

## FLAT BREADS

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### Abstract

GOCMEN, D., A. N. INKAYA and E. AYDIN, 2009. Flat breads. *Bulg. J. Agric. Sci.*, 15: 298-306

Flat breads are produced most of the world. But some of them are made mostly by traditional methods in Turkey, Middle East and Northern African countries. Flat breads are either one (single) layered or two (double) layered. Another two sub-groups for single layered flat breads are leavened or unleavened. Two layered flat breads are leavened. The most significant characteristic of flat bread that differs from other loaves or pan ones is that they have lower specific volumes. In this article, you will find a brief summary of the mainly ingredients used in flat bread production, production steps of flat bread, some flat breads produced all over the world and the production methods of the most common Turkish flat breads such as lavas, pide and yufka.

*Key words:* flat bread, yufka, lavas, pide

### Introduction

Flat breads are made throughout most of the world. Examples are tortilla, chapati, pita, parotta, yufka, tandoori roti, sangak, balady, barbari, taftoon, lavas, ciabatta, baati, bafla, phulka, kulcha, gyro bread.

Some flat bread has highly different characteristics rather than high volume pan bread. Some of these are (Coskuner et al., 1999):

- They have lower specific volumes but high crust and crumb ratio than pan bread
- The leavened flat breads have shorter fermentation period in comparison to pan bread
- They have different production conditions coming from higher baking temperature and shorter baking time.

Qarooni (1996) defined flat breads in two groups as one (single) layered or two (double) layered and

he made another two sub-groups for one (single) layered flat bread as leavened and unleavened (risen by a process of yeast fermentation). According to this; whereas barbari, gomme, lavas, tandır, pide, etc. are classified as leavened one (single) layered flat bread, yufka and parotta are classified as unleavened one (single) layered flat bread and Arabic (pita) and baladi, etc. are two layered flat bread.

Freshly baked flat breads are soft and elastic. When kept at room temperature they stale within few hours and become hard and tough. For example; chapatis are generally prepared twice a day for lunch and dinner, and unless eaten immediately after preparation, they stale rapidly and become difficult to chew (Shalini and Laxmi, 2007).

Especially, dietary fibre uses in flat bread production as additive. High dietary fibre ingredients are better in flat breads than pan or hearth breads without

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loss of quality because of more modest flour quality requirements (Qarooni et al., 1992). Barley has been successfully added into single layer flat breads including chapatis (Sidhu et al., 1990) and Turkish bazlama bread (Basman and Koksel, 1999).

Two-layer flat bread is widespread in Middle Eastern and North African countries (Paulley et al. 1998), and is becoming increasingly popular in western countries. Two-layer flat bread is commonly produced from high extraction flour, making it likely to find widespread acceptance as a high dietary fibre food (Izydorczyk et al., 2008). The bioavailability of zinc in cereal depends on the presence or absence of certain dietary factors such as fiber and phytate that adversely affect on the bioavailability of zinc (Franz et al., 1980). Human zinc deficiency is characterized by failure to undergo the sexual development and growth spurt associated with puberty. However, lack of available zinc may have other effects and may be one of the factors for lag of growth beginning in early childhood in Iran (Khaniki, 2005). When the phytate content of bread is reduced by fermentation, Zn absorption has been reported to increase (Navert et al., 1985).

Chapathi, phulka, poori, South Indian parotta and North Indian parotta are the widely consumed traditional products in the Indian subcontinent. These products are becoming increasingly popular and are normally consumed with adjuncts in house holds, industrial canteens, restaurants, etc. Protein supplementation of traditional flat breads like South Indian parotta has great potential in improving the nutritive value of these commonly consumed items (Indrani et al., 2007).

### **Mainly Ingredients Used in Flat Bread Production**

Quality of bread depends on firstly genetics of wheat and its growing conditions, and secondly quantity and quality of raw materials used as well as bread-making methods (Elgun and Ertugay, 1995). What makes the quality of bread is easily digestible, having a delicious and fine aroma, and not easily crumbling or staling characteristics (Aydın, 1993).

