K-STATE
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Judge's Guide for Foods and Nutrition Exhibits

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Contents

Introduction

Purpose of Food and Nutrition Exhibits

The purpose of 4-H food and nutrition exhibits is to provide an opportunity for 4-Hers to share what they learned in project work. When exhibits are judged, members have an opportunity to:

1. Be recognized for their efforts.
2. Gain satisfaction from doing, striving and learning.
3. Be inspired to do their best.
4. Learn expected standards.
5. Practice good sportsmanship and self control.

Purpose of the Manual

Judging baked foods at county and state fairs is a challenge. This manual contains guidelines and information that will assist judges in evaluating products. It will also provide useful information for Family and Consumer Science professionals, project leaders, parents and 4-Hers as they assist others, or prepare and evaluate their own food products.

Judging Food Products

Judging food products requires a knowledge and understanding of basic food science principles, good nutrition, sensory qualities of an optimum product and the factors that contribute to the success or failure of the product.

This publication defines the standard for typical baked food products that you will find in most 4-H Foods and Nutrition divisions. With the recent changes in the projects, many counties now offer exhibitors the opportunity to exhibit perishable food products. It is important that safe food practices always be followed for all exhibits, especially for perishable foods. Be sure that cold foods are kept cold and hot foods hot. Standards for perishable foods are not readily accessible, but you should be able to adapt the scorecard used at the Kansas State Fair, available on the Kansas 4-H website (*www.kansas4H.org*), for both perishable and non-perishable foods.

Human judgment is individual and subjective. Therefore, in order to be fair and consistent the judge must know the standard for evaluating each product. First impressions may not always be accurate. A lopsided cake may be just as tender as a symmetrical one. Evaluate all factors carefully – appearance color, density, tenderness, texture, and flavor – before making a final judgment. The judge must be careful to not let personal likes and dislikes influence or bias evaluation.

Evaluate the product as you see it. Begin and end with a positive approach. Emphasize the strong points; make suggestions for improving the weak. Evaluate each product on its own merit. In Kansas 4-H, compare the product to the standard, not to other exhibitors' products. This type of judging is called the Danish System. Each exhibit is compared to the standard, and every exhibit is awarded a ribbon as it meets the criteria for the following ribbon color groups:

Purple	outstanding on all standards
Blue	exceeds minimum standard, but may have minor flaws where improvements can be made
Red	meets all minimum standards and may have visible signs of needed improvements
White	fails to meet minimum standards

When you are asked to name a champion exhibit, of course you will need to compare exhibits against each other. Most open class divisions use the American System. In this system, exhibits are compared to each other, and the top exhibits receive a different colored ribbon and are ranked first, second, and third, or as deep as the superintendent instructs you. Not all exhibits may receive a ribbon.

Conference Evaluation

Most 4-H divisions now use conference evaluation as the preferred method of judging. This requires the 4-H member to be present. If the member is not present, judge the product against the standard, and use a score card and written comments to communicate your reasons for the placing.

Conference evaluation is designed to increase the value of the 4-H judging experience for both the 4-H exhibitor and the judge. The process

involves an experienced and knowledgeable judge interviewing the 4-H member while evaluating the project exhibit against a standard.

Benefits to the Member:

- Improves communication and other life skills.
- Recognizes personal success and progress.
- Encourages new ideas.
- Learns from the experience of the judge.
- Explains personal goals and objectives of the project.
- Describes methods and procedures used in the exhibit.
- Asks direct questions and gets firsthand information.
- Develops empathy as a decision maker.
- Benefits to the Judge:
- Helps the member feel good about the project.
- Shows the members that the exhibit is being judged, not the member.
- Finds out what the member wanted to achieve.
- Hears what processes were used to create the exhibit.
- Asks direct questions and gets firsthand information.
- Provides a learning experience for the member, parents and the public observing the judging by making open comments about the strengths and weaknesses of the exhibit, with recommendations for improvement.

Recipe for Conference Evaluation:

- Get acquainted, introduce yourself; call the 4-H'er by name.
- Begin positively.
- Be friendly and encouraging.
- Ask "sharing" questions. "How did you make this?"
- Ask "process" questions. "Was this hard to do?"
- Begin to ask questions that "generalize." "What would you do differently?"
- Finish with questions that "apply" to the real world. "When would you serve this bread to your family?"
- Be sensitive to the member's personality and needs.
- Use accepted standards to evaluate.
- Explain the placing, giving suggestions for improvements, if needed.

When You Evaluate Baked Products

Use your senses.

- **Look**
- **Touch**
- **Smell**
- **Taste**
- Look at the outside appearance of products — color, shape, and size.
- Lift product for lightness and texture.
- Touch the crust and check for a velvety, moist surface.
- Cut it with a sharp, smooth-edged knife to observe grain. Cut a 1-inch slice of cake from near center. Cut biscuits laterally. Muffins are cut from top to bottom.
- Break off a piece to observe texture. Look at it carefully for a fine grain. Touch it for softness and lightness.
- Smell it for a pleasant, characteristic odor.
- Taste a few crumbs for flavor and check the mouthfeel.
- All judges should come prepared. A small straight-edged knife; a long, serrated knife; a hand towel or washcloth; and pencil are essential. Since water may not always be available or easily accessible, one might also want to take a bottle of cool tap water and a cup.

