

DIETARY REQUIREMENTS' REVIEW FOR THE SAF

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ABSTRACT

To promulgate a culture of healthy eating in the Singapore Armed Forces (SAF), the nutrition standards for military feeding uses the Recommended Dietary Allowances based on nutrient reference values recommended by the Singapore Health Promotion Board, the World Health Organisation as well as recommended military nutritional requirements for the Australian Defence Force and US Army. DSTA, in partnership with the SAF's Headquarters Supply, Army Medical Services and Army Fitness Centre, reviewed the SAF dietary requirements as part of continuous efforts to ensure that SAF servicemen are provided with the appropriate amount of nutrients and calories for differing training requirements and encourage healthier choices in cookhouse dishes.

Keywords: ration, nutrition, recommended dietary allowance

INTRODUCTION

Effective training is founded on the basis of proper nutrition, prevention of overtraining and adequate recovery. It is thus important for active military personnel to meet their energy intake requirements through a well-designed diet plan. The current Singapore Armed Forces (SAF) Recommended Dietary Allowances (RDA) caters for sufficient energy, dietary carbohydrate and protein sources to support SAF training and operations. This standard is based largely on the nutrient reference values recommended by the Singapore Health Promotion Board (HPB) and the World Health Organisation (WHO). In addition, it is also within the ranges of recommended military nutritional requirements for the Australian Defence Force (ADF) and US Army.

RECOMMENDED DIETARY ALLOWANCES

The RDA is a nutrient and energy standards established for the different categories of servicemen involved in various physical activities due to their varied training needs (see Table 1). The RDA is dependent on the estimated daily energy expenditure of the servicemen based on their training activities as determined by the Army Fitness Centre and Army Medical Services. The SAF RDA is applicable to local and overseas training requirements, having undergone a revision in 2011 by subject matter experts from DSTA, the SAF's Headquarters Supply, Army Medical Services and Army Fitness Centre to align it with the recommendation of HPB.

Nutrients	Daily Recommended Dietary Allowance (Activity Based)			
	Normal	Active	Highly Active	Very Active
Energy (kcal)	2500	3000	3500	4000
Carbohydrate (g)	359	473	560	645
Protein (g)	94	95	96	105
Fat (g)	Up to 76	Up to 81	Up to 97	Up to 111
Cholesterol (mg)	Not more than 300			
Calcium (mg)	≥ 800			
Iron (mg)	≥ 6			
Vitamin A (µg)	≥ 750			
Vitamin B1 (mg)	≥ 1.18			
Vitamin B2 (mg)	≥ 1.77			
Vitamin C (mg)	≥ 30			
Fibre (g)	25 to 30			
Salt (mg)	Up to 4600			

Table 1. Daily recommended dietary allowance for the SAF

APPROACH TO ESTIMATING ENERGY REQUIREMENTS

Basis for Categorising Physical Activity Level

In the SAF, the Compendium of Physical Activities (CPA)¹ was used to aid in establishing the corresponding rate of energy expenditure of various military activities based on daily averages.

To ensure that the estimated energy requirements for the respective Physical Activity Levels (PAL) closely match national and international standards, the SAF PAL was benchmarked against that of HPB, WHO, ADF and the US Army (see Table 2).

Activity Classification	Physical Activity Level				
	SAF	HPB	WHO	ADF	US Army
Normal	1.47	1.4–1.69 (Sedentary)	1.4–1.69 (Sedentary)	1.6 (Sedentary)	1.7 (Light Activity)
Active	1.95	1.7-1.99 (Active)	1.7-1.99 (Active)	1.8 (Moderately Active)	1.8 (Moderate Activity)
Highly Active	2.27	2.0 – 2.4 (Vigorous)	2.0 – 2.4 (Vigorous)	2.0 (Very Active)	2.2 (Heavy Activity)
Very Highly Active	2.59	N.A	N.A	2.4 (Extremely Active)	2.5 (Exceptional Heavy Activity)

Table 2. Comparison of PAL

Daily Energy Requirements

Energy requirements is the amount of food energy needed to balance energy expenditure in order to maintain body composition and a level of necessary and desirable physical activity consistent with long-term good health. Table 3 shows an individual's energy requirements (kcal/day) for the respective PAL categories. The energy requirements for the SAF in the three categories (i.e. Normal, Active and Highly Active) are similar to the guidelines set by WHO and HPB. The energy requirements for the ADF and US Army are higher due to the larger body build of their servicemen. However the energy requirement per kg of body weight for the respective PAL categories is comparable among the SAF, ADF and US Army.