### **Flour**

Flat breads such as lavas, taftoon, barbari and sangak are generally produced from soft white wheat flours of higher extraction levels (Tavakolipour and Kalbasi-Ashtari, 2007). Generally flour which has an extraction rate of 80% or below is preferable in several flat bread types (Coskuner et al., 1999). Many studies have been conducted about determining the appropriate soft wheat flour for flat bread production. In one of these studies, they determined that soft white wheat is favourable to make baladi bread (Coskuner et al., 1999; Mutlu, 2003). In another study, researchers worked on finding out the appropriate wheat of many types for Arabic bread which is double layered flat bread and concluded that bread with finest characteristics can be obtained from hard wheat flour containing 10-12 % of protein and over 6% of damaged starch (Qarooni et al., 1987; Coskuner et al., 1999).

It is stated that mixing durum wheat flour and Indian wheat flour has raised the quality in Chapati production. In another research conducted, in comparison to the ones made of bread wheat flour, Arabic bread made of durum wheat flour has a rather softer texture. In durum wheat there happens a more starch damage than soft wheat flour by grinding process. With high proportion of starch damage, water absorption rises and it realizes high starch gelatinization and finally the crumb becomes softer (Coskuner et al., 1999).

Water absorptions of flours used for flat bread production are in wide limits. Although flour that is used for pan bread making has optimum water absorption of 60-65%, flour used for flat bread production has optimum water absorption of varying between 38% and 85% (Coskuner et al., 1999).

### **Water**

Water is a basic component that helps to get a homogenic mixture of other componenets in dough, and providing it with a desired visco-elastic structure as well as very effective on final product quality. Water - as a dissolving agent for many organic or inorganic substances – is a substance that helps dissolving hydrophilic components such as salt, sugar and

insoluble proteins and forms gluten by hydrating insoluble proteins in water (Elgun and Ertugay, 1995).

### **Salt**

It is of more significance that salt -one of the four basic components of bread dough – should be used in an appropriate amount in order to get a high bread quality (Boyacoglu, 1999). It should have a high dissolving level in water and should be physically clean, bright and white (Elgun and Ertugay, 1995).

### **Bakers' yeast or sourdough**

Flat breads may be leavened (have a raising agent of yeast or sourdough) or unleavened (Qarooni, 1996). Bakers' yeast helps forming aroma, maturing dough by fermentation of some fermentable carbohydrates available in dough and rising dough by formation of CO<sub>2</sub> (Elgun and Ertugay, 1995; Talay, 1997).

Sourdough is also used in flat bread fermentation. Sourdough consist of a piece of dough saved from the previous baking that is then mixed with flour, salt and water to produce bread. Sourdoughs are complex biological systems characterized by a dynamic interaction among endogenous lactic acid bacteria (LAB) and yeasts (Gobbetti, 1998; Katina et al., 2005). Sourdough fermentation can modify healthiness of cereals in a number of ways: it can improve texture and palatability of whole grain, fibre-rich or gluten-free products, stabilise or increase levels of various bioactive compounds, retard starch bioavailability (low glyceamic index products) and improve mineral bioavailability (Katina et al., 2005).

## **Production Steps of Flat Breads**

### **Mixing and kneading**

Most food systems containing wheat flour are started by mixing flour, salt, water and various other ingredients to form dough (Hoseney, 1988). Bakers' yeast or sourdough are also used in leavened products. Dough mixing involves the combining and blending of the formula ingredients (Pyler, 1988).

### **Resting**

Many types of flat bread are made of unleavened dough without fermentation. Since it is not fermented, it is agreed on that it should have a resting time of 30

to 60 min in order to gain enough water absorption for starch and proteins in dough after mixing. Resting time for flat bread generally shorter. Because they are mostly produced from weak wheat flour, and so a lower development of dough occurs. On the other hand, an excessive resting period causes loss in flat bread quality (Hoseney, 1988; Coskuner et al., 1999).

### **Fermentation**

Many types of flat bread are made of leavened dough with fermentation. Dough is fermented by bakers' yeast or sourdough. The major products of yeast fermentation are carbon dioxide and ethanol. Gas is retained and dough is leavened during fermentation (Hoseney, 1988). Sourdough fermentation has a positive effect on bread quality because it improves bread flavor (Hansen and Hansen, 1994; Thiele et al., 2002) and texture (Korakli et al., 2001) and prolongs shelf life due to the formation of antifungal compounds (Lavermicocca et al., 2000) and delays staling (Corsetti et al., 1998).