Note: If much judging is done, unsalted crackers, an apple, carrot sticks or a drink of tap water (not ice water) between samples helps clear the mouth of definite flavors. Do not sip coffee, tea or other beverages, as they impart their own flavors and impair judgment.

Terms Used in Judging

General Appearance: *The shape, condition of the crust, color of the exterior surface and volume.*

Shape

broken	oval	thin
even	round	uneven
flat	symmetrical	asymmetrical
thick	irregular	

Condition of top crust

dry	level	rounded
ruptured	pebbled	sticky
peaked	pocked	sunken
greasy		

Exterior color

black	golden brown	spotted
burned	gray	rich
bright	light brown	yellow
dark brown	normal white	
discolored	pale	
dull	practically no browning	

Volume or size: *Height, diameter or circumference of a product.*

average	large	small
excellent	medium	uniform
good	poor	

Lightness: *Light in weight for size.*

well aerated	flat	compact
fluffy	dense	heavy

Crumb: *Interior portion of product.*

Texture: *The size of the air cell and thickness of the cell wall make up the "grain" of the baked product.*

coarse	grainy	mealy
fine	harsh	rough
flaky	lacy	velvety
foamy		

Color: *Appropriate for the product, pleasing to the eye.*

bright	golden brown	rich
creamy	lustrous	snowy white
discolored	normal	speckled
dull	off-color	reddish brown
gray	mottled	deep chocolate
greenish	pale	

Moistness: *Degree of moisture within the crumb.*

dry	soggy
gummy	wet
moist	

Tenderness: *Ease with which product can be cut, broken, pulled apart.*

chewy	tender
elastic	tough
rubbery	

Flavor: *Combination of taste and smell.*

astringent	flat	salty
bitter	floury	soapy
bland	mellow	stale
well blended		nut-like
raw starch	brisk	eggy
strong	burned	rich
rancid	delicate	scorched
yeasty	buttery	unbalanced
sour		

Mouthfeel or Consistency: *Degree of firmness density, viscosity, fluidity, plasticity.*

brittle	grainy	solid
crisp	gummy	stiff
crystalline	liquid	soft
crumbly	pasty	soggy
curdled	rubbery	tender
firm	runny	hard
frothy	sirupy	mealy
gelatinous	slimy	thin
tough		

Food Safety

For the safety of all judges, food safety precautions must be followed. For the State Fair, only non-perishable foods will be accepted. No food item should require refrigeration. Those that do will be disqualified.

Perishable foods are those with egg custard and cream cheese type fillings and frostings, or foods that require refrigeration. Examples include cream or custard pies, breads with large amounts of fillings, and cream cheese frosting. They will not be allowed at the State Fair due to a lack of refrigeration. These products have higher amounts of dairy products and/or eggs that can support the growth of microorganisms at room temperature or warmer. Even though they are baked, they can still support microorganism growth at room temperature. Therefore, they need refrigeration for both safety and quality.

County fairs with refrigeration facilities may allow perishable type items. Check county fair guidelines for more information.

Fruit and pecan pies are acceptable. These products have high amounts of sugar and/or acid to suppress the growth of microorganisms at room temperature. German Chocolate cake frosting is also acceptable.

Alcohol

Any food item made with alcohol (i.e. beer, wine, hard liquor, etc.) will be disqualified. Flavoring ingredients such as vanilla, almond extract, etc. are acceptable.

Home-Style Canned Quick Breads

Home-style canned quick breads have been featured in popular magazines and promoted through mail order brochures and specialty shops. They are typically manufactured by small "home-based" operations and the process consists of oven-baking a batter in a wide mouth glass jar. After baking, the lid and ring are added to seal the jar.

From a food safety standpoint, inadequate heat treatment of this type of product coupled with favorable storage conditions could lead to development of botulinum toxins.

In a K-State study on the survival of inoculated *C. sporogenes PA 3679*, canned banana bread was baked at a temperature of 177˚C (350˚F). Even though this resulted in a highly desirable product appearance, it did not result in a safe product (totally free of inoculated Clostridium after storage) for human consumption, especially when baked products were stored under conditions (35˚C or 95˚F) that favor spore germination. When baked at higher temperatures to enhance food safety, it formed an excessive crust, which made an undesirable consumer product.

The standard procedure (that people would use at home) for home-canned quick bread recommends baking at 191˚C (375˚F) for 50 minutes. Even though this treatment resulted in non-detectable levels of sporeformers in uninoculated breads after 8 hours of storage at room temperature, the practice of making canned breads and cakes is not recommended.

