

# Warfighter's Guide to Performance Nutrition and Operational Rations

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## Warfighter's Guide to Performance Nutrition and Operational Rations



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### **Combat Feeding Directorate (CFD)**

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**The global leader and technology provider  
for military field feeding**

The mission of the Department of Defense Combat Feeding Research and Engineering Program is to provide an operationally relevant research and development base to deliver solutions for evolving field feeding challenges. CFD is responsible for the research, development, engineering, integration and technical support for the entire family of operational rations.

The program is driven by warfighter recommendations and feedback. This guide was created with input from the U.S. Army Research Institute of Environmental Medicine (USARIEM). USARIEM conducts nutritional research that provides a scientific basis for developing new rations, menus, policies and programs to enable the warfighter's health-readiness and optimal performance.

The purpose of this guide is to provide an overview of performance nutrition, as it relates to operational rations designed to support combat readiness and resiliency during deployments, field operations and mission-specific scenarios.

**This guide does not replace the need to consult with a physician and/or registered dietitian regarding diet and nutritional requirements for optimal individual performance.**

## Warfighter's Guide to Performance Nutrition and Operational Rations



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## Warfighter's Guide to Performance Nutrition and Operational Rations



## Performance Nutrition and Operational Rations

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### Providing the Warfighter the Fuel to Fight

Food is your body's fuel. Do you know how to get the maximum benefit from the foods you choose? Do you know the role of macronutrients (carbohydrates, protein and fat) and micronutrients (vitamins and minerals) in fueling your body? Do you know how to eat before and during a mission, and how to refuel afterwards, to maximize your performance?

By providing your body with the proper nutrition, you can improve your alertness, strength and endurance. Operational rations are designed using scientific evidence to ensure warfighter nutritional needs are met in all environments.

#### Action Plan

1. Check your knowledge of how foods and eating habits impact performance.
2. Analyze your existing operational ration food choices and mission requirements.
3. Create your performance nutrition plan.

## Warfighter's Guide to Performance Nutrition and Operational Rations



**Extreme environmental conditions can increase your energy needs.**

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## Energy Balance

### Performance Impact

- Operations in extreme environmental conditions (for example, cold, high altitude and heat), along with heavier equipment loads and terrain variances, can increase energy (kcal) needs.
- Not eating enough calories leads to weight loss, muscle wasting and decreased performance.

### Recommended Daily Intake\*

| Activity Level | Men (kcal/d) | Women (kcal/d) |
|----------------|--------------|----------------|
| Light          | 3000         | 2100           |
| Moderate       | 3400         | 2300           |
| Heavy          | 3700         | 2700           |
| Very Heavy     | 4700         | 3000           |

### Operational Ration Sources\*\*

| Operational Ration                             | Avg kcal/meal |
|--|---------------|
| Meal, Ready to Eat (MRE)                       | 1300          |
| First Strike Ration® (FSR) (contains 3 meals)  | 2900/Ration   |
| Meal, Cold Weather (MCW)                       | 1600          |
| Unitized Group Ration – A (UGR–A)              | 1300          |
| Unitized Group Ration – Express (UGR–E)        | 1350          |
| Unitized Group Ration – Heat & Serve (UGR–H&S) | 1350          |
| Unitized Group Ration – Marine (UGR–M)         | 1300          |
| Modular Operational Ration Enhancement† (MORE) | 1000/pack     |

\* Energy recommendations are estimates only and vary among individuals AR 40–25/OPNAVINST 10110.1/MCO 10110.49/AFI 44–141, 3 January 2017)

\*\* Operational Rations Handbook (Natick PAM 30-25)

† Augments rations to provide extra calories.

## Carbohydrates (CHO)

### Performance Impact

- During moderate to heavy exercise, CHO is the main fuel source for muscle.
- More strenuous activity levels increase CHO needs.
- Adequate amounts of CHO are needed for endurance, concentration, coordination, and recovery.

### Recommended Daily Intake\*

Approximately 3 grams (g)/pound of body weight (or 500 g of CHO/day for 165 pound warfighter).

