



GUIDANCE

# Bread and Bakery

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## Introduction

### Daily bread needs

- i. **Survival needs** are estimated to be about 250 g bread/person/day.
- ii. **Minimum needs** are estimated to be about 330 g bread/person/day.

### Supporting local production

Most of the bakeries in the northwest of Syria (NWS) use imported Turkish wheat flour (in November, 68 percent of the flour used by bakeries was imported from Turkey and distributed by the Disaster and Emergency Management Authority (AFAD)); the remainder use locally milled flour from local wheat. In recent years, the food security and livelihoods (FSL) cluster and national and international non-governmental organizations (NGOs) have been increasingly involved in the bread and bakery sector.

Supporting the wheat value chain has become one of the main priorities of the FSL cluster, including purchasing and milling local wheat, baking with the flour produced, and distributing the bread. However, the lack of sufficient wheat production for the population is an important challenge, along with the percentage shares of soft and durum wheat production in NWS. In some cases, wheat flour is mixed with other types of flour – for example, private mills mix wheat with barley at 10–15 percent – to compensate for the shortage of wheat.

### Importation of flour

Bread is central to Syrian society as bags of fresh, hot “khubz” bread are ubiquitous whenever families gather for meals. As conflict and massive displacement have resulted in unprecedented numbers of Syrians experiencing extreme loss, the FSL cluster and its partners have worked not only to help meet people’s immediate food needs, but also to restore a level of normality in the conflict-devastated society.

The structure of baked goods is based on flour. Wheat flour contains proteins that interact with each other when mixed with water to form gluten. It is this elastic gluten framework that stretches to contain the expanding leavening gases during rising. The protein content of flour affects the strength of the dough and different types of wheat flour contain varying amounts of gluten-forming proteins. Hard wheat mainly has a high protein content and soft wheat contains less protein. Bread made with yeast has a strong gluten framework.

Bakeries in northern Syria provide bread under three types of programme:



#### 1. Subsidized bread

Under these programmes, the FSL cluster and its partners supply flour free of charge to bakeries, enabling them to stay in business and offer affordable bread to their communities. By using subsidized flour, bakeries can keep their prices low enough for customers to afford to buy fresh bread. While the

price of bread increased by 700 percent in some areas late in 2020, bakeries supported by the FSL cluster and its partners were able to offer bread at half the average cost, benefiting not only the people who shopped at the bakeries, but all Syrians in the governorate, as it helped stabilize market prices for bread by increasing or maintaining access to subsidized bread. The weights and prices of the bread offered through these programmes differ markedly from one location to other.



## 2. Unsubsidized bread

Private and general bakeries buy their raw materials (wheat flour, yeast, salt, bags and fuel) themselves and also cover their own baking costs. Unsubsidized bread is sold in local markets at high prices.



## 3. Free bread

National /International NGOs supply flour to bakeries and pay the operating and transportation costs of distributing bread completely free of charge for households in camps and/or villages.

# The methodologies of intervention

## Subsidized bread

The aim of subsidized bread interventions is to maintain the price and weight of bread consumed and ensure that it is available in the market on at least five days per week. The approach to subsidizing bread prices is based on sharing the costs of bread production inputs between the bakery (public or private) and the NGO in many parts of NWS with the aim of decreasing the price of a package of bread or increasing its weight. Local councils, through AFAD flour or local flour (from mills belonging to the General Corporation for Grain, SPEG), also try to decrease the price or increase the weight of a package of bread. The implementing NGO should coordinate closely with the bakery departments of local councils in the case of any issue related to bakeries and selling points as these departments are the authorities that authorize or revoke licences and impose fines.

The mechanism for distributing subsidized bread is mainly through selling points that have semi-specific lists of beneficiaries from the population of the neighbourhood covered by each selling point according to local council statistics.

In most cases, subsidized bread is not distributed directly to the population through bakeries. All bakeries have a list of selling points and the quantity of packages of bread to be provided each day to each selling point.

Local councils or bread committees are responsible for determining:

1. selling points; and
2. the number of daily packages of bread for each selling point according to the population of the neighbourhood it covers.