### **Dividing-rounding-sheeting**

The dough is divided into individual loaf-sized pieces (Hoseney, 1988). Dough pieces are made round in order to get a gas retention capability and good flattening (Boyacoglu, 1999). The sheeting dough is a very important phase in terms of removing the gas inside its structure. Depending on the type of flat bread, dough is sheeted 2 to 10 mm thickness. Variation in flat bread thickness affects the quality in a great extent (Coskuner et al., 1999).

### **Baking**

There needs to bake it in special ovens in high temperatures varying 350-550°C for a quality flat bread production (Quail et al., 1990). Some flat bread is baked on an overheated hot plate with different shapes of dough. For example, yufka is baked on a hot plate for 15-30 seconds, lavas is baked on the oven walls at 320°C for 15-40 seconds and pide is baked in the oven at 320°C for 18 minutes (Talay, 1997), pita bread is baked in the oven at 370-500°C for 30-45 seconds (Pyler, 1988). When flat bread is baked at high temperatures in a shorter time, they receive better crust characteristics (Coskuner et al., 1999).

## Some Important Flat Bread Produced All Over the World

### *Chapati*

It is an unleavened one (single) layered Indian flat bread. Chapatti made from whole-wheat flour is usually consumed immediately after preparation. Almost 80% of the wheat produced in India is consumed in the form of chapatti. The formulation of chapatti is wheat flour, salt, oil and an appropriate amount of water (Shalini and Laxmi, 2007).

Chapatis are generally circular in shape of about 0.150 m diameter and 0.002 m thickness. Traditionally, chapatis are prepared by making a dough of whole wheat flour (Atta) or resultant Atta and water followed by resting and sheeting of the dough and are consumed fresh. Preparation of chapatis are generally done in domestic kitchens and canteens/hotels. With a change in life styles due to industrialization and urbanization, there is considerable commercial potential for the mechanized production of chapatis catering for the demand for ready-to-eat and easy-to-carry foods, which can be marked in unit packs similar to bread (Sridhar and Manohar, 2001). Chapatis are generally prepared twice a day, and unless eaten immediately after preparation, these stale rapidly and become difficult to chew. Freshly-baked chapatis are soft, pliable and elastic but when kept at room temperature they stale within few hours and become tough and rigid. In view of the fact, that chapatis may be manufactured on large mechanized scale and distributed, the staling of chapatis may become a critical factor consideration (Shaikh et al., 2007).

### *Tandoori roti*

It is an unleavened one (single) layered flat bread. It is prepared from a dough made by kneading flour, various amount of water and salt (Saxena et al., 2000). The dough is sheeted and baked in a tandoor. The tandoor is an oval in-ground oven, the walls of which are plastered with clay. It is heated by burning wood or natural gas. The sheeted dough is placed on a cloth pad and, with the help of a pad, is pasted to the heated walls of the tandoor. Depending upon the heat in the

tandoor, the roti is baked for 60 to 90 s (Singh et al., 2000).

### *Sangak*

This is an Iranian sourdough flat bread. It is leavened one (single) layered flat bread. Sangak is 70 to 80 cm long, 40 to 50 cm wide, and 3 to 5 mm thick. The bottom crust is full of indented blisters from heated pebbles in the oven hearth on which it is baked. The top crust has many small blisters and usually is sprinkled with sesame or poppy seeds. The ingredients, flour, water, sourdough, and salt, are mixed and fermented for 2 h. A portion of the dough (500g) is sheeted on a special convex peddle, docked, and transferred onto the hot pebbles of the oven. The temperature of pebbles varies from 350 to 500°C and the baking time from 2 to 4 min (Qarooni, 1996).