Activity Classification	Energy Requirements ² (kcal/day)				
	SAF	HPB	WHO	ADF	US Army
Normal	2500	2550 (Light)	2400 (Sedentary)	2857 (Sedentary)	3000 (Light Activity)
Active	3000	2950 (Moderate)	2900 (Active)	3333 (Moderately Active)	3250 (Moderate Activity)
Highly Active	3500	3450 (Heavy)	3450 (Vigorous)	3809 (Very Active)	3950 (Heavy Activity)
Very Highly Active	4000	N.A.	N.A	4523 (Extremely Active)	4600 (Exceptional Heavy Activity)

Table 3. Comparison of energy requirements

GUIDELINES ON MACRONUTRIENT DISTRIBUTION

The dietary requirement review takes reference from national and international standards to ensure that the macronutrient provision is consistent with these guidelines (see Table 4).

Carbohydrate

Carbohydrate is a critical macronutrient that allows the body to perform intermittent and relatively high-level physical activities (Kreider et al., 2010). The carbohydrate requirements for soldiers involved in active operations or training were found to be within the national and international standards (see Table 4). The SAF's daily carbohydrate provisions in cookhouses are thus more than adequate to meet the daily requirements of the SAF's active military personnel.

Protein

Daily protein intake is required to offset the oxidation of protein/amino acids during exercise and for muscle accretion (Kreider et al., 2010). Research has suggested the intake of protein before and following exercise training is beneficial for increasing muscle mass, promoting post-exercise recovery

and sustaining one's immune function during periods of high volume training (American Dietetic Association et al., 2009). The SAF's protein provision was found to be higher than HPB and WHO guidelines and within the range of the ADF and US Army standards (see Table 4).

Fat

Fats are a vital part of a healthy diet that adds taste to food and satisfies hunger. However, excessive fat intake is associated with many diseases, including obesity, heart disease, diabetes and many forms of cancer (Kreider et al., 2010). To promote a healthy eating lifestyle, the fat intake in the SAF was capped within the lower limit of the recommendation from HPB at between 1.1 to 1.7g/kg body weight/day (see Table 4).

ENHANCING THE SAF'S DINING EXPERIENCE

In addition to overseeing SAF dietary requirements, DSTA also works closely with the SAF's Headquarters Supply, the Republic of Singapore Navy, the Republic of Singapore Air Force and contractors to continuously improve meal provision in the SAF and introduce various innovative solutions over the years (see Figure 1).

Nutrients	Macronutrient Provision (g/kg body weight/day)				
	SAF	HPB	WHO	ADF	US Army
Carbohydrate	5.6-10.1	5.5	5-7	4.8-9.2	5.2-8.0
Protein	1.4- 1.7	1.05	0.8	1.35-2.4	0.8-1.5
Fat	1.1-1.7	1.1	N.A	N.A	1.3

Table 4. Comparison of macronutrients requirements

SAF Food Supply Milestones	
1967	Cookhouses were operated entirely by the SAF's military chefs. This working model was, however, not sustainable due to limited manpower resources.
1988	A chilled-cooked food system was implemented throughout the SAF.
1995	Retort pouches replaced the heavy and bulky canned food as field rations with the use of the retort process.
1997	Commercialisation of SAF cookhouses.
2002	Electronic cookhouse technology introduced to enhance cookhouse management.
2003	Nutritional analysis introduced to promote healthy diet.
2006	Field ration was enhanced with the introduction of commercial-off-the-shelf field ration accessory packs to provide variety.
2008	Environmentally friendly and compartmentalised out-ration meal boxes were introduced.
2009	The weekend meal was created for personnel on weekend duty.
2010	Introduction of carbohydrate-loading meals for the annual Army Half Marathon.
2013	Introduction of one-meal field ration pack as an option in addition to the 24-hour field ration packs.
2015	Choice@Breakfast was introduced in cookhouses to encourage breakfast consumption.

