SCRIPT

Wheat is one of the major important cereal crops in the world. In 2010 world production of wheat was 651 million tons, making it the third most-produced cereal after maize (844 million tons) and rice (672 million tons). In 2009, world production of wheat was 682 million tons, making it the second most-produced cereal after maize (817 million tons) and with rice as close third (679 million tons). Approximately 70% of the world wheat production is used as food, mainly as bread and cookies, and also as a source of proteins and dietary fiber for many people around the world.

A.Major cultivated species of wheat

1.Hexaploid Species:

Bread wheat or common wheat (T. aestivum) is a hexaploid species that is the most widely cultivated in the world. Spelt (T. spelta) is another hexaploid species is cultivated in limited quantities. Spelt is sometimes considered a subspecies of the closely related species common wheat (T. aestivum), in which case its botanical name is considered to be Triticum aestivum subsp. spelta.

Tetraploid Species:

Durum wheat (T. durum) is the only tetraploid form of wheat widely used today, and the second most widely cultivated wheat.

Emmer wheat (T. dicoccum) is a tetraploid species, cultivated in ancient times but no longer in widespread use.

Diploid Species:

Einkorn wheat (T. monococcum) is a diploid species with wild and cultivated variants. Domesticated at the same time as emmer wheat, but never gained the same importance.

Classes used in the United States:

In a general way wheats, are classified according to (1) the texture of endosperm, because this characteristic of the grain is related to the way the grain breaks down in milling, and (2) the protein content, because the properties of the flour and its suitability for various purposes are related to this characteristic.

Vitreous and mealy wheats

The endoserm texture may be vitreous (steely, flinty, glassy, horny) or mealy (starchy, chalky). The specific gravity of vitreous grains is generally higher than that of mealy grains. Thus, T. aegilopoides, T. dicoccoides, T. monococcum and T. durum are species with vitreous kernels, whereas T. compactum and T. aestivum are mealy.

Hard and soft wheats

Vitreous grains tend to be hard and strong, mealy grains tend to be soft and weak. Well-washed prime starch separated from wheat endosperm contains some 0.15-0.20% by weight of protein-“starch granule protein” (SGP). It has been found that one particular polypeptide of the surface SGP, with Mr 15k, named friabilin is strongly present in all soft wheats examined, but only weakly present in hard (T. aestivum) wheats, and completely absent from the very hard durum (T. durum).

Hard Red Spring – Hard, brownish, high-protein wheat used for bread and hard baked goods. Bread Flour and high-gluten flours are commonly made

from hard red spring wheat. It is primarily traded at the Minneapolis Grain Exchange.

Hard Red Winter – Hard, brownish, mellow high-protein wheat used for bread, hard baked goods and as an adjunct in other flours to increase protein in pastry flour for pie crusts. Some brands of unbleached all-purpose flours are commonly made from hard red winter wheat alone. It is primarily traded on the Kansas City Board of Trade. One variety is known as "turkey red wheat", and was brought to Kansas by Mennonite immigrants from Russia.

Soft Red Winter – Soft, low-protein wheat used for cakes, pie crusts, biscuits, and muffins. Cake flour, pastry flour, and some self-rising flours with baking powder and salt added, for example, are made from soft red winter wheat. It is primarily traded on the Chicago Board of Trade.

Hard White – Hard, light-colored, opaque, chalky, medium-protein wheat planted in dry, temperate areas. Used for bread and brewing.

B. Structure of wheat grain:

Wheat kernels are 5–8 mm in length, 2.5–4.5 mm in width, and 30–45 mg in weight. The wheat kernel can be divided into three distinct morphological parts: the endosperm, which makes up most of the grain; the bran layer, which surrounds the grain; the germ, which includes the embryo and the scutellum. The dorsal side of the wheat grain is rounded and the ventral side has a deep groove or crease along the entire longitudinal axis. At the apex or small end of the grain is a cluster of short, fine hairs known as brush hairs. The pericarp or dry fruit coat consists of four layers: epidermis, hypodermis, cross cells and tube cells. The remaining tissues of the grain are the inner bran (seed coat and nucellar tissue), endosperm, and embryo (germ). The aleurone layer consists of large, rectangular, heavy-walled, starch-free cells. Botanically, the aleurone is the outer layer of the endosperm, but as it tends to remain attached to the outer coats during wheat milling.