### Operational Ration Examples

|                              |  |
|------------------------------|--|
| <b>10-19.9 g CHO</b>         | <b>Meat Entrée</b> (beef stew, chicken stew)<br>or <b>Jam/Jelly Packet</b>   |
| <b>20-30 g CHO</b>           | <b>Cracker</b><br>or <b>Side</b> (potato au gratin, oatmeal)<br>or <b>Pasta entrée</b> (chili macaroni, spaghetti w/ beef & sauce)<br>or <b>Beverage</b> (cappuccino, cocoa, electrolyte)  |
| <b>Greater than 30 g CHO</b> | <b>Fruit</b> (spiced apples, CHO enhanced applesauce, dried fruit)<br>or <b>Bread</b> (snack bread, tortilla, filled bakery item)<br>or <b>Pasta entrée</b> (elbow macaroni, cheese tortellini)<br>or <b>Snack</b> (cookie, pound cake, candy)<br>or <b>Beverage</b> (CHO fortified) |

\*AR 40-25/OPNAVINST 10110.1/MCO 10110.49/AFI 44-141, 3 January 2017

## Protein (PRO)

### Performance Impact

- Essential for proper refueling after physical activity to promote recovery.
- Secondary source of energy for the body.
- Adequate amounts needed to maintain muscle and recover from injuries.

### Recommended Daily Intake\*

Approximately 0.7 g/pound of body weight  
(or 115 g of PRO/day for 165 pound warfighter).

*When adequate calories are consumed, then protein recommendations are generally met through diet alone, without the need for supplementation.*

### Operational Ration Examples

|                             |   |
|-----------------------------|---|
| 5-9.9 g<br>PRO              | <b>Spread</b> (peanut butter)<br>or <b>Meat snack</b>   |
| 10-20 g<br>PRO              | <b>Vegetarian entrée</b> (cheese tortellini)<br>or <b>Snack</b> (trail mix)<br>or <b>Beverage</b> (chocolate protein drink) |
| Greater<br>than<br>20 g PRO | <b>Meat entrée</b><br>(chicken chunks, tuna packet, barbecue beef)  |

## Fat

### Performance Impact

- During prolonged physical activity stored fat is used as energy.
- Fat helps your body absorb certain vitamins (A, D, E and K).
- Fat is the most energy dense nutrient and is essential for proper fueling.

### Recommended Daily Intake\*

20-35% of calories (2500 calorie intake = 56-98 g of fat)

### Operational Ration Examples

|                                      |  |
|--------------------------------------|--|
| <b>1-4.9 g<br/>Fat</b>               | <b>Fruit</b> (spiced apples)<br>or <b>Entrée</b> (chicken chunks)<br>or <b>Cracker</b><br>or <b>Beverage</b> (cappuccino, cocoa) |
| <b>5-10 g<br/>Fat</b>                | <b>Entrée</b> (chicken noodle & vegetable, cheese tortellini)<br>or <b>Bread</b> (snack bread, tortilla, filled bakery item)     |
| <b>Greater<br/>than<br/>10 g Fat</b> | <b>Snack</b> (trail mix, cookie, pound cake)<br>or <b>Spread</b> (peanut butter, cheese)   |

\*AR 40-25/OPNAVINST 10110.1/MCO 10110.49/AFI 44-141, 3 January 2017

## Vitamins and Minerals

### Performance Impact

- Vitamins and minerals don't provide energy, but they are necessary for energy production, and other cellular functions.
- Micronutrients have been added to fortify certain ration items to prevent deficiencies and maximize performance.

### Recommended Daily Intake\*

- Vitamin A: 3000 IU/day (men); 2333 IU/day (women)
- Vitamin C: 90 mg/day (men); 75 mg/day (women)
- Calcium: 1000 mg/day (men and women)
- Iron: 8 mg/day (men); 18 mg/day (women)

See AR40-25 for complete list of military dietary reference intakes.

