subjects were selected in this manner; the 93 subjects for comparison were selected at random from the remaining cases.

RESULTS

In the first and second studies, the criterion groups were compared by means of the chi-square test computed according to the method described by McNamar.[4] The results are presented in Table I. It will be observed that most of the factors found to be statistically significant in the first study were also found to be significant in the second study. It can be said with reasonable assurance that the following factors are associated with low acceptance:

Prior exposure to unfavorable opinions.

Prior unfavorable expectations or "set."

Perception of unfavorable crew attitude.

More than usual hunger at time of initial use.

Greater amount of time elapsed since last full meal at time of initial use.

Eaten only in small quantities (nibbles) at a time.

First-time use.

Undue fatigue or other unfavorable physiologic condition.

History of present or past food aversions.

In the third study,[5] the mean scores of the acceptance and aversion samples were compared on each of eight scales on the Life Experience Inventory by means of the *t*-test. The results are presented in Table II. Five of the

TABLE I

Factors Associated with Low Acceptability of Pemmican Among Aircrewmen

Factor	1st sample (N = 180)			2nd sample (N = 543)		
	Chi-square	*df*	*p*	*Chi-square*	*df*	*p*
Prior exposure to unfavorable opinions	11.96	3	0.02	2.08	3	0.70*
Prior unfavorable expectations	15.26	3	0.01	13.16	3	0.01
Perception of unfavorable crew attitude	21.36	4	0.001	64.48	2	0.001
Failure of instructor to try to "sell" pemmican as survival ration	6.28	2	0.05	5.20	2	0.20
More than usual hunger at time of initial use	7.68	3	0.05	20.00	3	0.001
Greater amount of time since last full meal at time of initial use	5.20	2	0.07	21.52	2	0.001
Eaten only in small quantities at a time	12.28	4	0.02	26.20	4	0.001
No previous use of pemmican	3.80	2	0.15	7.64	2	0.05
Unfavorable physical condition at time of initial use	2.64	1	0.10	25.52	1	0.001
A relatively restricted diet	31.40	2	0.001	3.16	2	0.30
Food aversions as a child	6.56	2	0.05	5.72	2	0.10
Food aversions at present time	9.40	2	0.01	10.64	2	0.01

* In a third sample, data about prior exposure were collected prior to training and "prior exposure to unfavorable opinions" was found to be significant at the 0.001 level of significance.

TABLE II

Comparison of Life Experience Inventory Score Means of Two Samples of Combat Aircrewmen Divided According to Their Acceptance of Pemmican

Scale	Acceptance group (N = 93)	Aversion group (N = 93)	*t*-ratio	Probability
Motivation	22.43	20.08	2.511	0.05
Leadership	15.34	12.97	2.762	0.01
Adaptability	13.77	12.72	2.360	0.05
Socialized aggressiveness	18.03	15.39	2.938	0.01
Non-conforming aggressiveness	8.18	7.71	0.861	Not significant
Social adjustment	52.61	47.99	2.634	0.01
Risk	21.70	19.80	1.771	0.10
Anxiety	6.52	5.86	1.546	0.15

eight scales differentiate at better than the 0.05 level of significance (motivation for achievement, leadership, adaptability, socialized aggressiveness, and social adjustment).

The detailed item analysis revealed numerous meaningful differences in the life experiences of the two criterion groups under study. One such constellation of items deals with various aspects of willingness to oppose others. Data concerning these items are presented in Table III. It may be inferred from these data that individuals who express an aversion for pemmican characteristically are unable to oppose others by disagreeing, fighting, deviating from norms, or competing. Likewise, they tend not to establish relations with others, or influence and lead them, and are characterized by a pleasure orientation, the association of work with unpleasantness, and overconcern about health.

TABLE III

Comparison of Pemmican Aversion and Acceptance Samples on Items of Interpersonal Aggressiveness and Willingness to Oppose Others

Item	*df*	*Chi-square*	Probability
Frequency of disagreement with teachers*	3	19.35	0.001
Always or usually took a dare	1	4.18	0.05
Fighting as a boy	1	4.88	0.05
Teasing other kids	1	4.52	0.05
Frequency of fighting as a boy	3	12.77	0.01
Frequency of punishment in school	4	5.14	0.25
Frequency of running away from home	3	14.54	0.01
Frequency of wanting to leave home during adolescence	2	11.58	0.01
Rarely or never accepts advice from older people	1	2.75	0.10
Parents disapproved of friends	1	11.37	0.001
Winning in competition important	1	2.65	0.11
Liking for competition	1	3.32	0.07
Improved performance under stiff competition	1	5.28	0.03
Prefers competing against others to competing with own record	1	†	0.01

* In all cases, the greater frequency is for the acceptance sample.

† Probability computed by the "exact method."

Viewed in their totality, the results present a picture of weak ego strength and a relatively unaggressive adjustment to life in general for the aversion sample. Thus, training designed to increase acceptability of survival rations might seek to increase ego strength, to encourage an experimental attitude free of bias, to foster a goal-orientation in adapting to survival rations, and to inform trainees of the scientific facts about the ration.

SUMMARY

Three studies designed to determine some of the psychologic and sociologic factors affecting the acceptability of pemmican in a simulated survival situation were described. In the first, it was found that acceptability was affected by prior exposure to unfavorable opinions, unfavorable personal expectations, perception of crew attitudes, hunger and fatigue at the time of initial use, nibbling only small quantities at a time, and food aversions exhibited presently or during childhood. The second study confirmed most of these and in addition indicated that absence of a prior use of the ration might

be a factor. In the third study, it was found that distinctive patterns of early life experiences differentiate the aversion group from the acceptability group. The acceptability group has had experiences indicative of higher motivation for achievement, more leadership, greater adaptability, a more aggressive adjustment to life in general, and more effective social adjustment.

REFERENCES

1. JOHNSON, R. E., and KARK, R. M.: *Feeding Problems as Related to Environment. An Analysis of United States and Canadian Army Ration Trials and Surveys, 1941–1946*, Quartermaster Food and Container Institute for the Armed Forces, Chicago, 1946.
2. STEFANSSON, V.: *Not by Bread Alone*, Macmillan, New York, 1946.
3. *Food Acceptance Methodology*, edited by D. R. Peryam, F. J. Pilgrim, and M. S. Peterson, Quartermaster Food and Container Institute for the Armed Forces, Chicago, 1954.
4. MCNEMAR, Q.: *Psychological Statistics*, John Wiley & Sons, New York, 1949.
5. TORRANCE, E. P.: *Personality Factors and Survival Ration Acceptability*. Crew Research Laboratory, Air Force Personnel and Training Research Center, Randolph Air Force Base, Tex., 1955. (Technical Memorandum CRL-TM-55-9).