Source: Aramouni, F.M.; K.K. Kone; J.A. Craig; and D.Y.C. Fung. "Growth of Clostridium sporogenes PA 3679 in Home-Style Canned Quick Breads." *Journal of Food Protection* 57:882-886

Cakes

Cakes can be divided into two categories: shortened and unshortened. Foam, chiffon, sponge, and angel cakes are in the latter class because they contain little or no added fat. Characteristically, unshortened cakes contain a large proportion of eggs or egg whites, are leavened by steam and air and are baked in ungreased tube pans. Unshortened cakes are extremely light and fluffy with good volume and an open, even texture. In comparison, shortened cakes, or butter cakes as they were once called, are leavened by baking powder and/or soda and acid, as well as steam and air. They may contain a relatively large proportion of solid or liquid shortening and are baked in almost any size and shape. Liquids, spices, flavoring and other ingredients are varied to produce a wide assortment of shortened cakes. Typically, these cakes are somewhat heavier than foam cakes, yet well aerated with a moist, tender crumb and fine, even grain.

Shortened Cakes

Characteristics of standard product

Appearance

- Rounded top, free of cracks
- Uniform, characteristic color throughout crust and crumb
- Thin crust
- High volume

Texture

- Soft, velvety crumb
- Even grain
- Small, thin-walled air cells
- Free of tunnels
- Moist, smooth mouthfeel
- Not sticky
- Light — but not crumbly

Tenderness

- Handles easily, yet breaks apart without difficulty
- Seems to "melt in the mouth," offers no resistance when bitten

Flavor

- Delicate, sweet flavor
- Well blended

Problems with shortened cakes and causes

Cracks on top

- Too hot an oven at beginning of baking period
- Batter too stiff
- Pan too narrow or deep

Peak in center

- Batter too stiff — too much flour
- Too hot an oven at beginning of baking period
- Overmixed after addition of flour

Fallen center

- Not thoroughly mixed after flour was added
- Too much fat, sugar or leavening
- Oven temperature too low
- Cake was moved during baking
- Pan too small for amount of batter
- Underbaked
- Not enough liquid

Tough crust or crumb

- Too little fat or sugar
- Too much flour or egg
- Overmixed after addition of flour
- Flour too high in protein

Sticky crust and noticeably shrunken

- Too much sugar
- Damp flour
- Insufficiently baked
- Incorrectly frozen and thawed

Sugary crust

- Too much sugar or leavening
- Ingredients not blended thoroughly

Soggy

- Wrapped before completely cooled
- Underbaked
- Too much liquid or ingredients with a high water content (ie., fruit, pumpkin, applesauce)

Bitter taste

- Too much baking powder

Unpleasant flavor

- Poor quality eggs or shortening

Heavy, low volume

- Poor quality shortening or shortening with no emulsifier
- Not enough leavening — gas lost before baking
- Overmixed — air incorporated during creaming is lost
- Too much fat, sugar, liquid or flour
- Not enough air incorporated during creaming

Insufficiently baked
Pan too small for amount of batter
Incorrect temperature for baking (too low)

Overlight, crumbly, coarse textured
Too much leavening, sugar, or shortening
Oven temperature too low
Fat and sugar insufficiently creamed
Undermixed — ingredients not blended thoroughly
Oil used instead of solid shortening

Dry, tough
Not enough fat, liquid, or sugar
Egg whites overbeaten
Overmixed after addition of flour
Overbaked
Too much flour, egg or leavening
Substitution of cocoa for chocolate with no increase in fat

Dull color
Poor quality ingredients
Low-grade flour

Tunnels and occasional large holes
Batter overbeaten
Uneven distribution of leavening agent
Not enough fat or sugar
Oven too hot
Failure to expel air when batter is placed in pan
Too much egg

Not symmetrical
Oven not level
Pan not centered in oven
Oven temperature not consistent
Paper liner in pan wrinkled
Batter not distributed evenly in pan
Batter not cut through with knife to release air pockets

Pale color
Shiny pan used
Too much batter for the pan

Sunken
Too little liquid
Too much sugar, shortening or leavening
Underbaked

Gelatinous layer at bottom of cake
Ingredients insufficiently blended

Foam or Unshortened Cakes

Characteristics of standard product.

Appearance
Thin, golden brown crust
Uniform crumb color
Rough, slightly cracked top crust
Symmetrical
Optimum volume

Texture
Light in weight in proportion to size
Well aerated
Finer, even, oval-shaped cells with thin cell walls
Sugary, slightly sticky crust

Tenderness
Moist
Soft crust and crumb
Delicate crumb that is easily broken apart

Flavor
Pleasant, well blended
Not eggy

Problems with foam cakes and causes

Thick, hard crust
Too hot an oven
Baked too long

Sticky crust
Too much sugar
Ingredients not blended thoroughly

Damp flour
Insufficiently baked

Tough crumb
Baking temperature too high
Overmixed

Coarse crumb
Underbeaten egg
Undermixed
Too hot an oven

Dark color
Inferior flour
Not enough cream of tartar
Wrong proportions — too much sugar