By using subsidized flour, bakeries can keep their prices low enough for their customers. While the price of both unsubsidized and subsidized bread increased by 700 percent in some areas late last year, bakeries supported by the FSL cluster and partners were able to offer bread at half the average cost, which benefitted not only the people who shopped at the bakeries, but also Syrians throughout the governorate, as it helped stabilize market bread prices. In general, the prices of subsidized bread were 30 – 70 percent of those of unsubsidized bread.

One of the FSL recommendations is to make calculate bread distribution/beneficiaries according to whether the intervention is an emergency response (for a maximum of four months) or a regular distribution (for a minimum of eight months) And the level of need – survival needs are estimated at about 250 g bread / person / day and minimum needs at about 330 g bread / person / day.

When implementing a subsidized bread intervention, all the bakeries in the target area should be included, because targeting a specific number of bakeries may cause conflict among people seeking to obtain subsidized bread. If a specified number of bakeries are involved, together the bakeries must cover the basic needs of the population for daily bags of bread.

To avoid having negative effects on the bread market, there must be coordination with all private and public bakeries before a subsidized bread intervention is implemented.

During the period of the subsidized bread intervention, the community should be informed on banners at bread selling points and bakeries indicating the weight, price and number of loaves in each package of bread (if possible), the period of intervention, and information on complaints and feedback mechanisms. Awareness of this information should also be raised through local social media platforms and banners displayed at the main meeting places in the target area, such as mosques, local council offices and schools.

### Unsubsidized bread

Unsubsidized bread is sold by private and public bakeries at higher prices than subsidized bread. In NWS, there is no standard weight or number of loaves for packages of bread, which vary from area to area. The price is defined according to the package weight. This modality applies in villages and cities but not the camps. The local authorities in each area are responsible for monitoring the price of bread.

### Free bread distribution

Generally, national / international NGOs offer free bread for internally displaced persons in camps through blanket distributions that cover the bread needs of all the people in the camp. The bread is 100 percent free of charge and is distributed in the camps to avoid the need for internally displaced persons to transport themselves to another location. In villages, the NGOs

target the most vulnerable people (at the household level) according to specific selection and vulnerable criteria. The distribution method is based on the daily need for bread (survival or minimum) and the composition of the household. The distribution points should be close to the beneficiaries' accommodation.

## Standard specifications for flour

### Fortified wheat flour

Fortified wheat flour must be manufactured from wheat of good quality, free from foreign materials, substances that are hazardous to health, excessive moisture, insect damage and fungal contamination, and in compliance with all relevant national food laws and standards:

- in conformity with Codex STAN 152-1985;
- obtained from non-genetically modified varieties (if required in the contract);
- made from wheat stored in dry, ventilated and hygienic conditions with only safe insecticides (such as phosphine) used for fumigation; and
- with fumigation, when needed, performed by certified operators.

### Vitamins and minerals

Micronutrient premixes must be delivered to the processor of fortified wheat flour with a complete certificate of analysis and proof of purchase.

Micronutrient premixes must be stored in a dry, cool and clean place where the temperature is a maximum of 25 °C.

### Product specifications *(for flour procurement)*

Many types of wheat flour are used to make Syrian bread:

- **550 or “zero”**: in this type the extraction rate is 55 percent, which means that each 1 kg of wheat gives 550 g of wheat flour.
- **650**: this is the best type for Syrian bread. The extraction rate is 65 percent, which means that each 1 kg of wheat gives 650 g of wheat flour.
- **750**: in this type the extraction rate is 75 percent, which means that each 1 kg of wheat gives 750 g of wheat flour and the remainder is wheat bran and impurities.
- **850**: the extraction rate is 85 percent, which means that each 1 kg of wheat gives 850 g of wheat flour and the remaining 150 g is wheat bran and impurities.

Wheat flour must be produced according to recommended general principles of food hygiene CAC/RCP 1-1969 Rev 4 – 2003 (table 1).

The wheat supplier must warrant that the wheat flour conforms to Codex STAN 152-1985, is freshly milled and is suitable for bread making.