### *Tanoor bread*

It (also known as taftoon bread) is an leavened one (single) layered, flat and docked. Docking is used for decoration, as well as for preventing pocket formation during baking. It is popular in the South western part of Iran. Tanoor bread requires flour, active dry yeast, salt, and various amounts of water. The processing steps are mixing, dividing, proofing, sheeting, docking, baking and packaging. Crust color is reddish brown. High quality tanoor bread has a uniform thickness with an even distribution of small blisters on the top crust (Farvili et al., 1997).

### *Rye flat bread*

This type of flat bread is produced in the Scandinavian countries. It was prepared by mixing a blend of barley, oat and rye flours with water, rolling the dough to a thin layer, and baking on a hot plate. Traditional production of Finnish sour rye flat bread includes a well-developed sourdough starter, rye flour, wheat flour, yeast, salt, sugar and water. All ingredients are mixed to develop a cohesive dough and allowed to ferment for 45 min. Dough pieces of 400 g are rounded and sheeted to 0.7 to 1.0 cm thickness. A round (5.0 cm diameter) central portion of the sheeted dough is cut and removed. It is then fermented for 30 to 45 min and baked at 230°C for 30 min (Qarooni, 1996).

### **Parotta**

It has been consumed widely in southern parts of India. South Indian parotta is an unleavened one (single) layered, flat, circular and creamish white coloured product (Indrani and Rao, 2000). It possesses light brown spots on the surface, a soft pliable handfeel, soft and slightly chewy texture, with distinct layers, optimum oiliness, easy breakdown in the mouth and with typical pleasant taste and aroma (Indrani and Rao, 2004). Parotta is prepared from wheat flour, salt and water. Sugar and egg are used optional ingredients. The dough after a rest period of 30 min is rounded, relaxed and spread into a very thin film with application of oil on the surface of the dough. Then the sheeted dough is folded, coiled, rested and again sheeted into a circular shape and baked (Indrani and Rao, 2000).

### **Tortilla**

Tortilla is a very common food in Central and South America but are becoming an important snack or bread substitute all over the world. It is thin, unleavened one (single) layered flat bread, made from finely ground maize (corn) or wheat flour and is characterized by a flexible texture and easy handling of the product (Scazzina et al., 2008). Wheat flour tortilla is baked products that have been produced in Mexico for centuries. The major ingredient of flour tortillas is wheat flour. The final product can be defined as a flat, circular, light-coloured bread. Tortillas are generally eaten with beans, meats, cheese, avocados, spreads, and other ingredients (Waniska, 1999). Corn tortilla is commercially produced from masa, ground nixtamalized whole grain corn, and water (Arambula et al., 1999).

Tortilla is produced from mixing of flour, salt and water. The dough is mixed and divided into pieces. Dough pieces are passed twice through two pairs of sheeting rolls. After the first passage, an oval shaped flat dough is formed. It is then passed through the second pair of sheeting rolls, which are fixed at a 90° angle to the other pair. After the second passage, a round shape is produced. Finally, they are hand stretched to the final shape and thickness. Tortilla

dough pieces are baked in a three-tier oven (Qarooni, 1996).

### **Pita**

Pita breads are circular, leavened two (double) layered flat breads that have their origin in the Middle East and are variously called Arabic bread, balady, shamy, Syrian bread and pocket bread. Pita breads is made with flour, water, bakers' yeast and salt. In pita bread production, all the ingredients are mixed into a fully developed dough with a temperature of 24.5-25.5°C and fermented for about 1 h. The dough is then scaled, rounded by means of a rounding belt, and given an intermediate proof of 15 to 20 min. The relaxed dough pieces are sheeted and then undergo a final proof of 30 min in a cabinet maintained at a temperature of 30°C and relative humidity of 95%. Then the dough sheets are deposited on the hot oven hearth for baking. The two layered structure or pocket formation of pita breads is created by steam during baking in a hot oven at 370-500°C. Exposure of the flat loaves to the very high temperatures in the oven causes an almost instantaneous formation of top and bottom crusts. As the heat penetrates the interior of the loaf, it transforms the interior moisture into steam within some 30-45 seconds. The steam, being confined by the external crust, expands the loaf into a puffed-up form that consists essentially of only the top and bottom crusts. The interior void thus created by this baking method then forms the "pocket" when the puffed-up loaf collapses on cooling (Pyle, 1988).