Dry
Egg whites overbeaten
Too much flour
Too little sugar
Overbaked
Too slow a baking temperature

Heavy
Air lost during mixing
Eggs not beaten to optimum volume
Cream of tartar omitted

Shrunken
Too low a baking temperature
Too little cream of tartar
Insufficiently baked

Uneven appearance
Ingredients not thoroughly blended in texture

Cookies

There are five main types of baked cookies — rolled, dropped, refrigerator, pressed, and bar or sheet cookies. Rolled cookies are made from a rather stiff dough that is rolled on a lightly floured board to the desired thickness and cut out into various shapes. Dropped cookies are made from a soft dough that is dropped from a spoon or dipper onto a cookie sheet. They may or may not be flattened. Refrigerator cookies are made from a comparatively rich dough that has been thoroughly chilled, then cookies are shaped into balls or sliced from a roll. Pressed cookies are made from a rich, stiff dough extruded through a decorative die. Bar cookies may be cake-like or compact and chewy: A stiff batter is baked in a shallow pan and cut into bars or squares when cool.

Cookie dough should be easy to handle but as soft as possible. The addition of too much flour causes dry, flinty, cracked cookies that have little appeal. Prepared and baked with care, all types of cookies can meet high standards.

No-bake cookies can be made from ready-to-eat cereals, oatmeal, chow mein noodles, nuts, raisins, or coconut, and held together with a cooked syrup. These cookies are generally made by younger, beginning skill members. They may melt or become sticky or oily, depending on the recipe and the weather.

Characteristics of standard product

Appearance
Uniform shape
Even contour
Uniform color
Ingredients evenly mixed

Texture
Characteristic of type — soft or crisp

Tenderness
Breaks apart easily when chewed
Not crumbly or hard

Flavor
Pleasing, well blended
Free of unpleasant or distracting flavors

Problems with cookies and causes

Flour streaked
Too much flour used during rolling
Incorrect proportion of ingredients

Improper measuring techniques
Poorly mixed

Dry or crumbly
Wrong proportion of ingredients
Incorrectly measured
Poor mixing techniques
Not enough liquid
Overbaked

Bottom crust too dark
Cookie sheet not centered in oven
Dark cookie sheets used

Top crust too dark
Too hot an oven
Overbaked

Excessive spread, loss of shape
Cookies placed too close together on cookie sheet
Dough too soft — too much liquid
Dough placed on hot baking sheet

Doughy, raw flavor
Underbaked
Dough too stiff

Off flavor
Rancid shortening, nuts, seeds (sunflower, poppy) or coconut
Poor quality ingredients
Too much baking powder
Improper storage — causes cookies to become stale or pick up other odors and flavors

Sticky, hard
Too much sugar
Overbaked
Flour too high in protein

Tough
Overhandled
Too little fat or sugar

Irregular size and shape
Dough improperly handled when placed on cookie sheet

Pastry and Fillings

Pastry is a simple food system composed of fat, flour, salt, and water. But, often a quality product is not easily achieved. The key to success lies in the technique used to mix and roll the dough. Ingredients must be handled delicately, not mixed too much or too little, if a high quality pastry is to be prepared. Characteristics of standard product:

Appearance
Rough, blistered surface with no large air bubbles
Golden brown edges
Center of bottom and top crusts are light in color
Not shrunken
Attractively shaped edges
Uniform thickness

Texture
Layers are evident when pastry is broken
Crisp and flaky
Not mealy

Tenderness
Cuts easily with a fork but holds shape when lifted; not so tender that it falls apart

Flavor
Pleasant, bland
No trace of burned, raw, or rancid flavor

Problems with pastry and causes

Lack of tenderness
Insufficient fat
Protein content of flour too high (ie., bread flour)
Fat not divided finely
Too much water
Dough overhandled during mixing and/or rolling
Too much flour used when pastry was rolled

Lack of flakiness (mealy or crumbly)

- Too much fat
- Protein content of flour too low (i.e., cake flour)
- Fat too warm when combined with flour
- Fat divided too finely
- Not enough water
- Self-rising flour inadvertently used
- Undermixed
- Oil used instead of solid fat

Pale, dull color

- Too little fat
- Underbaked
- Too much water
- Too much flour on pastry board
- Oven temperature too low
- Rolled too thick

Shrunken

- Over handled
- Pastry stretched when placed in pan
- Dough not rolled to uniform thickness
- Unbalanced recipe

Burned

- Overbaked

Smooth surface, not blistered

- Overhandled
- Too much flour used during rolling

Uneven edge

- Crust not rolled in even circle
- Edges not carefully shaped

Large air bubbles

- Pastry not pricked before baking
- Pan too small for amount of dough — causes pastry to buckle

Soggy lower crust

- Filling too moist
- Cooked filling too hot when added
- Crust torn or broken — causes filling to run underneath the crust
- Shiny pie pan used — causes crust to bake too slowly
- Pie pan placed on baking sheet or aluminum foil — interferes with heat transfer
- Oven temperature too low or time too short