The embryo (germ) consists of the plumule and radical, which are connected by the mesocotyl. The scutellum serves as an organ for food storage. The outer layer of the scutellum, the epithelium, may function as either a secretory or an absorption organ. In a well-filled wheat kernel, the germ comprises 2-3% of the kernel, the bran 13-17%, and the endosperm the remainder. The inner bran layers (the aleurone) are high in protein, whereas the outer bran (pericarp, seed coats, and nucellus) is high in cellulose, hemicelluloses, and minerals; biologically, the outer bran functions as a protective coating and remains practically intact when the seed germinates. The germ is high in proteins, lipids, sugars, and minerals; the endosperm consists largely of starch granules imbedded in protein matrix.

C. Products of wheat

Wheat’s which have a high protein (i.e., gluten,12-14%) content are called “strong wheat or hard wheat” and generally used to produce bread, whereas those which have low protein (i.e., gluten, 8-11%) content are called “soft wheat or weak what” and generally used for making biscuits, cookies, and cakes. Hard flour, or bread flour, is high in gluten and has elastic toughness that holds its shape well once baked. Soft flour is comparatively low in gluten and so results in a finer or crumbly texture. Soft flour is usually divided into cake flour, which is the lowest in gluten, and pastry flour, which has slightly more gluten than cake flour. Wheat gluten is composed of two components i.e., gliadin and glutenin. Gliadin exhibits dough viscosity and extensibility,

while glutenin exhibits dough elasticity. Raw wheat can be ground into flour or, using hard durum wheat only, can be ground into semolina; germinated and dried creating malt; crushed or cut into cracked wheat; parboiled (or steamed), dried, crushed and de-branned into bulgur also known as groats. If the raw wheat is broken into parts at the mill, as is usually done, the outer husk or bran can be used several ways. Wheat is a major ingredient in such foods as bread, porridge, crackers, biscuits, Muesli, pancakes, pies, pastries, c akes, cookies, muffins,rolls, doughnuts, gravy, boza (a fermented beverage), and breakfast cereals. Breads, cookies, cakes, crackers, macaroni, spaghetti, and other forms of pasta are made from flour, which is ground up kernels of wheat.

Bread

Wheat is the principal cereal used for bread making. Other cereals, particularly rye, are also used to some extent. Bread is usually made from a wheat-flour, water, salt and is cultured with yeast, allowed to rise, and finally baked in an oven. Other ingredients which may be added include flours of other cereals, fat, malt, flour, yeast foods, emulsifiers, milk, and milk products, fruit. Owing to its high levels of gluten (which give the dough sponginess and elasticity), common wheat (also known as bread wheat) is the most common grain used for the preparation of bread. There are a few basic steps which form the basis of all bread making. They can be listed as follows:

• The mixing of wheat flour and water, together with yeast and salt, and other specified ingredients in appropriate ratios.
• The development of a gluten structure in the dough through the application of energy during mixing, often referred to as ‘kneading’.
• The incorporation of air bubbles within the dough during mixing.
• The continued ‘development’ of the gluten structure created as the result of kneading in order to modify the rheological properties of the dough and to improve its ability to expand when gas pressures increase because of the generation of carbon dioxide gas in the fermenting dough. This stage of dough development may also be referred to as ‘ripening’ or ‘maturing’ of the dough.
• The creation and modification of particular flavour compounds in the dough.
• The sub-division of the dough mass into unit pieces.
• A preliminary modification of the shape of the divided dough pieces.
• A short delay in processing to further modify physical and rheological properties of the dough pieces.
• The shaping of the dough pieces to achieve their required configurations.
• The fermentation and expansion of the shaped dough pieces during ‘proof’.
• Further expansion of the dough pieces and fixation of the final bread structure during baking.