**Table 1. Wheat flour specifications**

#	Specification	Content / dose
1	Moisture content	14% maximum
2	Ash	0.65% maximum of dry matter
3	Protein	11% minimum of dry matter
4	Zeleny index	30 ml minimum
5	Delayed sedimentation	Zeleny value + 5 ml minimum
6	Hagberg Falling Number (HFN)	230 minimum (including 60 second preparation)
7	Wet gluten	28% minimum
8	Gluten index	85% minimum
9	Chopin Alveograph	W: 215 minimum
		P: 80 minimum
		L: 80 minimum
10	Fatty acid	Maximum 120 mg KOH per 100 g dry matter

### Micronutrients

Fortified wheat flour must provide the micronutrient supplements shown in table 2.

The incorporation rate is 250 g of micronutrient premix per metric ton of flour.

**Table 2. Micronutrient rate and chemical form**

#	Chemical	Dose and chemical form
1	Vitamin A	1.0 mg/kg dry vitamin A palmitate 250 n.s
2	Vitamin B 1	4.4 mg/kg thiamine mononitrate
3	Vitamin B 2	2.6 mg/kg riboflavin
4	Vitamin B 3	35.0 mg/kg nicotinamide
5	Vitamin B 12	0.008 mg/kg cyanocobalamin
6	Folic acid	1.0 mg/kg folic acid
7	Iron	15 mg/kg NaFe EDTA
8	Zinc	30 mg/kg zinc oxide

## Safety

Fortified wheat flour must be free of noxious matter and must not contain any substances originating from microorganisms or any other poisonous or deleterious substance such as anti-nutritional factors, heavy metals or pesticide residues in amounts that may represent a hazard to health.

## Shelf-life

Wheat flour must retain the above qualities (tables 1 and 2) for at least one year from the date of manufacture when stored in dry conditions at the ambient temperatures prevalent in the country of destination.

## Marking

- Name of product: Fortified wheat flour.
- Net contents.
- Name and address of supplier (including country of origin).
- Batch number.
- Production date.
- Additional marking as per contractual agreement.

## Storage

Fortified wheat flour must be stored under dry, ventilated and hygienic conditions. The technical field teams should carry out spot check visits (preferably through weekly visits to the contracted mill) to ensure that the storage conditions of the wheat, flour and other processing outputs (residues) comply with the agreed technical requirements and standards.

## Yeast

Dry yeast comes in powder form and is highly soluble in water and stimulating. It is added to the dough five minutes after the start of kneading. Yeast is kept in dry, cool conditions and should not be exposed to the sun. Most dry yeast has a shelf-life of three months.

Wet yeast comes in the form of a dough and contains the same materials as dry yeast. After being softened in a bowl, it is added to the bread through a mixer five minutes after the start of kneading. It is kept in a refrigerator at temperatures of 5 – 10 °C and has a shelf-life of one week.

In local markets in NWS there are many brands of Syrian, Iranian and Turkish yeast. Each bag of dry yeast is equivalent to two containers of wet yeast.

### Bakery (private or public)

In general, private bakeries have one production line. As well as a production hall, the bakery should have:

- a warehouse that is isolated from the production hall to avoid exposure to moisture, insects and rodents;
- a spare parts room and a maintenance room isolated from the production hall;
- a room for the power generator;
- a room for the air tank and the main electrical panel; and
- a storage room for salt, yeast and plastic bags.

The production hall should be at least 200 m<sup>2</sup> in area and contain:

- a mixer close to the flour warehouse;
- a slicer to cut the dough;
- a first fermentation conveyor belt, a first dough sheeter, a second dough sheeter and a second fermentation belt;
- a rolling machine;
- a baking oven; and
- a cooling belt.

After kneading, the dough moves along fabric conveyor belts to the hose fire (the baking oven) to be baked. The baked bread is then cooled on conveyor belts. As the loaf cools, some of the moisture rises toward the crust, which becomes soft or leathery, unlike the hard shell it acquired in the oven. Cooled bread is immediately bagged and packaged.

Most public bakeries have at least two production lines, each with its own kneading machine. Public bakeries have the same structure as private bakeries, with some differences such as automatic kneaders and automatic transfer of the dough to the slicer.

