For information:
COMD FORCOMD
COMD 1 DIV
SOCAUST

ADF COMBAT RATION PACK USER REQUIREMENT

Reference:
A. R21156925 Army Modernisation Plan of 28 Jul 15

1. I refer the enclosed draft user requirement for ADF combat ration packs (CRP UR) for your endorsement. It seeks to inform sustainment modernisation of CRP driven by our capability needs.

2. The Human Performance Army Modernisation Line of Effort (HP AMLE) at reference A details the need for mission adaptable nutrition and ergogenic aids to optimise the physical and cognitive performance of combatants and to improve their nutritional behaviour. This CRP UR sets out the functional performance requirements and pack configurations to achieve this AMLE milestone and ultimately sustain the performance of combatants undertaking current and likely future operations. The UR has been developed in collaboration with DLOG-A staff through two working group meetings considering the advice of functional commands, the other services and DSTG research findings.

3. The CRP UR seeks a range of modular, lightweight, energy dense and nutrient enriched components to sustain individual combatants and is a better fit with four-man combat platforms/capability bricks. The implementation of the UR will provide a mission adaptive modular ration system, introduction of functional food bars, cater for a range of climates and the dietary diversity of ADF personnel. The UR also aligns with NATO CRP interoperability requirements.

4. Your endorsement of the CRP UR will guide DSTG research initiatives and CASG procurement actions to trial the modular ration configurations during 2016. My HP AMLE lead, [22], will continue to support your staff with its implementation.

Enclosure:
1. R2222018658 ADF Combat Ration Pack User Requirement
ADF COMBAT RATION PACKS USER REQUIREMENT

References:
A. Army Modernisation Plan 2015 Annex D Human Performance of 28 Jul 15
B. NATO STANAG 2937 Ed. 4 (2013) AMedP-1.11 Requirements Of Individual Operational Rations For Military Use of Oct 13
F. DEFAUST 1000C PART 12 Automatic Identification Technology Labelling and Marking
G. Army Logistic Instruction MM1-65 Combat Rations of 16 Jun 15
H. SUPMAN 4 of 14 Nov 14
I. DEFLLOGMAN Vol 4 Compendium 2 ADF Commanders Reference Guide to Nutrition

Introduction

1. Soldiers think and fight better if properly fed. The ADF uses combat ration packs (CRP) to sustain the joint land force during field exercises and operations where suitable field catering is unavailable or not practicable. Continued research in nutrition and food sciences and development of optimised rations provides the ADF with combat rations that deliver the best nutrition for sustained cognitive and physical performance over the full spectrum of operations.

2. To optimise physical and cognitive performance of personnel operating in a wide variety of environments and climates, the ADF needs CRP to provide adequate levels of total energy, macronutrients (protein, fat, and carbohydrate), micronutrients (vitamins, minerals, trace elements) and fibre. CRPs need to supply pre-packaged meals which meet food safety standards, are sealed in robust packaging with a long shelf life, can be readily stored and transported, individually carried, and require minimal preparation in the field.

3. As the ADF’s land capability manager responsible for the ongoing development and provision of CRP, Army has based this user requirement upon the guidance in references A-E to articulate the functional attributes required of an improved combat ration system. The intent is to direct acquisition, provide a framework for ongoing research and analysis, optimise human performance and enhance combat effectiveness across the joint force.
Operational setting

4. The ADF is required to sustain personnel across the full spectrum of operations in environments and situations where fresh rations are unavailable due to operational risk, training, remoteness, failure of local infrastructure or disaster response. The operations will range from low to high tempo and short to long duration. Field training exercises replicate and prepare forces for these operations. Forces engaged in these missions will likely subsist partially or entirely on CRP for periods ranging from days to months while on the move or static in austere patrol and forward operating bases in the field or a degraded and potentially contaminated environment. Therefore, the nutrient content of such rations needs to be sufficient to maintain the health, combat readiness and performance, both physical and cognitive, of those combatants.

5. Energy requirements vary depending on the nature and place of operations, activity levels, type of terrain (littoral, tropical, temperate, continental, desert at altitudes from sea level to 4000m) and weather conditions (temperatures -10°C to 50°C). Typical daily energy expenditure of combatants is up to 16 MJ. High activity levels and cold climates may increase daily energy requirements to 18–20 MJ. In situations where there are protracted periods of feeding combatants mainly or solely with packaged rations, personnel are at risk of reduced food and nutrient intake resulting in weight loss (muscle and fat), compromised immunity and degraded cognitive and physical performance. These risks can be minimised by the use of specified maximum feeding durations and mission-adaptive CRP configurations.