Breadmaking processes

Most of the desirable changes resulting from ‘optimum’ dough development, whatever the bread making process, are related to the ability of the dough to retain gas bubbles (air) and permit the uniform expansion of the dough piece under the influence of carbon dioxide gas from yeast fermentation during proof and baking. The creation of dough with a more extensible character is especially important for improved gas retention while reductions in dough resistance and elasticity play a major role in the modification of bubble structures during processing. Until about 40 years ago the necessary changes

were achieved by mixing the dough and allowing it to rest for a defined period of time (several hours) as a large mass before dividing the bulk dough and processing the unit pieces. The development of no-time (i.e. no resting time in bulk before dividing) dough making processes changed traditional bread making. Foremost amongst the process changes was the development and commercialisation of the Chorleywood Bread Process (CBP). In the CBP the development of optimum dough qualities was achieved in the mixer by transferring a defined energy input to the dough. The result of the introduction of the CBP was to eliminate the need for bulk fermentation periods with considerable raw material and time savings, as well as to initiate changes in ingredient and processing technologies which are still evolving today. The principles of the CBP were adopted in many countries around the world. Even in those bakeries which did not adopt the CBP there has been a similar trend away from long periods of bulk fermentation to shorter processing times and the use of more functional ingredients to achieve more consistent bread quality.

Bread types

Many different bread types have been evolved with the passage of time and all require their own individual bubble structures, processing techniques, processing equipment and process control mechanisms. The main bread types can be divided into four broad categories:

1. Pan breads – that is, products based on placing a piece of dough in a metal pan for the proving and baking stages. Commonly the pan will be rectangular, though round pan shapes are known. Sometimes the pan may have a separate lid fitted to more tightly control product shape. Examples are the sandwich loaf (lidded), open-top pan breads, pan coburgs (round, unlidded), milk rolls (round, lidded) and malt loaves (baked under inverted pans).
2. Free-standing breads – that is where the dough product is proved and baked without the aid of a pan to constrain and support the sides of the dough. This approach leads to a crustier product. Examples of this type of product include, bloomers, cottage loaves and coburgs.
3. Baguettes, pain Parisien and other products made as long, stick-shaped loaves. Sometimes placed on indented trays for proving and baking. Typically these products will have a high degree of crust formation and characteristic surface markings.
4. Rolls and other small fermented breads baked on trays or indented pans. These products will have higher levels of sugar and fat in the recipe and so typically will have a sweeter flavour and softer eating character. The process by which bread quality is determined still relies heavily on subjective assessment (Cauvain, 1998b). Broadly there are groups of attributes which will be taken into account:

• External character which encompasses product dimensions, volume, appearance, colour and crust formation.
• Internal character which considers the sizes, numbers and distribution of cells in the crumb (crumb grain), the crumb colour and any major quality defects, such as unwanted holes or dense patches, visible in a cross section of the product. Each bread type has its own special cell structure requirements and therefore there is no single standard which can be applied to all products.
• Texture, eating quality and flavour. In assessing texture we are concerned with its mechanical properties such as firmness and resiliency.

Cookies and Biscuits

The term “biscuit” is used in Britain to describe a flat, crisp, baked good; the term “cookie” is reserved for something softer and thicker, or for a food made to an American recipe. In United States the term “cracker” is reserved for biscuits of a low sugar and fat content. Cookies are most commonly baked until crisp or just long enough that they remain soft, but some kinds of cookies are not baked at all. Cookies are made in a wide variety of styles, using an array of ingredients including sugars, spices, chocolate, butter, peanut butter, nuts or dried fruits. The softness of the cookie may depend on how long it is baked. Cookies are broadly classified according to how they are formed, including at least these categories:

Bar cookies consist of batter or other ingredients that are poured or pressed into a pan (sometimes in multiple layers), and cut into cookie-sized pieces after baking. In British English, bar cookies are known as "tray bakes". Examples include brownies, fruit squares, and bars such as date squares.