### Operational Ration Examples

Many ration components are good sources of micronutrients. Eat a variety of components to obtain a balance of nutrients. If you are unable to eat your entire ration, then choose the entrée and fortified ration components first.

| FORTIFIED COMPONENT     | VITAMINS |    |    |    |    |     |   |   |   |            | MINERALS |         |      |
|-------------------------|----------|----|----|----|----|-----|---|---|---|------------|----------|---------|------|
|                         | A        | B1 | B2 | B3 | B6 | B12 | C | D | E | Folic Acid | K        | Calcium | Zinc |
| Chocolate Protein Drink |          |    |    |    |    |     | x | x |   |            |          |         |      |
| Beverages/Pouched Fruit |          |    |    |    |    |     | x |   |   |            |          |         |      |
| Beverages, Sugar Free   |          |    |    |    |    |     | x |   |   |            |          | x       |      |
| Cheese Spread           | x        |    |    |    |    |     |   | x |   |            |          | x       |      |
| Peanut Butter           | x        | x  |    |    | x  |     | x |   |   |            |          |         |      |
| Crackers/Snack Bread    |          |    |    |    |    |     |   |   |   |            |          | x       |      |
| Pudding                 |          |    |    |    |    |     |   | x |   |            |          | x       |      |
| First Strike Bars       |          | x  | x  | x  | x  | x   | x | x | x | x          | x        |         | x    |

\*AR 40-25/OPNAVINST 10110.1/MCO 10110.49/AFI 44-141, 3 January 2017



## Hydration

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### Performance Impact

- Fluid requirements may double with physical activity and/or hot weather due to added sweat loss.
- Dehydration in excess of 2-3% of body mass increases risk of injury, interferes with mental functions, and decreases performance.
- Too few electrolytes may lead to muscle cramping and reduce your body's ability to function.

### Recommended Daily Intake\*

- Cooler Environments
  - 3.2-8.5 quarts (qt) (3-8 liters (L)) of fluid/day (see figure on next page)
  - 2-4 g of sodium/day
- Hot Environments
  - 4.2-12 qt (4-11.4 L) of fluid/day (see figure on next page)
  - 4-9 g sodium/day

### Operational Ration Examples

Beverages (Carbohydrate-electrolyte beverage)

**NOTE:**

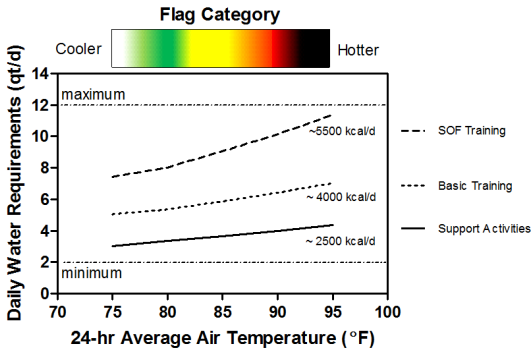
*Carbohydrate-containing beverages are also a source of calories (e.g. 5.3 qt [5 L]/day of sports drink can add up to 1600 extra calories).*

*Sodium needs can generally be met by consuming rations, particularly entrees and salty snacks (jerky, pretzels, corn nuts).*

\* TC 4-02.3 and TB MED 507 (fluid recommendations) and AR 40-25/OPNAVINST 10110.1/MCO 10110.49/AFI 44-141, 3 January 2017 (sodium recommendations)

## Hydration

The graph below depicts water requirements over a range of average daily air temperatures and corresponding heat stress flag categories.



**EXAMPLE:** On a day when the average air temperature is 75° F (24° C) and your activity level requires 4000 kcal, then your daily water requirement is approximately 5 quarts (4.7 L)/day.

### NOTE:

- Hourly fluid intake should not exceed 1.5 qt (1.4 L).
- Fluid needs can vary based on individual differences in sweat rate and sun exposure.

## Nutrient Timing and Recovery

### PERFORMANCE IMPACT

- Eating regularly, to include before field operations, maximizes physical and mental performance.
- Improper fueling negatively impacts mission outcomes.
- Caffeine can temporarily improve performance. It is not a substitute for sleep.