6. CRP should be as light and as small as possible. Whether mounted or dismounted, joint land force elements need to actively manage load carriage to match the capacity of the combatant or platform to the anticipated demands of the mission. Combat personnel also engage in patrolling activities and short-duration operational tasks on a regular basis. In such settings, total weight carried becomes a critical consideration and some mission equipment may be given priority over rations. For example, the combat load of a combatant varies with the task being undertaken, but may be up to 47E, depending on the combatant’s role, force protection requirements and mission equipment. Carriage of food is often compromised by the need for a combatant to reduce the total combat load.

7. This user requirement is predicated on the supply to combatants of suitable potable water, in sufficient quantity, for hydration and preparation of CRP meals. Water is generally supplied and does not form part of this requirement. Total weight of the CRP should consider any required carriage of additional water. A land combatant carries as part of their personal load 47E quantity of water commensurate with the requirements of the mission. Typically an individual dismounted combatant carries 7 a daily ration 47E for personal consumption. Mounted combatants carry similar daily consumption quantities of water on the vehicle.

8. Special purpose rations. In addition to the CRP requirement above, there is a requirement for the preparation and survivability assurance of special purpose rations.

47E

* When in marching order.
These rations require higher levels of testing to ensure stability in extremes of pressure, temperature and contamination risks. The additional requirements of special purpose rations will be set out in a case specific user requirement.

9. **Service Cadets.** Service Cadet training ration requirements are not covered by this CRP user requirement.

**Ration configurations**

10. The required CRP configurations are detailed at annex A. The configurations address the nature of contemporary operations and training and articulate the functional requirements, which facilitate continuous improvement. This CRP user requirement incorporates individual use items as part of a modular and adaptive approach to combat rationing. These items had been delivered to combatants on operations and exercises in ‘care’ packs separate to CRPs.

11. Interoperability with allies, particularly ABCA and NATO, is a key concern of capability development, especially for common items such as CRP. The requirements for CRP below will meet or exceed those of NATO set out in reference B.

**Continuous improvement**

12. The ADF must keep pace with advances in nutrition and food technology science to optimise the cognitive and physical performance of its combatants. The system of selection, composition and acquisition must be adaptive so that CRPs are continuously improved each production cycle. Changes to menus should be incorporated into the production cycle so as to cater for a variety of tastes, food preferences of combatants and to apply developments in food and nutrition sciences.

**Performance Criteria**

13. Performance criteria for the combat ration system are as follows.

a. **Mission adaptable.** The CRP must comprise modular components that are energy and nutrient dense and suitably packaged and apportioned so as to permit ration components to be tailored to the tactical and environmental requirements of a planned mission. The combatant should be able to match the energy and nutrient value of the ration with the anticipated individual demands of the mission. This matching will be informed by education and training on enhanced nutritional knowledge and behaviours to mitigate mission stresses on physical and cognitive performance.

b. **Health and hygiene.** The CRP is critical to the maintenance of an individual’s health and general morale while serving in hostile and austere operational and exercise environments. Packaging should minimise the need for hand to food contact and minimise the need to clean re-useable ancillaries. The pack should

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3 Conditions such as very cold weather, high altitude freefall, submergibility, radiological and biological contamination.

4 Cold weather ration requirements differ significantly from tropical ration requirements.
include items to support the maintenance of personal hygiene including hand sanitising. Continued feeding with CRP should not impose significant burden upon or compromise physical, psychological or dental health. A general purpose individual ration should contain only items or components that do not harm the health and wellness of a normal, healthy individual when the ration is consumed for continuous periods in accordance with the guidance set out at annex C.

c. **Shelf life.** CRP may be stored and transported in varied and demanding environments and hence require high levels of shelf stability in all food and beverage components. CRP should be shelf stable in the sense of being safe and fit for human consumption while preserving, as much as possible, the nutritional value of the food and its organoleptic properties (taste, texture, appearance and smell). The cumulative effects of time and temperature on CRP shelf life performance must be assured and improved. The minimum shelf life duration requirements are set out at annex D.