Drop cookies are made from relatively soft dough that is dropped by spoonfuls onto the baking sheet. During baking, the mounds of dough spread and flatten. Chocolate chip cookies (Toll House cookies), oatmeal (or oatmeal raisin) cookies and rock cakes are popular examples of drop cookies.

Filled cookies are made from rolled cookie dough filled with a fruit or confectionery filling before baking. Hamantash are a filled cookie.

Molded cookies are also made from stiffer dough that is molded into balls or cookie shapes by hand before baking. Snickerdoodles and peanut butter cookies are examples of molded cookies. Some cookies, such as hermits or biscotti, are molded into large flattened loaves that are later cut into smaller cookies.

No-bake cookies are made by mixing filler, such as cereal or nuts, into a melted confectionery binder, shaping into cookies or bars, and allowing to cool or harden. Oatmeal clusters, Rice Krispies Treats and Rum balls are all no-bake cookies.

Pressed cookies are made from soft dough that is extruded from a cookie press into various decorative shapes before baking. Spritzgebäck are an example of a pressed cookie.

Refrigerator cookies (also known as icebox cookies) are made from a stiff dough that is refrigerated to become even stiffer. The dough is typically shaped into cylinders which are sliced into round cookies before baking. Pinwheel cookies are representative.

Rolled cookies are made from stiffer dough that is rolled out and cut into shapes with a cookie cutter. Gingerbread men are an example.

Sandwich cookies are rolled or pressed cookies that are assembled as a sandwich with a sweet filling. Fillings include marshmallow, jam, and icing. The Oreocookie, made of two chocolate cookies with a vanilla icing filling, is an example.

Cookies also may be decorated with an icing, especially chocolate, and closely resemble a type of confectionery.

Cracker

A cracker is a baked good typically made from grain flour dough and usually manufactured in large quantities. Crackers (roughly equivalent to savory biscuits in the United Kingdom) are usually flat, crisp, small in size (usually 3 inches or less in diameter) and made in various shapes, commonly

round or square. Flavorings or seasonings, such as salt, herbs, seeds, and/or cheese, may be added to the dough or sprinkled on top before baking. Crackers are often branded as a nutritious and convenient way to consume a staple food or cereal grain. Crackers are eaten on their own or can accompany other food items, such as cheese or meat slices; dips; or soft spreads such as jam, butter, or peanut butter. Bland or mild crackers are sometimes used as a palate cleanser in food product testing or flavor testing, between samples.

The holes are placed in the dough to stop overly large air pockets from forming in the cracker while baking. Crackers come in many shapes and sizes - round, square, triangular, etc.

In U.S. English, the name "cracker" is most often applied to flat biscuits with a savory, salty flavor, in distinction from a "cookie", which may be similar to a "cracker" in appearance and texture, but has a sweet flavor. Crackers may be further distinguished from cookies by the manner in which they are made. Crackers are made merely by layering dough and cookies may be made in many of the same manners a cake would be prepared. Crackers sometimes have cheese or spices as ingredients, or even chicken stock. Crackers are typically salted flour products.

Cake

Cake is defined as an edible, (un)leavened, baked, sweet flour confectionary, often enriched with other minor compounds for appearance, typically round and flat in shape. Modern cake, especially layer cakes, normally contain a combination of flour, sugar, eggs, and butter or oil, with some varieties also requiring liquid (typically milk or water) and leavening agents (such as yeast or baking powder). Flavorful ingredients like fruit purées, nuts, dried or candied fruit, or extracts are often added, and numerous substitutions for the primary ingredients are possible. Cakes are often filled with fruit preserves or dessert sauces (like pastry cream), iced with butter cream or other icings, and decorated with marzipan, piped borders or candied fruit.