Rancid

- Poor quality shortening

Meringue

Appearance

- Light brown on ridges

Volume

- Light

Texture

- Soft, cuts easily with knife; fine, uniform cells throughout meringue

Flavor

- Sweet, mild, well-blended

Problems with meringues and causes

Dark brown, burned peaks

- Overbaked
- Too much sugar
- Peaks too high

Pale

- Underbaked
- Too low temperature

Beads of liquid on surface

- Overbaked
- Too low temperature

Shrinks from edges

- Not sealed to edge

Sticky, gummy, tough

- Overbaked
- Baked at too low temperature

Too tender

Interior not baked long enough

Meringue placed on cold pie filling

Liquid collects at surface between filling and meringue

Egg whites underbeaten

Meringue not baked long enough

Baked too high temperature

Cream of tartar omitted

Burned flavor

Overbaked

Raw flavor

Underbaked

*Pie Fillings

(**Note:** At the Kansas State Fair, only non-perishable pies are allowed to be exhibited. This includes fruit and pecan pies. Custard or meringue pies are not accepted.)

Cream fillings are usually a custard base with both egg yolk and starch or flour used to thicken the mixture. Egg whites are usually reserved for meringue. Milk, water and/or fruit juice are typical liquids used. Custard fillings use the whole egg as the thickening agent and, milk as the liquid ingredient. A chiffon filling is often a mixture containing egg yolk and gelatin as structural ingredients. The mixture is folded into egg whites then poured into the pie shell. The filling is refrigerated for two or three hours. Fruit fillings usually consist of fruit, fruit juice, sugar, and a thickener such as flour, cornstarch and/or tapioca.

Cream Fillings

Consistency

Smooth, holds soft shape when sliced

Flavor

Pleasing, well blended

Characteristic of ingredients

Problems with cream fillings

Too thin

Not enough starch or egg yolk

Flows when cut

Mixture not heated long enough before yolk is added

In lemon pies, excessive heating after lemon juice is added can cause thinning of starch

Grainy

Burner too high

Lumpy

Not enough stirring

Egg yolks not "tempered"

Cornstarch wasn't combined with sugar and salt before adding water

Too thick, gummy, sticky

Improper proportion of ingredients

Too much starch, egg yolk

Not enough liquid

Custard Fillings

Consistency

Smooth

Firm, yet tender

Color

Uniform

Yellow

Flavor

Mild, sweet egg flavor

Problems with custard fillings

Too thin

Underbaked, too much sugar

Tough

Baked too long, too much egg in proportion to other ingredients

Porous

Baked too long

Weeping

Baked too long

Baked filling not cooked enough before moving to baked crust

Filling broken

Poor technique in transferring custard to crust

Flecks of yellow and white

Not adequately mixed

Chiffon Fillings

Consistency

Rigid when cut, but tender, light, airy, smooth

Problems with chiffon fillings

Lumpy — due to egg yolk

Egg yolk mixture heated over too high heat
Not stirred adequately
Didn't use double boiler

Lumpy — due to gelatin

Gelatin not prepared properly before adding to egg yolk mixture

Soft, flows when cut

Egg yolk mixture not heated sufficiently
Pie not chilled
Recipe doesn't contain enough thickening

Heavy

Egg whites not beaten sufficiently
Poor folding technique

Tough, rubbery

Proportion of egg yolk/gelatin too high

***Source:** *General Score Card for Judging 4-H Food Preparation Exhibits*, Oregon State University, for adaptation of pie filling information.

Fruit Fillings

Consistency

Tender
Softly holds shape

Appearance

Filling retained in pie

Flavor

Good fruit flavor

Problems with fruit fillings

Gummy

Too much thickening agent
Too high proportion of tapioca

Too firm

Too much thickening agent

Too thin

Not enough thickening agent
Too much sugar

Filling spills out on crust

Oven temperature too low
Insufficient sugar and/or fruit
Insufficient thickening
Too much sugar
Upper crust shrinkage, or not sealed

Excessively sweet, with little fruit flavor

Too little fruit and fruit juices in proportion to sugar

Spices cover fruit flavor

Too much spice

***Source:** *General Score Card for Judging 4-H Food Preparation Exhibits*, Oregon State University, for adaptation of pie filling information.

Biscuits

There are two basic types of biscuits — rolled and dropped. Both are leavened by baking powder and contain similar ingredients but differ in the proportion of liquid and method of preparation. As a result, the appearance and texture of the two are dissimilar.