Kneading takes about 20 minutes with an automatic kneader and 30 minutes with manual kneading, with 40–50 litres of water per 100 kg of flour, depending on the moisture of the flour. The dough should be rested for a short time before being transferred to the slicer, sheeter, baking oven (at 600 °C for no more than 20 minutes with upper and lower burners), cooling belt (at least 60 m for at least 10 minutes) and finally bagging and packaging.

*Note: All bakery machines should be cleaned and maintained by a technician to avoid malfunction during baking and poor bread quality.*

## Operational cost of producing 1 metric ton of flour

Prices are in United States dollars (USD), mentioning the date, exchange rate, price per metric ton, and price per package of bread.

### From warehouse to bakery

It is essential to budget for labour and transportation costs during the design phase of a bread distribution programme. In NWS, wages for workers are usually between USD 120 and USD 150 per month, which is USD 5–6 per day. Workers may be asked to carry out other tasks as their contracts are monthly and are treated as cash for work (CFW). Another way to contract labour for the loading and unloading of wheat flour and other requirements is to include it in contracts with vendors and make it a condition of the contract with each vendor. In these cases, workers are supervised directly by the contracted vendor.

Transportation is another essential item to consider during the preparation stage of the project, and the contracting process can follow the same modality, either by calling for bids and receiving offers for transportation, or by including transportation in the contract with the vendor supplying flour and yeast.

It is not advisable to use cash for work arrangements in such activities (within bakeries) because the work is arduous and dangerous and should be carried out by skilled daily workers.

### Inside the bakery

Cost of baking 1 metric ton of flour						
#	Item	Quantity	Unit	Unit cost (USD)	Total cost (USD)	Notes
1	Flour	1	mt	275	275	
2	Yeast	6	kg	2	12	Turkish
3	Table salt	3	kg	1	1	
4	Water	400–500	litre	2	2	
5	Plastic bags*	8	kg	1.5	12	
6	Fuel	60	litre	0.55 – 0.70	33–42	Differs between local and imported fuel.
7	Labour	6	USD	6	6	Differs according to the capacity of the bakery.
8	Maintenance	2	USD	2	2	
9	Production hall	10	USD	10	10	
10	Flour transport, loading & uploading	4	USD	4	4	
<b>Total</b>					<b>357–366</b>	<b>USD</b>

\*Plastic bags of low-density polyethylene (LDPE) type.

## Notes:

- Fuel cost includes the tunnel oven heating cost which is approximately USD 13. This cost is fixed and normally calculated as tunnel oven heating cost divided by quantity of flour produced in mt.
- Yeast consumption decreases in summer by approximately 1–2 kg/mt of flour)
- The cost decreases by USD 10 when a public electricity network is available.
- Costs from the bakery to the beneficiaries comprise costs for staff, transportation, distribution points, monitoring staff, visibility and administration. It is estimated at about USD 70–80/mt of flour.

## Supply chain for flour

The supply chain is important in maintaining the baking process and daily distributions. The supplier should be provided with a clear supply plan clarifying the estimated dates for the next deliveries of flour, yeast and other requirements. This plan will also give the vendor a clear understanding of the amount of bread to be produced per day and when the next shipment should be released.

Sample supply chain plan: total deliveries of wheat flour during the month	
No	
Date	
Day	
Imported flour	
Bread produced by bakery	
Flour used	
Flour needed to produce bread (1,000 kg flour/1,3000 kg bread)	
Bread bags received	
Flour consumed	
Total imported flour	
Remaining flour	
Total imported yeast	
Yeast consumed	
Remaining yeast	

*Note: This table should be updated daily.*

## Inspection and laboratories

### Analytical requirements

The following table lists the compulsory tests and reference methods for bread production.