d. **Convenience.** Food components should be able to be prepared for consumption with a minimum of equipment, time and physical effort. Ready-to-eat components, such as those that are energy dense, should be able to be carried in easily accessible load carriage pouches and be eaten quickly to provide the energy needed during and in-between operational tasks such as those involving physical activity and/or mental concentration. CRP meal and beverage components must be capable of being consumed hot or cold, without a substantial reduction in palatability. Devices for heating (either separate, self-heating or integrated into packaging) that warm food and beverages without generating flame or odour should be supplied. CRPs are to be used upon opening of the sealed primary container and not require refrigeration.

e. **Nutrition.** Standard combat rations should meet the nutritional requirements of the combatant without supplementary fresh components, particularly within the recommended feeding periods advice at annex C. Combat rations tailored to meet special tactical and environmental requirements should aim to meet the nutritional requirements as fully as possible subject to the mission constraints. The addition of ergogenic aids, nucleotides, amino acids, fatty acids, phytonutrients, nutraceuticals and pre- and probiotics should be considered in Defence-specific component formulation to assist in meeting performance and nutrient targets.

f. **Packaging.** Packaging of combat rations should protect the integrity of food items and conform with its tactical use, storage and transport. Three levels of ration packaging should comprise primary packaging in contact with the food, the secondary CRP bag and tertiary outer container. Specific packaging requirements are set out at annex E.

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5 Cleansing of the hands, face and body as well (armpits, groin, feet). Also cleansing of the teeth to ensure dental hygiene.

6 Extremes of temperature and humidity, particularly shelf life integrity in storage in the...
g. **Menu diversity.** There should be a sufficient range of menu modules and diversity of food and beverage components in a production cycle available so personnel have adequate variety to ensure that ‘menu fatigue’ is minimised. CRP should be designed to take account of the broad religious, ethnic, and cultural diversity of the ADF and alliance partners in aspects of food choices and their preparation and consumption. The variety of menus issued in the CRP should contain at least two menu modules that are vegetarian, halal and kosher to meet ADF’s commitment7 to providing an inclusive working environment.

h. **Ancillaries.** It is desirable that all necessary equipment to heat and consume an individual ration be included in, or supplied with, the ration pack. It is preferable that the packaging be easily opened without specific tools. If specific tools are required, they should be provided. Re-usable ancillary elements must be capable of being cleaned and maintained by the user.

i. **Labelling.** CPR labelling must set out the title, warnings, composition, nutritional content and relevant preparation instructions of each ration module component. Specific attributes of labelling are set out at annex E.

**System Interfaces**

14. The CRP system must fit within extant land system components as follows.

a. The CRP food components should interface with field catering equipment and not interfere or interact with the use and storage of other combatant systems including weapon systems, ammunition, communications equipment and other equipment as follows:

(1) Equipment carried by the combatant including a cup and water bladder.

(2) Any field cooking equipment and ancillary items supplied to a combatant, including individual heating systems separately supplied.

(3) Field catering equipment, including cooker and cooking pot set supplied for crew and group catering.

b. Carriage of the CRP requires sizing of the boxed and individuals pack to fit within extant carriage systems as follows.

(1) Individual carriage will be compatible with the Land 125 Phase 3 Soldier Combat Ensemble equipment and require a capability to withstand bursting due to rough handling.

(2) Individual rations should be boxed for issue and transport in quantities of twelve modules, with a total weight being not more than 25kg8.

(3) Boxed rations should be suitable for palletting systems and all transport modalities, including commercial civilian aircraft.

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7 Defence Diversity and Inclusion Strategy 2012-2017  
8 25kg is the all corps physical employment standard for a box lift.
(4) Crew rations should be easily stored in vehicles.

(5) No ration packs are to contain materials or substances classified as dangerous cargo under the IATA\(^9\) criteria.

15. Palleted stocks of CRP should be stackable with planned materiel handling equipment (i.e. Manitou) and trackable with automated inventory tracking (AIT) systems (as detailed in reference F). Palleted stocks are to conform with the requirements detailed at annex E.

16. The availability of CRP should be responsive to both forecast operational and training usage and contingency. Stocks of CRP are to be managed with extant unit-level supply inventory management systems. The supply system must monitor usage and respond to re-stocking equipments promptly.