### **Bazlama**

It can be defined as a single layered, flat, circular and leavened bread with a creamy yellow color. It has an average thickness of 3 cm and diameters ranging from 10 to 20 cm (Coskuner and Karababa, 2005). Bazlama is produced in Turkey and the Middle East countries.

## **The Most Common Traditional Turkish Flat Breads**

Nowadays, there is an increased interest in the production of cereal based ethnic foods, especially various types of flat breads such as yufka, lavas and pide



in Turkey. Most of flat breads are generally home-made and are widely consumed in the villages, but are now increasing in popularity in the cities in Turkey (Coskuner and Karababa, 2005). Some types of the Turkish flat bread are; lavas, yufka, pide, bazlama and gomme. They are made either leavened or unleavened.

### Lavas

Lavas is a leavened, one (single) layered flat bread. It is elliptical shaped, 20 to 30 cm long, 10 to 20 cm wide, and 3 to 5 mm thick (Figure 1). Flour, salt, water and bakers' yeast are the ingredients (Tekeli, 1970; Talay, 1997). The production of lavas is given Figure 2.

In lavas production, all the ingredients are mixed and kneaded into a fully developed dough and fermented for 30-60 min at 30°C. The dough is then scaled, divided, rounded and given a final proof of 15 to 20 min at 30°C and then dough pieces are sheeted. They are baked at a temperature of 320°C for 15-40 seconds. They are placed on a special oven and kept at oven walls for baking (Tekeli, 1970; Talay, 1997).

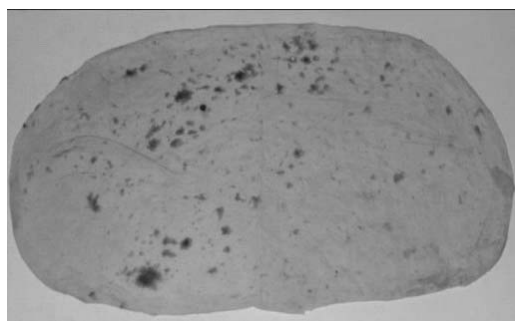
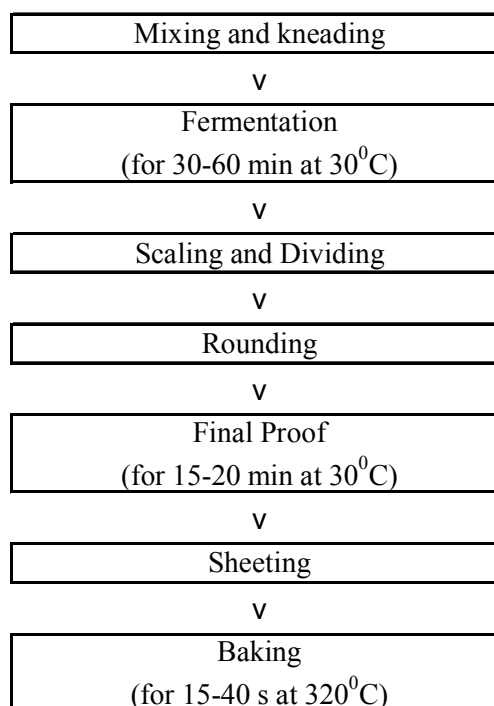


Fig. 1. Lavas

### Pide

It is a kind of circular shaped flat bread made of leavened dough of slight viscosity and is mostly consumed in the holy month of Ramadan in a thickness of 1.5-2 cm and in a diameter of 20-25 cm (Tekeli, 1970) (Figure 3). Flour, salt, water, shortening, sugar, bakers' yeast and some additives are used for pide production. Figure 4 shows the production steps of pide. Pide looks like Iranian barbari and Indian tandoori naan bread.