No.	Test	Recommended level	Reference method
1	Organoleptic	Pleasant smell; typical taste and colour	
2	Moisture content	14% maximum	ICC No. 110 ISO 711-2009
3	Ash	0.65% maximum of dry matter	ICC No. 104
4	Protein	11% minimum of dry matter	ICC No. 105
5	Zeleny index	30 ml minimum	ICC No. 116 and 118 ISO 5529
6	Delayed sedimentation	Zeleny value + 5 ml minimum	
7	Hagberg Falling Number (HFN)	230 minimum (including 60-second preparation)	CC No. 107 ISO 3093
8	Wet gluten	28% minimum	AACC 38-12A ICC No. 155 ISO 21415-1
9	Gluten index	85% minimum	CC No. 155 AACC 3812
<b>Chopin Alveograph</b>			
10	W	215 minimum	AACC 54-30A ISO 27971
11	P	80 minimum	
12	L	80 minimum	
13	Fatty acid	maximum 120 mg KOH/100 g dry matter	O 7305 AOAC 14022
14	Vitamin A	1.0 mg/kg	OAC 992.04 AACC 86-03
15	Iron	15.0 mg/kg	AOAC 944.02 AACC 40-41B

*Note: There are a limited number of local laboratories in NWS. SPEG has a specific laboratory for this purpose, but more local laboratory capacity is needed in order to ensure the quality of flour and bread.*

## Transportation and storage of flour and bread

### Case 1

If the contract with the flour supplier is for regular deliveries of flour directly to the bakery warehouse, there is no need to contract a warehouse for wheat flour storage. Instead, the supplier will make regular shipments of wheat flour to the bakery.

## Case 2

If the contract with the supplier is for providing wheat flour in a single delivery, there is need to contract a warehouse for storage. It is then the responsibility of the warehouse keeper to follow the rules and instructions regarding storage conditions, which include the following:

1. The warehouse should be firmly closed, with no holes in its walls through which rodents may enter.
2. The warehouse windows should be covered with metal mesh to prevent the entrance of pests.
3. Before storing any material, the warehouse should be sterilized (usually with phostoxin pills) to kill any pests and firmly closed for a minimum of 24 hours.
4. Flour should be stored on wooden shelves on the floor.

Special conditions for storing wheat:

- The warehouse must have windows that can be closed during sterilization with 1 g of phostoxin (equal 3 tablets of phostoxin) for each cubic metre of the warehouse.
- After storing the wheat in the warehouse it should be sterilized with phostoxin gas and left with the windows and doors closed for 72 hours before the doors are opened for ventilation and the milling starts.

## Bread production quality

### Storage of flour in the warehouse

The following storage conditions are recommended:

- Stacking the bags of flour to a maximum of five bags high.
- Keeping the floor and corners of the warehouse clean.
- Leaving corridors between the stacks of flour bags to allow ventilation.
- Putting wooden pallets with plastic insulation under the bags.
- Installing “no smoking” posters and fire extinguishers.
- Covering holes and windows with soft mesh that does not let in insects.
- Avoiding sources of humidity.
- The warehouse should have the possibility of being firmly closed in case sterilization with phostoxin gas is required.

### Baking conditions

Baking should be carried out in conditions that are healthy and clean and with enough space for easy movement. All the equipment in the bakery should be clean and in good condition, with regular maintenance to avoid malfunctioning during baking or poor bread quality. All the bread

produced should be of the same high quality. The bakery should be provided with tables and metal racks for carrying bags of bread and keeping it in good condition. The bakery must have a water tank and a reliable source of clean, healthy water. The cooling conveyor belt must be between 30 and 40 m at least. The primary and secondary fermentation process should be suitable for the fermentation process, taking into consideration the differences in temperature between summer and winter. The rate of bread production should be no less than 1.165 kg of bread per 1 kg of wheat flour (with a standard range of between 1.165 and 1.2 kg).

### Bread packaging

All the bread produced should be put into plastic bags made from low-density polyethylene (LDPE). The bakery should be provided with tables and metal racks to carry the bags of bread to be in a good condition. The bread packages should be put into plastic baskets (with a capacity of no more than ten bread bags) for delivery to distribution points. The plastic bread baskets should be stacked at a maximum of five baskets high.

### Contractual services (with bakeries)

There are many kinds of contract with bakeries:

- Purchasing of the bread and distributing it to the beneficiaries, either directly from the bakery or at the sites where beneficiaries gather.
- Providing the bakery with flour and operating costs with a profit margin.
- The contract must include a distribution plan and stipulate the weight of bread packages.
- Use an alternative production line (at the same or in another bakery) in case of any malfunction.
- The distribution point should be no more than 15–20 km away from the bakery.

