

WORLD FOOD PROGRAMME

Guidance for Temperature Control Storage & Transportation (Nutritious Food Products)

Sahel Operation

21 March, 2012

BACKGROUND

WFP expanded the use of new type of nutrition products such as ready-to-use supplementary food (RUSF) and Super Cereals Plus. Currently those products are produced by limited suppliers, such as NUTRISET, CERFAR and MICHIELS.

The field conditions do not always allow an optimum conservation and transport of nutritious food products which can lead to the deterioration of the nutritional properties of the product. This document aims to provide rapid and basic information for logisticians on best nutritious foods management practices. Firstly, the guidance specifies various temperature exposures to the three products and their shelve life. Secondly, it provides recommendations for temperature control and stock management in terms of products' shelve life. Finally, the document outlines key recommendations regarding storage management and transportation of the products.

1 – GENERAL PRODUCT INFORMATION

PRODUCTS	< 30°C	30 – 40°C	40°C
Plumpy Sup	24 months	16 months	12 months
Plumpy Doz	24 months	16 months	12 months
Super Cereal Plus	12 months	8 months	6 months

Note: This guidance note should not be considered for locally produced products.

TEMPERATURE AND SHELVE LIFE (OPTIMUM STORAGE CONDITIONS):

Plumpy Sup: The speed of degradation reactions increases in high temperature of storage. At 40°C and above in the storage, the product starts to degrade dramatically.

Plumpy Doz: Same as above, the speed of degradation reactions increases in high temperature of storage. At 40°C and above in the storage, the product starts to degrade dramatically.

Cereal Plus: The speed of degradation reactions increases in high temperature of storage. At 40°C and above in the storage, the product starts to degrade dramatically.

2 - TEMPERATURE CONTROL

2.1 - STORAGE TEMPERATURE CONTROL

The temperature of 35°C is the upper limit for optimum preservation for the three products as recommended by the manufacturers. A temperature of 40°C is the accelerated threshold of the degradation mechanisms and reactions of the products.

a. IN HUBS

Heat and humidity are main factors for degradation of the products. Even if we have hermetic / aluminium coated packaging (sachets) to protect the products from deterioration, we have to avoid any exposure to water and humidity. Table below specifies the measures that should be taken to prevent deterioration of the products in the warehouses.

RECOMMENDED MEASURES:

1 - Air Conditioner (AC) should be installed in the main Hubs to avoid high temperature and when the products will be stored longer than six months (that includes hot season).

2 - Leave the cartons on the pallets without stacking them. You can, at most, put another or two layers of cartons on the top of a full pallet.

3 - Storage standard must be respected (products should be stored at least 10 cm above the floor and a space of at least 30 cm between the Pallets.

4 - Install three thermometers in each warehouse (one at the entrance, one in the middle and one in the back).

5 - Temperature should be recorded regularly (8.00, 12.00, 17.00) by the store keeper and written on the temperature sheet which should be displayed near the store keeper's desk to be seen by everyone.

6 - If possible, products should be kept separate from other foodstuffs where a risk of microbiological contamination might exist. At least, a separated area should be used in the warehouse to prevent from contamination.

7 - Respect the guidance of storage facilities in term of hygiene and security.

b. IN PRIMARY WAREHOUSES

In the main warehouses where the food products will be stored for an extended time period, measures as recommended in the table above (recommendations 1 through 7) should be taken.

c. IN SECONDARY WAREHOUSE

If there is no AC in the warehouse, comply with the standard ventilation protocols. The measures as recommended in the table above (recommendations 2 through 7) should also be taken.

2.2 STORAGE RECOMMENDATIONS

The conditions in the warehouses in the Sahel Region (high temperatures inside warehouses) are not usually suited for long term storage of nutritious food products. Thus, for food products to remain in good condition, it is important to keep temperature inside the warehouses at a maximum 35°C.

a. OPTIMISATION OF EXISTING STORAGE FACILITIES

Since constructing an insulating panels or installing ACs for an entire warehouse would be too costly, we recommend construction of an insulated temperature controlled space inside a warehouse.

The main objective is to create a temperature and humidity controlled storage space for maximum conservation of nutritious food products. In order to achieve this objective, we need to create an insulated and temperature controlled room inside an existing storage structure. The Head of Logistics will decide on the best location for the construction of the insulated structure within the existing structure.

The recommendation is that an insulated space can be constructed inside the warehouse where a separate air conditioning units would be installed. Cooling down individual warehouse spaces is a cheaper alternative to industrial sized air conditioners.



Considering the environment in the Sahel region, cement blocks and wood planks can be used to build the insulated space. This type of insulation would lower down substantially temperature inside the structure and would also help control humidity.

For better temperature control, corners around the door and ceiling of the structure should be well insulated. In addition, air conditioners must have exhaust hose going out a window or outside an external wall. Thus, the new structure must share one or two walls of the main warehouse. For better insulation, if possible, a cob layer could be added to the outer walls of the cooling structure.