Cake is often the dessert of choice for meals at ceremonial occasions, particularly weddings, anniversaries, and birthdays. There are countless cake recipes; some are bread-like, some rich and elaborate, and many are centuries old. Cake making is no longer a complicated procedure; while at one time considerable labor went into cake making (particularly the whisking of egg foams), baking equipment and directions have been simplified so that even the most amateur cook may bake a cake. Cakes are broadly divided into several categories, based primarily on ingredients and cooking techniques.

Chemically leavened cakes by gaseous development from baking powders, including carbonates, ammonia, acetone and ethanol.

Yeast cakes are the oldest and are very similar to yeast breads. Such cakes are often very traditional in form, and include such pastries as babka and stollen.

Cheesecakes, despite their name, aren't really cakes at all. Cheesecakes are in fact custard pies, with a filling made mostly of some form of cheese (often cream cheese, mascarpone, ricotta or the like), and have very little flour added, although a flour-based or graham cracker crust may be used.

Cheesecakes are also very old, with evidence of honey-sweetened cakes dating back to ancient Greece.
Sponge cakes are thought to be the first of the non-yeast-based cakes and rely primarily on trapped air in a protein matrix (generally of beaten eggs) to provide leavening, sometimes with a bit of baking powder or other chemical leaven added as insurance. Such cakes include the Italian/Jewish pan di Spagnaand the French Génoise. Highly decorated sponge cakes with lavish toppings are sometimes called gateau; the French word for cake.
Butter cakes, including the pound cake and devil's food cake, rely on the combination of butter, eggs, and sometimes baking powder or bicarbonate of soda to provide both lift and a moist texture. Beyond these classifications, cakes can be classified based on their appropriate accompaniment (such as coffee cake) and contents (e.g. fruitcake or flourless chocolate cake).
Raw materials
↓
Raw material weighing and mixing
↓
Dividing
↓
Rounding and sheeting
↓
Fermentation and proving
↓
Baking
↓
Decoration
↓
Packaging

Pasta
Pastas (alimentary pastes) are among the simplest cereal products used in the human diet. The alimentary pasts include foods such as spaghetti, macaroni, vermicelli, and noodles. Ideally, they are made by mixing durum wheat semolina or flour, common wheat farina or flour, or various combinations of these, water and optional ingredients such as egg, spinach, tomato, herbs, etc.
a.Macaroni
Macaroni is a variety of dry pasta made with durum wheat. Elbow macaroni noodles normally do not contain eggs, (although they may be an optional ingredient) and are normally cut in short, hollow shapes; however, the term refers not to the shape of the pasta, but to the kind of dough from which the noodle is made. Although home machines exist that can make macaroni shapes, macaroni is usually made commercially by large-scale extrusion. The curved shape is caused by the different speeds on either side of the pasta tube as it comes out of the machine. The name derives from Italian "maccheroni", however Italians use "maccheroni" to refer to any form of pasta, whatever the shape, whether it is straight, tubular, two-inch or longer pasta. A different name, "chifferi" is used to refer to the elbow pasta shape of this article.
Spaghetti

Spaghetti is a long, thin, cylindrical pasta of Italian origin. Spaghetti is made of semolina or flour and water. Italian dried spaghetti is made from durum wheat semolina, but outside of Italy it may be made with other kinds of flour. Traditionally, most spaghetti was 50 cm (20 in) long, but shorter lengths gained in popularity during the latter half of the 20th century and now spaghetti is most commonly available in 25–30 cm (10–12 in) lengths. Spaghetti is cooked in a large pot of salted, boiling water then drained in a colander (scolapasta in Italian). In Italy, spaghetti is generally cooked al dente (Italian for to the tooth), just fully cooked and still firm. Outside Italy, spaghetti is sometimes cooked to a much softer consistency. Spaghettini is thicker spaghetti which takes more time to cook. Spaghettini and vermicelli are very thin spaghetti (both of which may be called angel hair spaghetti in English) which takes less time to cook.