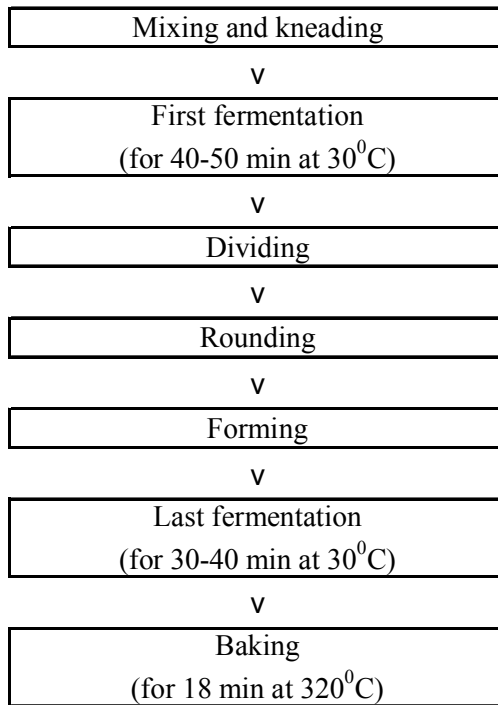


Flour, salt, water, shortening, sugar, bakers' yeast and some additives are mixed and kneaded. During kneading process, 4/5 of water is added at first and the rest is together with an addition of bakers' yeast. It is kneaded for 15-20 min in order to obtain ho-



Fig. 3. Pide

mogenous dough. The dough which is first fermented for 40-50 min at 30°C is divided in an appropriate weight and rounded. After that, it is formed and is last fermented for 30-40 min at 30°C. It is baked at a temperature of 320°C at 18 min in the oven (Talay, 1997).

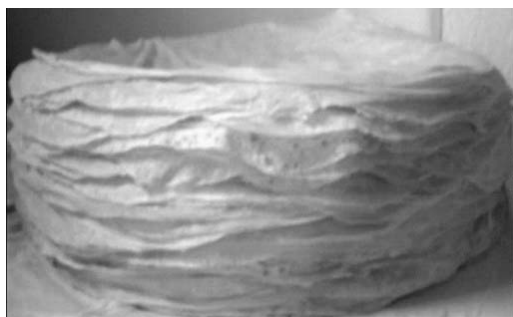


**Fig. 4. Pide production**

### *Yufka*

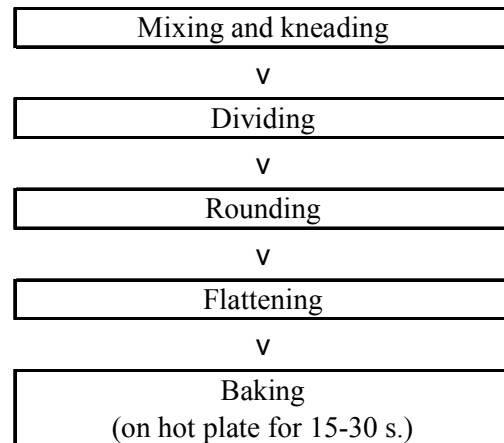
Yufka can be defined as circular, cream-colored, and unleavened single layered flat bread in Turkey (Figure 5). Yufka should be uniform in diameter, well baked, have a cream-colored surface, and its flexibility (ability to roll) should be excellent (Basman and Koksels, 2001). It is a kind of flat bread which is 1 to 2 mm thickness, 40 to 50 mm diameter (Anonym., 1992). The production of yufka is shown in Figure 6.

In yufka production, firstly flour is mixed with water, salt, little vinegar or lemon juice and very little olive oil and kneaded. Dough is divided in pieces in



**Fig. 5. Yufka layers**

different weights of any demand and rounded. It is flattened in homes by a roller or a rolling pin. But in big enterprises, it is flattened by yufka-making tools and then is baked in a shorter time on a hot plate (Tekeli, 1970; Anonymous, 1992). Both of sides of it are baked on hot plate for 15-30 seconds (Figure 7).



**Fig. 6. Yufka production**



**Fig. 7. Baking of yufka on hot plate**

## Conclusion

Flat bread is made mostly by traditional methods in Turkey, Middle East and Northern African countries. Some types of the Turkish flat bread are; lavas, yufka, pide, bazlama and gomme. Flat breads are made either leavened or unleavened. They are also divided into two major groups: one (single) layered and two (double) layered. Double layered flat breads are leavened with baker's yeast or sourdough. Single layered flat breads are made as both leavened and unleavened.

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