Characteristics of standard product

Rolled Biscuits

Appearance

Cylindrical
Pale, golden brown top crust
Even height

Creamy white crumb with no brown or yellow flecks
Evenly contoured
Straight sides and flat, fairly smooth top
Uniform size
Free of excess flour

Texture
Small, uniform gas holes
Relatively thin cell walls
Crumb peels off in sheets, flakes or layers

Tenderness
Crisp yet tender outer crust
Crust and crumb offer little resistance to bite
Light and moist

Flavor
Bland, mild
No bitterness or rancidity

Dropped Biscuits

Appearance
Pale, golden brown top crust
White crumb
Slightly pebbled surface
Straight or gently sloped sides

Texture
Less uniform, larger gas holes than kneaded biscuits
Slightly thicker cell walls

Tenderness
Crisp, tender outer crust
Crust and crumb offer little resistance to bite

Flavor
Bland, mild

Problems with biscuits and causes

Not flaky
Not enough shortening
Shortening under- or overmixed with flour
Underkneaded

Tough
Lack of fat
Overhandled
Too much liquid or flour

Pale crust
Too slow an oven
Underbaked
Flour on surface of biscuit

Misshapen, uneven
Cutter twisted during shaping
Dough not uniform in thickness

Uneven browning
Uneven shape
Uneven heat

Flat, heavy
Not enough leavening
Underbaked
Too much flour or liquid
Improperly mixed

Coarse, uneven cells
Too much leavening
Underbaked
Ingredients inaccurately measured
Undermixed

Harsh, dry crumb
Dough too stiff
Overbaked

Bottom crust too dark
Baked on darkened pan

Hard crust
Too close to heating element in oven
Baked too long
Too high a temperature

Crumbly, oily

Too much fat

Yellow specks

Uneven distribution of soda or baking powder

Floury surface

Too much flour used when kneading or rolling

Low volume

Improper manipulation

Not enough leavening, or leavening not effective, not fresh

Ingredients inaccurately measured

Wrong time and temperature

Doughy

Underbaked

Bitter or soapy

Too much leavening

Ingredients not blended thoroughly

Rancid

Poor quality shortening

Loaf Breads

Fruit or nut loaf breads are fast and easy to make. The ingredients, method of mixing, and baking technique are similar to those used for muffins. Some quick bread recipes are made by the cake method. Interesting variations are made by adding nuts, fruits, cereals, and other flours.

Quick breads are not always baked in loaf pans. For example, corn bread and Irish soda bread are baked in shallow pans, spoon breads in casserole dishes or layer cake pans, Sally Lunn bread in a tube pan, and Boston brown bread may be baked in loaves or steamed in covered cans or special molds.

Cracks in the crust are typical of quick breads and do not necessarily indicate an unsatisfactory product. Products should not be scored down because of cracked tops. However, some people prefer a loaf bread without a center crack. An explanation of why cracks form and hints to prevent them are given below.

Reasons for cracked crust

1. The large mass of batter in the loaf pan heats slowly. Therefore it is desirable to allow time for the leavening agent to react, and an increase in volume to take place, before the crust sets. When this procedure is followed a baked product with a smooth, rounded crust results. When baking is too rapid, a cracked top crust and a more solid crumb will result.
2. Using long, narrow pans will result in a loaf with a crease or small crack on top. Consistency of batter will influence the depth of crack. Batter touching the pan bakes first. As batter warms to baking temperature, it thins and allows a film of fat and sugar to run toward the center of the crust; thus a shiny line or a sticky crack forms down the center of the loaf.
3. A crack forms because the unbaked batter under the crust "erupts" when the leavening agent reacts.

Baking hints to prevent cracked crust

1. Preheat oven to 350° F and bake quick bread as soon as mixed.
2. Preheat oven to 375° to 400° F. Cover quick bread and allow to stand at room temperature 20 to 30 minutes before baking.
3. Tent a piece of heavy foil over the top of the loaf pan filled with batter. Allow foil to remain until batter rises and begins to brown, then remove foil carefully so that you do not touch the soft crust. This keeps the top moist and prevents a heavy crack from forming.

Characteristics of standard product

Appearance

Even contour, no "lip" at upper edge of loaf

Rounded top

May have a center crack

Evenly browned top and bottom crust

Uniform crumb color

Well-distributed nuts and fruit

Texture

Relatively fine crumb

Uniform grain

Free of large tunnels
Moist
Not mealy or crumbly

Tenderness
Crisp, tender crust
Firm but delicate crumb

Flavor
Pleasant
Characteristic of the variety of loaf bread

Problems with quick loaf breads and causes

Low volume
Inaccurate measuring techniques
Too little leavening
Too much liquid or flour
Insufficiently mixed
Fry line edge because sides of pan were greased

Crumbly, dry
Overbaked
Too little liquid or fat
Too much flour

Compact, heavy
Underbaked
Wrong type of flour
Too much flour

Coarse textured, irregular grain, tunnels
Too little fat or sugar
Overmixed

Tough
Too much flour
Overmixed

Peaked
Too much batter in pan
Overmixed

Heavily crusted
Too close to heating element of oven
Baked too long
Too high an oven temperature

Soggy
Wrapped while warm
Underbaked
Too much fruit

Flat flavor
Too little salt

Muffins

Muffins come in many varieties. Each has its own special characteristics. Plain muffins, sweet muffins, cereal muffins, and fruit or nut muffins differ in appearance, texture and flavor. When setting standards for muffins the type should be considered. For instance, a bran muffin differs from a plain muffin, yet general standards for quality can be applied.