17. NATO Stock Numbers (NSNs) are required for a set that comprises the boxed CRPs and all the necessary individual equipment to properly consume the ration by menu/ration type such as utensils and heating. These unique set of NSNs are used when rations are ordered and issued in multinational settings.

**Materiel System function and performance**

18. The function and performance attributes of the CRP comprising the design, development, supply and replenishment of stock levels are ranked from essential to desirable in table 1 to annex B.

**Training and Doctrine**

19. ADF CRP policy documents (references F-H) are to be revised to address periods of usage, supplementation and nutritional guidance when using CRP. These policies should identify the balance between operational requirements and nutrition and the method of supplementation for any operationally required periods of suboptimal nutrition following CRP feeding periods beyond the recommended usage.

20. Ab-initio and combatant level training on the CRP should be aligned with social and educative initiatives promoting improved nutritional behaviours, health and personal hygiene. This education will add interpretation of the labelling and nutritional advice of the ration.

21. The Integrated Logistic Supply Instruction (ILSI) for Combat Rations should provide the doctrine for the management and support – technical, maintenance, supply and test - attendant to the production, purchase, sustainment, and disposal of the CRP. The ILSI shall describe the support to be provided by the following ADF bodies.

a. Health Systems Program Office (HLTHSPO) – for technical support and design acceptance. The Design Acceptance Authority Representative (DAAR) for and ancillaries is the HLTHSPO DAAR.

\(^9\) IATA. **IATA Dangerous Goods Regulations** are derived from the ICAO Technical Instructions. Industry practice is to follow the IATA Dangerous Goods Regulations which are issued more frequently than the Technical Instructions.
b. Defence Science and Technology Group (DSTG) - support in accordance with Army research and development requests (ARDRs) in the areas of quality assurance, DEF(AUST) specifications, testing and evaluation, Defence-specific food production, product evaluation, research and development.

c. Land Engineering Agency (LEA) - on packaging advice, speciality engineering and interoperability with land systems.


e. Army, Directorate of Logistics-Amy (DLOG-A) – the capability manager chair of the CRP Configuration Control Board (CCB) on alignment with this user requirement and operational considerations.

Facilities and Infrastructure

22. The Joint Logistics Command (JLC) Joint Logistics Unit (East) (JLU (E)) is to be used to warehouse contingency stocks of CRP.

23. Contingency stock is not to be stored for a period greater than 12 months and is to be progressively rotated over this period utilising the first-in-first-out principle.

24. The volume quantity of CRP is to be determined by Army.
CRP capability stakeholders

25. Army, as the CRP capability manager, leads and monitors the ADF requirements through a CCB. The need for the capability and its alignment with force modernisation is advised by Strategic Plans - Army Branch. The CCB will comprise representation from each service, other services, Capability Acquisition and Sustainment Group’s (CASG) HLTHSPO, JHC, JLC and DSTG with responsibilities as follows.

a. Army functional commands – FORCOMD, 1 DIV, SOCOMD – are users of the CRP system and are responsible to advise the capability manager on user requirements.

b. Navy, Air Force and JOC are to advise the capability manager of the suitability and requirements of the CRP system for service specific activities and operations.

c. VCDF’s JHC and JLC, CASG and DSTO are to advise the capability manager on the development and delivery of the CRP capability system.

Deputy Chief of Army

Tel: (02) 6265 4258

30 Sep 15

Annexes:
A. Combat Ration Pack Configurations
B. CRP Materiel System Function and Performance
C. Periods of Feeding with CRP
D. Combat Rations Shelf Life
E. Packaging, Labelling and Palletising of CRP
ANNEX A

COMBAT RATION PACK CONFIGURATIONS

1. The CRP configurations that address the nature of contemporary operations and training, and facilitate continuous improvement to meet the functional performance requirements of the joint land force are described below.

a. **Individual rations.** Individual rations must comprise lightweight, energy and nutritionally dense modules. These are to support a daily energy requirement of 14-18 MJ. A modular individual ration system is to be as follows.

(1) **Mission Adaptive One Man Combat Ration (MACR1M).** The MACR1M system provides a lightweight and compact selection of ration modules for use by an individual combatant over a 24-hour period. A daily requirement comprises staple, main meals and hygiene modules. The MACR1M system, described at appendix A-1, should cater for the diversity of ADF personnel as follows:

1. two ‘staples’ modules for the common items (biscuits, food bars, beverages, condiments, utensils if required) appropriate to the environment

2. a minimum of twelve main meal selections being hydrated and lightweight (dehydrated) of which three are compatible with vegetarian, four compatible with halal and four kosher meals

3. two field hygiene modules comprising consumables for male and female combatants respectively.