### RECOMMENDATION

- Consume ration items at regular intervals, every 4-6 hours of wakefulness.
- Consume protein over the course of the day (approx. 0.7 g/lb of body weight or 115 g for 165 lb warfighter).
- Consume caffeine up to 200 mg, and re-dose every 3-4 hours, only as needed. Do not exceed 800 mg caffeine per day.

### BEFORE FIELD OPERATIONS

(approximately 1-4 hours)

- Eat a snack/small meal to maximize energy stores and focus on CHO (approx. 0.5-1.8 g/lb of body weight).
- Pre-mission intake needs will differ between individuals and during high intensity activity (ex: field assaults) high protein/fat/fiber intake may lead to digestive upset.
- If needed, 30-60 minutes before activity, use caffeine (up to 200 mg) to boost your mental and physical performance.

### OPERATIONAL RATION EXAMPLES WITH GREATER THAN 30 g CHO

- **Fruit** (spiced apples, CHO enhanced applesauce,)
- **Bread** (snack bread, tortilla, filled bakery item)
- **Pasta entrées** (elbow macaroni, cheese tortellini)
- **Snacks** (cookie, candy)
- **Beverage** (CHO fortified)

## Nutrient Timing and Recovery

### DURING FIELD OPERATIONS

- Snack when you can to meet energy needs (every hour if possible).
- Focus on your CHO intake with a goal of 30-60 g CHO/hour during high activity level operations.
- Drink enough fluid to prevent excessive dehydration (0.5 - 1.0 qt [0.5 - 1.0 L]/hour).

### OPERATIONAL RATION EXAMPLES WITH GREATER THAN 30 G CHO

- Fruit (spiced apples, CHO enhanced applesauce, dried fruit)
- Snacks (filled bakery item, candy)
- Beverage (CHO fortified)

### AFTER FIELD OPERATIONS

(within 30-60 minutes)

- To kick start recovery and refueling, consume 80-120 g CHO and 15-25 g PRO after heavy physical activity.
- Drink to relieve thirst and promote urination.

### OPERATIONAL RATION EXAMPLES

- Recovery trail mix and pudding:  
CHO 90 g + PRO 17 g
- Chocolate PRO drink, peanut butter, and crackers:  
CHO 90 g + PRO 25 g
- Meatballs in marinara sauce, Italian bread sticks, and beverage (CHO fortified):  
23 g PRO + 85 g CHO

## **Warfighter's Guide to Performance Nutrition and Operational Rations**

**Choose foods to  
meet your performance  
nutrition needs.**

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## Food Labels

The nutrition facts label provides the operationally relevant nutrition information a warfighter may need. For more information on energy and nutrient levels of operational rations, search the Combat Rations Database (ComRaD) by visiting <https://www.hprc-online.org/page/Combat-Rations-Database-ComRaD>.

- Are you consuming enough energy (kcal) to meet your performance needs?
- Are you consuming enough CHO to meet your performance and recovery needs?
- Are you consuming enough protein to promote recovery and maintain muscle mass?
- Are you consuming enough vitamins and minerals to maximize performance?
- Is your energy requirement greater than 2000 calories/day?

| <b>Nutrition Facts</b>         |                     |                      |            |
|--------------------------------|---------------------|----------------------|------------|
| Serving Size 1 Pouch (227g)    |                     |                      |            |
| Servings Per Container About 1 |                     |                      |            |
| Amount Per Serving             |                     |                      |            |
|                                | <b>Calories</b> 260 | Calories from Fat 90 |            |
|                                |                     | % Daily Value*       |            |
| <b>Total Fat</b>               | 9g                  |                      | <b>15%</b> |
| Saturated Fat                  | 4g                  |                      | <b>20%</b> |
| Trans Fat                      | 0g                  |                      |            |
| <b>Cholesterol</b>             | 30mg                |                      | <b>10%</b> |
| <b>Sodium</b>                  | 300mg               |                      | <b>13%</b> |
| <b>Total Carbohydrate</b>      | 30g                 |                      | <b>10%</b> |
| Dietary Fiber                  | 5g                  |                      | <b>19%</b> |
| Sugars                         | 7g                  |                      |            |
| <b>Protein</b>                 | 16g                 |                      | <b>%</b>   |
| <b>Vitamin A</b>               | 10%                 | <b>Vitamin C</b>     | 15%        |
| <b>Calcium</b>                 | 10%                 | <b>Iron</b>          | 20%        |