Characteristics of standard product

Appearance
Rough, pebbled surface
Golden brown top crust
Even contour, slightly rounded top — no peaks

Texture
Fairly large gas holes uniformly distributed
Free of long, slender tunnels
Medium thick cell walls

Tenderness
Little resistance when bitten and chewed

Flavor
Bland or slightly sweet

Problems with muffins and causes

Pale
Too little batter in muffin cup
Overmixed
Too cool an oven

Unevenly browned

- Too hot an oven
- Oven does not heat uniformly
- Pans filled too full
- Wrong proportion of ingredients, too much baking powder or sugar

Too brown

- Incorrect time and temperature
- Too much sugar

Peaks

- Pans filled too full
- Overmixed
- Insufficient leavening
- Batter too stiff
- Oven temperature too high or uneven
- Dropped from spoon held too high above the pan

Tough, elastic

- Too much flour
- Too little fat or sugar
- Overmixed

Compact

- Wrong time and temperature
- Improperly mixed
- Insufficient leavening
- Too much flour or liquid

Irregular grain, tunnels

- Overmixed
- Too much liquid
- Inaccurately measured
- Too little fat or sugar

Smooth crust

- Overmixed

Hard crust

- Baked too long
- Oven temperature too high
- Too close to heating element in oven

Harsh, dry crumb

- Batter too stiff
- Too much flour
- Overbaked

Rough surface, sharp edges

- Undermixed
- Too much flour

Waxy, shiny

- Egg and milk insufficiently mixed

Flat flavor

- Too little salt

Gray interior

- Too much leavening

Yellow spots

- Ingredients insufficiently blended

Cracked

- Wrong-sized pan
- Too high an oven temperature

Sticky

- High proportion of sugar or sweetener, oil in recipe

Yeast Breads

Standards of quality are easily established for dinner rolls and plain loaves of bread because there is little variety in the ingredients used and the physical characteristics of the product. The formula is usually relatively lean (contains little or no fat or eggs) compared to a sweet dough. Sweet rolls and coffee cake are made from a rich, soft dough that contains more eggs, fat, and sugar than the dough used for loaves of bread.

The process of making speciality yeast products and a loaf of bread are similar. Adequate development of gluten either by kneading or beating is essential for a satisfactory product. When a no-knead or batter bread is made, the thin batter is mixed quickly and thoroughly without kneading. The batter is left in the mixing bowl for rising or

placed directly in the baking pans. Characteristically, batter breads have a more open grain, lacy appearance and uneven surface than kneaded breads.

A great variety of breads is possible by adding nuts, fruit, raisins, spices, herbs, and seeds; by substituting speciality flours for part of the flour; by shaping the dough in different ways; and by using various toppings and garnishes. Rolls from plain bread dough can be baked quickly in an oven at 425 ˚F. However, rich doughs are baked at lower temperatures, 350˚ F to 375˚ F, to prevent excessive browning of the crust.

Characteristics of standard product

Appearance

- Golden brown crust
- Good volume with even height
- Well shaped
- Symmetrical
- Smooth, unbroken top surface
- Loaf should have a shredded border (break and shred) along one side
- Characteristic crumb color, uniform throughout
- Free of flour streaks

Texture

- Even, moderately fine grain
- Slightly elongated cells
- Porous, honeycomb-like texture
- Free of large air pockets
- Light for weight
- Thin, even, crisp, tender crust
- Free of flour "line"

Tenderness

- Moist, silky crumb with a tender but elastic quality

Flavor

- Pleasing, well blended
- Fairly bland
- Nut-like or wheaty
- Free of sour or yeasty taste

Problems with yeast products and causes

Uneven shape

- Dough improperly shaped
- Crowded oven
- Too much dough for pan
- Insufficiently proofed

Heavy, poor volume

- Low-grade flour
- Too large proportion of low-gluten flours
- Insufficiently proofed
- Too cool while rising
- Under kneaded
- Yeast killed
- Collapsed, because over-proofing weakened the gluten
- Poor distribution of ingredients

Crackled crust

- Insufficiently fermented
- Cooled too rapidly

Bulged, cracked crust

- Too stiff a dough
- Uneven heat during baking
- Insufficiently proofed

Thick crust

- Baked too slowly

Tough crust

- Insufficiently proofed
- Low-grade flour
- Risen dough over-handled

Pale crust

- Too slow an oven
- Underbaked
- Too much salt
- Dough became dry during rising
- Too little sugar

Dark, dull crumb

- Under- or over-proofed

Wrong temperature while rising
Too cool an oven
Old or stale yeast

Tough crumb
Too much salt — retards fermentation

Streaked loaf
Poorly mixed
Addition of flour during molding
Surface of dough became dry before shaping