(2) **Combat Food Bar (CFB).** A compact, eat from the hand, lightweight ration bar consumed on the move during the first 72 hours of intense activity to sustain physical and cognitive performance. The CFB complements the other individual rations and permits feeding while on task.

(3) **Combat Ration Meal (CRM).** A complete single ration meal may be utilised to supplement or replace MACR1M for shorter type missions where weight or load restrictions may apply.

b. **Crew Ration.** Rations are required for mounted combatants, personnel in static environments, or when the tactical situation allows combatants to gather for meals. This requirement is met by the MACR1M system. The boxing of MACR1M modules is to provide a ‘four-pack’ of modules to fit the crewing of platforms and combat capability ‘bricks’.

c. **Emergency Rations:** Standardised individual contingency rations are to keep an individual alive in emergency situations with the best possible emergency ration pack while they are waiting to be rescued or the emergency is
remediated. These must fit in a personnel ensemble or kit as part of force protection equipment.

(1) The combat emergency ration (CER) is to include 100g of an energy dense, palatable bar, be fortified with water-soluble vitamins (currently providing approximately 2.4 MJ).

(2) An emergency survival flying ration (EFR) is to provide a survival level of energy for survivors (currently about 6 MJ including beverage components). It is to be packaged within a light, food-safe stainless steel container and fit the Land 125 Ph3 aviator ensemble. For aviation, the EFR is to be placed in an aircraft or a lifeboat (with aircraft emergency equipment) for survivors of air crashes, ditchings or forced landings. The EFR is also to be issued to Mounted Crewmen\(^{10}\) as part of vehicle survival equipment should the crew be separated from their vehicle in close contact with an adversary and return to a friendly position.

2. The rations must have nutritional and ergogenic characteristics that are safe, have been scientifically shown to maintain health and optimise performance. Ration pack nutritional requirements are as follows.

a. **MACR1M**. The daily MACR1M is to have quantities of the macronutrients that contribute to total energy according to the following percentage ranges— protein 13–18%, fat 23–33% and carbohydrate 54–59%. If feeding continues beyond 16 consecutive days, supplementation may be required, as described in Table 1 below.

b. **CFB**. The CFB is to be energy and nutritionally dense ready-to-eat foods, such as a meal bar not exceeding 100g offering 1-2MJ a functional food bar nutrition delivery system.

c. **CRM**. A combat meal ration that is lightweight, energy and nutrition dense ready-to-eat from the hand issued a high intensity activity (such as a Raid). This single meal could replace a meal or supplement other ration packs when a mission has very high energy demands.

**Appendix:**

1. Mission Adaptive One Man Combat Ration Modules

\(^{10}\) Mounted Crewman of a Main Battle Tank (MBT) and Australian Light Armoured Vehicle (ASLV) - and later, the Combat Reconnaissance Vehicle (CRV), Infantry Fighting Vehicle (IFV) and Manoeuvre Support Vehicle (MSV) delivered by Land 400
MISSION ADAPTIVE ONE MAN COMBAT RATION MODULES

1. MACR1M modules components are to provide for a total daily energy yield of 14-18 MJ and daily nutritional requirements. The daily individual allocation of MACR1M modules will comprise one staple, one meal and one hygiene. Ancillaries modules for items such as insect repellent should be available on demand.

2. The modules of the MACR1M modules are set out in the table below based on the ration components currently fielded. Note that the hygiene module includes elements that had been delivered in monthly ‘care’ packs.