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

**Understand your  
nutritional needs, and  
plan ahead to optimize  
performance.**

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## Plan Ahead

The following table may help you plan your energy and fluid intake before, during and after missions, based on body weight.

| Body Weight (lbs) | TIMING                               |  |  |
|-------------------|--------------------------------------|--|--|
|                   | Pre-Mission                          | During**   | Post-Mission   |
| <145-165          | 80-300 g CHO<br><br>drink to thirst  | 30-60 g CHO/hr<br><br>0.5-1.0 qt<br>(0.5-1.0 L)/hr | 80-120 g CHO,<br>15-25 g PRO<br><br>drink to relieve<br>thirst and<br>promote urine<br>production* |
| 165-185           | 90-350 g CHO<br><br>drink to thirst  | 30-60 g CHO/hr<br><br>0.5-1.0 qt<br>(0.5-1.0 L)/hr | 80-120 g CHO,<br>15-25 g PRO<br><br>drink to relieve<br>thirst and<br>promote urine<br>production* |
| >185              | 100-400 g CHO<br><br>drink to thirst | 30-60 g CHO/hr<br><br>0.5-1.0 qt<br>(0.5-1.0 L)/hr | 80-120 g CHO,<br>15-25 g PRO<br><br>drink to relieve<br>thirst and<br>promote urine<br>production* |

- Know your own body tolerances; practice during training and before actual missions.
- If needed, 30-60 minutes before activity, use caffeine (up to 200 mg).
- Know your calorie needs, and eat at regular intervals.
- During multiple hours of heavy to very heavy physical activity, snack regularly with goal to consume 60-90 g CHO/hour.

\* fluid needs vary by individual, do not exceed 1.5 qt (1.4 L)/hr (1500 ml/hr)

\*\* cold weather or high altitude increases needs to 50-75 g CHO/hour **15**

### Plan Ahead: Vignette 1

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You are part of an Infantry Platoon deployed in support of combat operations in a hot climate. Your mission is to conduct dismounted zone reconnaissance patrols throughout the Area of Responsibility. At 0730 you are dropped off by helicopter 5 kilometers away from the objective. At 1530 you are scheduled to be picked up by vehicles upon completion of the mission. The patrol requires travel over varied terrain and significant elevation changes. As the platoon moves towards the extraction point, you receive contact and are stuck on the objective for an additional 5 hours.



## Plan Ahead: Vignette 1

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### IF YOU ARE A 185 LB MAN OR A 150 LB WOMAN:

#### What are your energy needs?

Heavy activity level = approximately 3700 kcal (man) or 2700 kcal (woman).

*Caloric needs can vary based on individual differences in height, weight, age, and gender.*

#### Which ration(s) meet your needs?

FSR + MORE

#### When will you use the ration items?

**Before:** (100-400 grams CHO)

- Toaster Pastry + Dried Fruit + Ergo Beverage Base (125 g CHO)
- Consume additional items, including fluids, as needed to meet individual pre-mission needs.

**During:** (30-60 g CHO/hour)

- Snacks (First Strike Bar, Toaster Pastry, Energy Gel, Corn Kernels), Pocket Sandwiches, and/or Beverages - CHO Beverage Base
- Fluids - 0.5-1.0 qt (0.5-1.0 L)/hr

**After:** (80-120 g CHO, 15-25 g PRO)

- Italian Style Sandwich + Beef Snacks + First Strike Bar (Mini) + CHO Electrolyte Beverage (93g CHO + 22 g PRO)
- Tortilla + Peanut Butter + Applesauce + Beef Snacks (90g CHO + 23 g PRO)
- Fluids - drink to relieve thirst and promote urination.