OPTIMISATION MODEL





When constructing the ceiling, it is important to leave a space between the warehouse ceiling and the new structure for better air circulation. In addition, few holes must be drilled in through the ceiling. Our recommendation for a space of 1000 m2 drill four or five holes of 20X30 cm which is essential for air circulation in the cooling space.

b. MOBILE STORAGE SOLUTIONS

• ISO Containers:

Insulated containers with or without built-in refrigeration units can be used for temperature control of nutritious food products. The advantage of using those containers is that they are robust and suitable for difficult environments; however it is an expensive option with limited storage capacity (a 20ft container has capacity of approximately 30m3).

In addition, if insulated containers are used for storage of nutritious food products, they should not be exposed to the sun for an extended time period. Each container should be covered, i.e. a layer of straws or other means can be used as a cover.

• Mobile Storage Units (MSUs) - Rubbhall/Wikkhall:

MSUs (rub hall/wikkhalls) could also be used for temperature control storage. A MSU of 32X10 msq capacity may require 4 large ACs units (each 75000 BTU). In addition to installing ACs, a dedicated main power supply for the plant (transformer/city power).

The size of the A/C and the generator set can differ from one location to another, depending on weather conditions. Regular AC units may be used. Industrial units could be an option as well as they can work in more extreme conditions and require less maintenance. However, an industrial AC requires good and steady electricity power supply and is costly in terms of fuel or electricity running cost.



c. MIDIUM-TERM STORAGE SOLUTIONS

• Panelised Temporary Warehousing:

Where more large scale storage is required for a limited duration the option of temporary panelised warehouses is available. These have the advantage that they may be disassembled/moved, quicker to install compared to a permanent warehouse as well as cooling unites, if required, can be installed and will perform more efficiently and economically compared to a regular warehouse. However, this option requires ground works and is not as durable as permanent construction.

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NOTE: All Storage Facilities Must Comply With Standard Ventilation Protocols*.

*Refer to WFP's Food Storage Manual

2.3 Temperature Control for Transportation

Severe exposures to high temperature could occur during the transportation phase of the products. Thus, it is important to take the appropriate measures to prevent and monitor these exposures.

Temperature Control during Transportation of Products:

RECOMMENDED MEASURES FOR LAND TRANSPORTATION

- During land transportation, bear in mind that the temperature in non-insulated containers could rise above 35°C. Ventilation and regular temperature monitoring must be considered.
- Refrigerated containers should be a must but the availability of them in some countries may be a problem in terms of required quantities and high costs.
- If refrigerated containers are not available, insulated containers must be used to avoid product exposure to extreme temperature during land transportation phase. Monitor temperature inside the containers regularly.
- The products which will be more exposed, will be the ones situated near the ceiling of the containers.
- Leave cartons on pallets to limit the risk of degradation.
- Keep cartons at 20 cm from the walls and 30 cm from the ceiling of the containers. Dunnage (wood, cardboard) should be fixed between the wall of the container and the cartons to avoid damage during transportation.
- The stock piling should not be more than two layers on top of full pallets.
- If there are no containers used to transport nutritious food products, the cargo must be covered with tarpaulin to protect it from heat and humidity. For better insulation, consider using a blanket or other material between the tarpaulin and the cartons to minimise the products' exposure. In addition cargo must not be left under the sun for an extended time period.

REFRIGERATED CONTAINERS

One of the best solutions to transporting food products in the regions with high temperature exposures is the use of refrigerated containers. These containers feature extremely heavy insulation. To allow air flow under and around the stored products and for added strength, aluminum t-bar floors are used in some refrigerated storage containers. For our food product transportation needs, these portable refrigerated containers offer a very secure solution in terms of temperature control for transport and temporary storage.

Refrigerated containers offer one of the best solutions for temperature control of perishable foods, however, it's a very costly and difficult to find, especially for large shipments, in West Africa. It also requires constant monitoring during the transportation phase which might not always be possible.

3 – SUPPLY CHAIN MANAGEMENT

Supply Chain management is key for good preservation of food products as the temperature control is difficult to manage during various phases of the supply chain.

a. UP-STREAM PROCUREMENT

The products will have a reduced shelf life in Sahel due to weather conditions in the region. In order to avoid temperature exposures, the stock should be procured and managed in a manner to avoid long storage in non-temperature controlled warehouses. If we do not comply with the basic product's management requirements, a rapid degradation of the products might occur.

Upstream procurement should be scheduled in batches in order to avoid long storage period and exposure of the products to high temperatures and humidity.

b. DOWN-STREAM PROCUREMENT

Food products should be procured and delivered downstream to the cooperating partners in batches (minimum required quantities) to prevent extended exposure in non-temperature controlled warehouses. Appropriate information should be provided to the partners, mainly specifying storage requirements for these products.

In high temperatures environment, long term storage of nutritious food products, especially at cooperating partners' Extended Delivery Points (EDP) as well as Final Delivery Points (FDP), should be avoided.

4 - SUMMARY

Following are two basic recommendations for better preservation of nutritious food products, specified in this document:

- 1. Manage the pipeline and deliveries to partners according to the minimum needs of partner requests.
- 2. If the products are not needed for an immediate distribution, keep them as long as possible in a warehouse with temperature below 35°C before releasing to the partners.

For more information: WFP Food Quality Control Web Page: <u>http://foodquality.wfp.org/QualityProcedures/Commoditystorage/tabid/490/Default.aspx</u>