<table>
<thead>
<tr>
<th>Serial</th>
<th>Ration module</th>
<th>Contents (based on currently fielded components)</th>
<th>Types</th>
<th>Number of options</th>
<th>Daily individual allowance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Staples</td>
<td>Beverages (coffee/tea/sports/energy/gels), utensils, biscuits, chocolate, drink powder, condiments</td>
<td>Hot weather/temperate weather</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Meals</td>
<td>Retort pouch meals x 2, As Standard hydrated or Lightweight (dehydrated) packs</td>
<td>Standard Halal compliant Kosher compliant Vegetarian Per table 2 below</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Hygiene</td>
<td>Sanitiser, soap, scourer, hand towellette, toilet paper, feminine hygiene,</td>
<td>Male / female</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Ancillaries</td>
<td>water purification, foot powder, insect repellent</td>
<td>Water purification Foot powder Insect repellent</td>
<td>3</td>
<td>On demand</td>
</tr>
</tbody>
</table>

3. The types of the modules comprising the twelve MACR1M main meal modules is set out in table 2.

<table>
<thead>
<tr>
<th>Serial</th>
<th>Menu</th>
<th>Meal</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Standard 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Standard 2</td>
<td>Lightweight</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Standard 3</td>
<td>Lightweight</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>Standard 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>Halal 1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>F</td>
<td>Halal 2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>G</td>
<td>Halal 3</td>
<td>Lightweight</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>Halal 4</td>
<td>Vegetarian compatible</td>
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<tr>
<td></td>
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<td>---</td>
<td>---</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I</td>
<td>Kosher 1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>J</td>
<td>Kosher 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lightweight</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>K</td>
<td>Vegetarian 1</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>L</td>
<td>Vegetarian 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lightweight</td>
<td></td>
</tr>
</tbody>
</table>

4. Each of the MACRIM modules are to be separately boxed in quantities of twelve. As an example, a unit will be able to order a box of twelve hot weather staples, a box of twelve meals menu F (containing two retort-pouched meals) and a box of twelve male hygiene – to feed twelve males for one day. Within the twelve box, components are grouped into sets of four to fit the crewing of platforms and combat bricks.
ANNEX B

CRP MATERIEL SYSTEM FUNCTION AND PERFORMANCE

1. The function and performance attributes of the CRP comprising of the design, development, supply and replenishment of stock levels are ranked from essential to desirable as follows.

Table 1 Functional and performance requirements ranking

<table>
<thead>
<tr>
<th>Serial</th>
<th>Requirement</th>
<th>Essential</th>
<th>Important</th>
<th>Desirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Improvement</td>
<td></td>
<td>CRP incorporates advances in nutrition and food technology sciences</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Changes to menus at each production cycle</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mission adaptable</td>
<td>Modularity of CRP components</td>
<td>Support enhanced nutritional knowledge and behaviours</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Health and hygiene</td>
<td>Feeding does not compromise physical, psychological or dental health</td>
<td>Maintain hand, dental and body hygiene</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meal hygiene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Continuous feeding on ration packs</td>
<td>Maintain physical, psychological and dental health with supplementation</td>
<td>MACRIM 30d</td>
<td>45d</td>
</tr>
<tr>
<td>5</td>
<td>Shelf life</td>
<td>High levels of shelf stability in all food and beverage components</td>
<td>Preserve nutritional value of the food and its organoleptic properties</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>IAW annex D</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Suitable for operations in littoral, tropical, temperate, continental,</td>
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<td></td>
<td></td>
<td>desert</td>
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<td></td>
<td></td>
<td>Attitudes from sea level to 4000m</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Temp -10°C to 50°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Convenience</td>
<td></td>
<td>Prepared with minimum of equipment, time and effort</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Beverages hot and cold</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Interoperability</td>
<td>Interoperability with allies, particularly ABCA and NATO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Nutrition</td>
<td>Fortification of selected components with nutrients</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Inclusion of ergogenic aids and ingredients for enhanced physical and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cognitive performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Packaging</td>
<td>Protect the integrity of food items and conform with its tactical use,</td>
<td>Incinerator safe</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>storage and transport</td>
<td>Non-tainting of boiling/heating water</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waterproof, rodent and insect resistant</td>
<td>Biodegradable packaging</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Menu diversity</td>
<td></td>
<td>Sufficient range of menus and diversity of food and beverage components</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>to support acceptance and religious dietary constraints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ancillaries</td>
<td>Contain at least a spoon</td>
<td>Opened without specific tools</td>
<td>All necessary equipment to heat and consume included</td>
</tr>
<tr>
<td>---</td>
<td>-------------</td>
<td>--------------------------</td>
<td>------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>11</td>
<td>Labelling</td>
<td>Weights, warnings, NSN Allergy Warnings</td>
<td>Food items, instructions, AIT</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Integration with soldier systems</td>
<td>To fit extant and future soldier load systems</td>
<td>Interface with in-service cooking equipment</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>System support</td>
<td>No dangerous cargo natures</td>
<td>Suitable for palletting systems</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Supply</td>
<td>Supply responsive to usage and contingency</td>
<td>Stackable Trackable Lefatable</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Doctrine</td>
<td>Nutritional education</td>
<td>Doctrine on CRP in LWP-G 1-1-4 and TMP Align with improved nutritional behaviours, health and personal hygiene</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Use of water</td>
<td>Does not add to personal water required without a hydration benefit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>CRP types (annex A)</td>
<td>Modular system MAC1M, CER, EFR</td>
<td>FBR, CRM</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Energy content</td>
<td>MAC1M 14-18 MJ or greater</td>
<td>CER, EFR, CRM as high as possible</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Nutrient content</td>
<td>MAC1M w/out supplementation</td>
<td>CER, EFR, CRM as high as possible</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>CRP Weight</td>
<td>MAC1M &lt; 1600g Packs of twelve MAC1M less than 25kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PERIODS OF FEEDING WITH CRP