In general, it is important to know the daily production and full production capacity per day of the bakery, and its working days.

All these activities should be subject to the monitoring and criteria of the organization implementing the programme. The bakeries must submit daily delivery documents signed by the managers of selling points. The documents should be reviewed by the implementing organization, and ideally they should be approved by bakery committees or local councils.

## Service quality

### Distribution/selling points

Spot checks should be carried out at selling point to ensure that prices and weights meet the agreed standards and that posters indicating the intervention details and complaints mechanisms are clearly visible.

## COVID-19 mitigation measures (annex 1)

### Challenges and mitigation measures

#### In the warehouse

- i. Warehouse space: Support the rehabilitation and establishment of warehouses for storing flour at public bakeries.
- ii. Moisture, insects and rodents: Support the sterilization of warehouses and offer training to bakery staff.
- iii. Security against theft: Support and train warehouse guards, and support the installation and use of digital security cameras.
- iv. Flour warehouse: Ensure that warehouses are distant from odorous materials and check their condition.

#### In the bakery

- v. Lack of spare parts.
- vi. Contract with more than one entity (organization).
- vii. Lack of electricity causes yeast damage: use dry yeast.
- viii. Increased number of bread packages in baskets: There should be no more than ten packages per basket.
- ix. Bread moisture percentage: Check that the moisture content is 400–500 litres/MT. The dough should lose 20 percent of moisture while in a cooling system of 40 m.
- x. The extraction rate of the milling affects the bread quality: The best type extraction is 650 g/kg.
- xi. The quality of wheat and the presence of insects or diseases affect the quality of the bread: Mill wheat that is free from sunn pest and insect diseases, which affect the gluten rate.
- xii. Short cooling belt: The standard length is 60 m and it should be at least 40 m.
- xiii. Packaging that does not take into consideration the moisture rate and temperature of the bread: Control the moisture content in the dough, oven and cooling system.

#### With beneficiaries

- xiv. Fake documents: The mitigation measure for this problem is to remove from the distribution list any households that have not accepted bread for five days and replace them with others on the waiting list. When a household does not receive bread temporarily, another household on the waiting list will receive its bread share in its absence.
- xv. Access to beneficiaries by road: The bakeries should be in the targeted areas with presence of communication with LCs.
- xvi. Selection criteria: For free bread in the camps the modality should be blanket distribution, but in the villages distribution should be according to vulnerability criteria. For subsidized bread, blanket distribution should be used in all the targeted areas.
- xvii. Number of selling points: When a lot of selling points are used, monitoring is difficult. Volunteers and/or daily workers can be contracted to cover the gaps.
- xviii. Movement of beneficiaries between locations: Update beneficiary lists on a monthly basis

- and prepare a waiting list for filling gaps when beneficiaries move out of the area covered.
- xix. Beneficiaries' dissatisfaction with the weight of bread packages and the number of packages distributed to each household: Distributions should be based on the minimum needs for adults according to the number of members of the household.
  - xx. Support for beneficiaries interrupted by shortages of wheat flour: Coordinate with other organizations involved in the bread distribution programme, BBCG and the FSL cluster to fill gaps and avoid overlaps or duplication.
  - xxi. Sales/distribution points that are distant from bakeries: The bakeries should be located a maximum of 15 km from the targeted area.
  - xxii. Bakeries work at night and have sold all of their bread by early morning: Appoint a team to work the night shift to resolve this problem. It is preferable to appoint staff and daily workers from target communities, who can work with the bakeries in their areas and avoid having to travel at night to reach them.

## ANNEXES

1. [GOAL Daily Production Form](#)
2. [The Syrian Specification and Marketing Requirements for Dry Yeast](#)
3. [GOAL Price Calculator](#)
4. [GOAL COVID-19 Standard Operating Procedures \(SOP\)](#)
5. [WFP Technical Specifications for fortified wheat flour V4.0/23 May 2011](#)
6. [WFP Technical Specifications for wheat grain for loaf bread V4.0/10 February 2021](#)
7. [Warehouse Inspection Table](#)



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