Figure 1. SAF food supply milestones (Wong, 2011)

Healthier Choices In Cookhouse Meals

DSTA worked closely with cookhouse contractors to prepare meals using healthy ingredients such as those endorsed by HPB with the Healthier Choice symbol³ (HCS). Wholegrain foods such as brown rice, wholemeal bread and oats with health benefits were incorporated in cookhouse menus. More choices of dairy and soy items, such as yoghurt, low fat milk and soy products, were introduced as alternatives to replenish protein and calcium intake for SAF servicemen.

Healthier Cooking Methods

DSTA advocated the use of less oil, fat, salt and sugar during meal preparation. DSTA worked with cookhouse contractors to develop innovative cooking methods through the use of natural herbs and spices to enhance the taste of prepared meals. Contractors also incorporated healthier cooking methods

such as baking, grilling, steaming, braising and stir-frying. In addition, deliberate effort was put in menu planning to reduce the frequency of deep-frying to control the fat contents of SAF meals. Figure 2 illustrates a range of menu choices that utilised healthier cooking methods.

Choice@Breakfast

Studies have shown that breakfast is the most important meal of the day, as it is the first meal after an overnight fast (Cho, Dietrich, Brown, Clark, & Block, 2003; Nicklas, O'Neil, & Myers, 2004). This is coupled with the fact that many training activities tend to be conducted in the morning. The initiative of introducing two choices of menu during breakfast was thus implemented by DSTA to encourage the consumption of adequate protein to meet servicemen's energy requirements. Figure 3 illustrates the breakfast menu choices under this initiative.



Figure 2. Menu choices using healthier cooking methods



Figure 3. Breakfast menu options under the Choice@ Breakfast initiative

Special Menu for Festive Season and Public Holidays

DSTA also worked with contractors to create new dishes for festive seasons such as Chinese New Year, Christmas, Hari Raya Puasa and Deepavali. Figure 4 illustrates samples of menus served during festive seasons.

Enhancements to SAF Field Ration

The SAF field ration has evolved over the years since its inception in 1975. Before 1995, the first generation of field rations comprised canned foods of limited variety, with hard tack biscuits being the only source of carbohydrates. In 1995, the introduction of the retort⁴ process enabled rice, pasta, noodles and potatoes to replace biscuits as the main sources of carbohydrates. The current 24-hour field ration provides a daily calorie value of at least 3350 kcal per pack and is designed to provide a wholesome meal to meet the dietary requirements of servicemen in the field (see Figure 5). To ensure robust feeding support for servicemen during field training, one-meal field ration – which provides a caloric value of 1000 kcal per meal – was implemented to cater for more flexibility in meal provision and reduce food wastage.

CONCLUSION

The SAF's dietary requirements were reviewed by DSTA in accordance with national and international guidelines to meet the nutritional needs of SAF servicemen. DSTA worked with the relevant stakeholders to introduce innovative solutions in the SAF diet to meet the evolving changes in training programmes, increased demands in energy requirements and changing tastes of the new generation servicemen.

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Figure 4. Examples of special menu for festive season (Reprinted with permission from SFI Manufacturing Pte Ltd)



Figure 5. 24-hour field ration (Sajeed, 2010)

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ENDNOTES

¹ Compendium of Physical Activities (2000) contains a list of physical activities based on specific activity types and intensity in metabolic equivalent, with their respective coding schemes. The CPA was published in the American College of Sports Medicine as well as Medicine and Science in Sports and Exercise.

² Figure from SAF and HPB based on male subject with an average weight of 63.5 kg and age between 18 and 30 years. Figure from WHO based on male subject with an average weight of 65 kg and age between 19 and 29.9 years. Figure from the ADF based on male subject with an average weight of 78 kg and age between 19 and 30 years. Figure from the US Army based on male subject with an average weight of 79 kg and age between 19 years and above.

³ HCS serves as an easy-to-understand indicator of the product's healthiness. Products carrying HCS are considered as "healthier options" e.g. lower in total fat, saturated fat, sodium and sugar; higher in dietary fibre and calcium compared to similar products within the same food category. The symbol is administered by the Health Promotion Board (a statutory board under the Ministry of Health, Singapore Government), and a part of the Nutrition Labelling Programme in Singapore.

⁴ The retorting process involves the application of high heat and pressure to produce sterilised, shelf-stable food products. The retorting process involves the application of high heat and pressure to produce sterilised, shelf-stable food products.

BIOGRAPHY



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