1. Maximal feeding periods set out below reflect the operational experience and forecast scenarios requiring the extended use of CRP, particularly when there exists operational risks to fresh ration feeding and supply.

2. Although CRP can be used during sustained operations, it is acknowledged that the health of a combatant is best maintained by incorporating periods of fresh feeding as part of the ration plan whenever the operational situation allows. Reference H will set out the policy on baseline limits to the periods that CRP may be issued, and the any periods of fresh feeding to maintain cognitive and physical performance and health. Improved CRP should aim to minimise the need for fresh supplementation.

Table 1 Periods of CRP feeding by ration type

<table>
<thead>
<tr>
<th>CRP</th>
<th>Standard Days</th>
<th>Operationally requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>30</td>
<td>As necessary</td>
</tr>
<tr>
<td>Emergency</td>
<td>As necessary</td>
<td>As necessary</td>
</tr>
</tbody>
</table>

3. DSTG advice is to inform the nutrient supplementation requirements that may arise following prolonged periods of CRP feeding.
COMBAT RATIONS SHELF LIFE

1. The CRP must be shelf stable i.e. safe and fit for human consumption, for the following periods depending on the climatic conditions under which they may be stored.

2. The shelf life of CRP must meet or exceed the periods set out in table 1 and table 2. Once the CRP is deployed from an environmentally controlled storage facility, its remaining shelf life must not degrade more than the factors set out at table 2.

Table 1*: Shelf Life of CRP

<table>
<thead>
<tr>
<th>CRP Type</th>
<th>Type</th>
<th>life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>MACR1M, CFB, CRM</td>
<td>36</td>
</tr>
<tr>
<td>Emergency</td>
<td>EFR</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>ER</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 2*: Remaining Shelf Life of CRP Following a Period of Storage in Temperate Conditions (≤ 25 °C) as a fraction of remaining shelf life by temperature

<table>
<thead>
<tr>
<th>Storage Temperature</th>
<th>25 °C</th>
<th>39 °C</th>
<th>43 °C</th>
<th>49 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remaining shelf life</td>
<td>1.0</td>
<td>0.5</td>
<td>0.25</td>
<td>1 mth</td>
</tr>
</tbody>
</table>

*Based on NATO guidance at reference B

3. As examples on how to apply Table 2:

a. If a MACR1M has been stored for approximately 20 months in a temperate environment (~25 °C or less) it has 16 months shelf life remaining if it remains in a temperate environment. If that MACR1M is deployed and held at temperatures up to 43 °C prior to consumption, the remaining shelf life is reduced by a factor of 0.25, i.e. it has 4 months remaining shelf life.

b. If an EFR has been stored for 20 months in a temperate environment, it has 16 months shelf life remaining if it remains in a temperate environment. If that EFR is deployed and held at temperatures up to 39 °C, the remaining shelf life is reduced by a factor of 0.5, i.e. it has 8 months remaining shelf life.

c. If any CRP is deployed at temperatures of 44-49 °C (or greater) without environmental protection, regardless of previous storage time in a temperate environment, it has only 1 month of remaining shelf life.
4. Note that the effects of time and temperature on shelf life would be best addressed by measuring the cumulative exposure to time and temperature. This may be achieved by using time temperature indicators or sensors coupled to RFID technology to log and calculate effective time/temperature exposure. This would be much more accurate and reduce wastage compared to the above tables.
PACKAGING, LABELLING AND PALLETISING OF CRP

1. Packaging, labelling and palletising of combat rations should protect the integrity of food items and conforms with its tactical use, storage and transport. The enduring functional requirements are set out in the user requirement. Those below also apply to the CRP system but are set out here to permit updates due to technologically enhancements.