*The Operational Ration components listed above are only examples — other options may also meet requirements (check the food labels and ComRaD Database)*



### Plan Ahead: Vignette 2

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You are part of an Infantry Platoon conducting a training mission in a moderate climate. Your mission is to emplace surveillance devices on the objective area. Reaching the designated objective area involves a 7 kilometer dismounted movement from the Company area. Your unit will leave the line of departure at 0730. Your uniform includes your individual Weapon, Load Bearing Vest, Advanced Combat Helmet, Camel Back with water and pack. Time on target will require a sustained moderate activity level for patrolling, infiltration of the objective and device installment. Movement back to the Company area is scheduled to start around 1300 and follow the same 7 kilometer route.



## Plan Ahead: Vignette 2

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### IF YOU ARE A 185 LB MAN OR A 150 LB WOMAN:

#### What are your energy needs?

Heavy activity level = approximately 3400 - 3700 kcal (man) or 2300 - 2700 kcal (woman).

*Caloric needs can vary based on individual differences in height, weight, age, and gender.*

#### Which ration(s) meet your needs?

3 MREs (a MRE may be substituted by a UGR meal if provided)

#### When will you use the ration items?

**Before:** (100-400 grams CHO)

- [MRE] Hash Browns with Bacon + Granola with Milk and Blueberries + Snack Bread + CHO Beverage Base (134 g) or [UGR H & S, Breakfast] Oatmeal + Milk + Harvest Cake + Grape Juice (125 g)
- Consume additional items, including fluids, as needed to meet individual pre-mission needs.

**During:** (30-60 g CHO/hour)

- [MRE] Snacks – First Strike Bar, Toaster Pastry, Crackers, Pound Cake
- Beverages – CHO Beverage Base
- Fluids - 0.5-1.0 qt (0.5-1.0 L)/hr

**After** (within 30-60 minutes): (80-120 g CHO, 15-25 g PRO)

- [MRE] Chili Mac Entrée + Cheese Spread + Candy III (fruit flavored discs) (80 g CHO + 22 g PRO)
- Fluids - drink to relieve thirst and promote urination.

**After** (several hours):

- [MRE or UGR H&S, Dinner] Consume items to balance daily intake and meet individual post-mission needs.
- Fluids - drink to relieve thirst and promote urination.

*The Operational Ration components listed above are only examples — other options may also meet requirements (check the food labels and ComRaD Database).*

## RESOURCES

- Combat Rations Database (ComRaD) ration nutritional information:  
<https://www.hprc-online.org/page/Combat-Rations-Database-ComRaD>
- Nutrition and Menu Standards for Human Performance Optimization:  
*AR 40-25 / OPNAVINST 10110.1 / MCO 10110.49 / AFI 44-141*
- Human Performance Resource Center Warfighter Nutrition Guide:  
<https://www.hprc-online.org/page/Nutrition/Warfighter-Nutrition-Guide>
- Heat Stress Control and Heat Casualty Management:  
*TB MED 507 / AFPAM 48-152*
- Fluid and electrolyte replacement guidance:  
[https://www.dir.ca.gov/oshsb/documents/Heat\\_illness\\_prevention\\_tbmed507.pdf](https://www.dir.ca.gov/oshsb/documents/Heat_illness_prevention_tbmed507.pdf)
- Operational Rations Handbook (Natick PAM 30-25) Ration information and menus:  
[http://nsrdec.army.mil/img/pdfs/OP\\_Rations08-22-16.pdf](http://nsrdec.army.mil/img/pdfs/OP_Rations08-22-16.pdf)
- Academy of Nutrition and Dietetics (AND), Dietitians of Canada (DC), and American College of Sports Medicine (ACSM) performance nutrition guidelines:  
[http://journals.lww.com/acsm-msse/Fulltext/2016/03000/Nutrition\\_and\\_Athletic\\_Performance.25.aspx](http://journals.lww.com/acsm-msse/Fulltext/2016/03000/Nutrition_and_Athletic_Performance.25.aspx)