Packaging

2. Packaging should protect the integrity of food items and conform with its tactical use, storage and transport. The three levels of packaging comprising primary packaging in contact with the food, the secondary CRP bag and tertiary outer container (conforms with reference B). Packaging should have the following attributes.

a. Packaging of items for personal carriage should be quiet to handle, non-reflective, minimise weight and rubbish.

b. Where possible and cost-effective, biodegradable packaging should be used.

c. The packaging should not generate hazardous flames, gases or particulates if incinerated.

d. Primary and/or secondary packaging must resist environmental degradation and rodent/insects while being carried and stored.

e. Primary and/or secondary packaging should be waterproof.

f. Secondary packaging should be rodent and insect resistant.

g. Tertiary packaging must be water resistant

h. Packaging shall be usable or adaptable to store water or as a waste bag.

i. Packaging intended to be heated by boiling water should not taint the water.

j. Bulk packaging should enable ease of packing onto standard pallets.

k. Primary, Secondary, tertiary and bulk packaging should all be appropriately marked with human readable information (HRI) to ensure that the user can determine the contents, health warnings (as appropriate) and the expiry date/shelf life.

l. Secondary, tertiary and bulk packaging should be marked with description, type, batch lot and shelf life are marked with both machine readable information (MRI) and HRI (reference G).
Labelling

3. CPR labelling must set out the title, warnings, composition, nutritional content and relevant preparation instructions of each ration module component. Specific attributes of labelling are set out below.

a. The net metric weight should be declared on the packaging of a ration. Secondary and/or tertiary packaging must mention the production date at least as an ordinal date (year + number between 1 and 366, 1 being January 1st) or in the day/month/year format (e.g., 01 Jan 2011).

b. Any safety warnings related to preparation, consumption and use of the ration or its components must be clearly identified on each individual operational ration pack and on individual ration modules. The warnings shall be conveyed through the use of a suitable warning pictogram that clearly and universally conveys the intended message. This requirement also applies to specific tools, heaters, and fuel issued separately.

c. The food items should be identified on the primary package of these items. Food components must also have an ingredients list where appropriate. The instructions for proper preparation and consumption should be printed on each of the components as appropriate. Non-food components should be identified and labelled with instructions for use when appropriate.

d. Instructions setting energy and nutrient values of food components, healthy meal selection and any requirements for follow on supplementation.

e. Secondary, tertiary and bulk packaging should be marked per reference G, ensuring that NSN, description, type, batch lot/shelf life are marked with MRI and HRI.

Palletising of the ration

4. Individual ration packs are typically grouped in fibreboard or aluminium boxes that are in turn stacked on a pallet as a unit load. It is recommended that the rations be stacked on NATO type pallets (1200 x 1000 millimetres) for air movement standardisation purposes. Pallets must be free from foreign material and/or growth(s) such as, but not limited to, adhering dirt, mud, mildew, mould, etc.

5. The boxes must be uniformly arranged in a pattern that results in efficient utilisation of the pallet’s entire surface area. These boxes must be stacked to form a compact squared load centred on the load base and squared with all corners of the pallet with no overhang. Boxes must be equalised with the sides and/or ends of the pallets. The boxes of each pallet load should also be interlocked where possible by reversing the pattern in each layer. Consideration should be given to the dimension of the case and pallet to facilitate interlocking.

6. Pallet loads must be properly and sufficiently secured utilising straps, shrink or stretch films, netting and/or caps such that the load will be secure, stable, and provide added protection against moisture, dust and contamination under shipping, handling and distribution rigors without causing damage to the boxes.
7. The quantity of individual operational ration packs on a pallet must be readily identified and clearly and legibly marked on the pallet unit load.

8. The minimum number of rations on a pallet position (i.e., on one single or on two stacked pallets) shall be 150 days of supply (DOS) for one man. The height and weight for a single pallet position, including the pallet(s), shall not exceed 2.2 meters and 1000 kg respectively. A pallet of rations must contain different menus.