Crumbly loaf
Weak flour
Use of variety flours
Excessive or insufficient proof

Coarse-grained
Inferior yeast
Salt omitted
Low-grade flour
Fermented too long or at too high a temperature
Under-kneaded
Not enough flour
Too cool an oven

Yeasty, sour or bitey flavor
Poor yeast or flour
Fermented too long
Too high a temperature while rising
Too little sugar
Baked too slowly or incompletely

No break and shred
Dough not rolled and shaped properly before placed in pan

Machine Breads

The standards for breads made using the bread machine should be the same as handmade breads. Of course, you will have to allow for the "mixer" hole that is left in the bottom of the loaf. The following information provided by the Wheat Foods Council will give you some additional information as you evaluate machine breads and conduct conference evaluation with exhibitors.

Operation

Before using the bread machine, read the instruction manual and/or view the video that comes with your machine. Each machine is unique. Accurate liquid and dry measurements are essential. Spoon flour into a standard dry ingredient measuring cup and level off. Measure liquids in a transparent liquid measuring cup and read measurements at eye level.

Open the lid and touch the dough after the first five minutes of the mixing cycle. If necessary, add more liquid or flour. A perfect dough is soft to the touch, slightly sticky, and nearly cleans the bottom of the bread pan. Place ingredients in the pan in the order suggested by the instruction manual. It is imperative that the yeast not touch the liquids or the salt when using the delayed baking feature.

The ideal temperature for ingredients is room temperature. Some bread machines have a preheat cycle that brings ingredients to the proper temperature. If the machine doesn't have a cool-down or keep-warm cycle, remove the loaf promptly and cool on a wire rack to prevent a soggy crust. Room temperature, drafts or humidity may affect the results.

Flour

Bread flour is recommended for use in bread machines. Because bread flour has greater protein content and gluten strength than all-purpose flour, the resulting loaf usually has greater volume and is finer-textured. Add wheat gluten to improve loaf volume and texture in recipes using whole wheat, rye, or other whole grains. Use 1 to 1½ teaspoons wheat gluten to each cup of whole grain flour. An equal amount of additional water may be needed. Gluten-free breads can be made using oat, rice, potato, corn or soy flour.

Yeasts

Instant, active dry and bread machine yeasts are available for use in bread machines. Consult the manual for recommendations. Check the yeast's expiration date for freshness. It is economical to buy yeast in larger quantities, so place yeast in a sealed bag and refrigerate or freeze. Bring the amount needed to room temperature before using.

Sweeteners and Salt

White and brown sugar, honey, and molasses may be interchanged successfully. Do not use artificial sweeteners because they do not provide food for the yeast. Never eliminate salt because it adds flavor, acts as a growth inhibitor for yeast and strengthens the dough structure. Salt substitutes are not recommended because they give the bread an off-flavor.

Liquids and Eggs

The temperature range of liquid is 75˚ to 85˚ F for automatic bread machines. Check with a thermometer. It may be necessary to decrease liquid slightly in humid weather. Milk, buttermilk and water may be interchanged equally. Water gives a crisp, lighter crust; milk gives a softer, browner crust. Fresh milk can be replaced with nonfat-dry milk. Use an equal amount of water as the milk, and about 3 to 4 tablespoons of milk powder per cup of water.

When using the delayed baking feature, always use milk powder. Add it with dry ingredients and keep away from liquids. Reduce the amount of water in equal proportion to the amount of fresh milk added.

For food safety, never use perishable ingredients — such as fresh milk, meat, eggs, cheese, yogurt, orange juice and vegetable purees — with the delayed baking feature. Egg substitutes may be used instead of eggs.

Fats

Most breads contain a small amount of fat. Fat keeps bread tender and fresh, and aids in browning. Vegetable oil, solid shortening, butter, or margarine may be substituted in equal proportions.

Tips

Lemon juice or vinegar may help improve the structure of the loaf. Use one teaspoon per loaf. For high altitudes, some experimentation is required because the dough may rise faster. You may need to reduce the amount of yeast, sugar or flour, or add liquid or gluten. Consult your manual. When adding oats, multi-grain cereal, or cornmeal, soak in the liquid for about 5 to 8 minutes. Bulgur, cracked wheat or whole wheat berries need to be softened by cooking or soaking to keep them from scratching the pan.

To adapt your favorite bread recipe for the bread machine, first start with the amount of flour the machine needs, then calculate the other ingredients. Do not exceed the capacity of the pan. Refrigeration stales bread. Store bread in a sealed container at room temperature or freeze.

Troubleshooting

Collapses after rising

Too much yeast or liquid
Too little flour
Used quick-rise yeast
Too much dough for pan
Liquids too hot

Too dry

Too much flour
Not enough liquid

Crust too brown

Use a lighter setting
Remove loaf a few minutes before baking cycle completes

Loaves don't raise

Too little yeast
Too little liquid
Yeast not fresh
Increase sugar and water
Ingredient temperature wrong
Use bread flour
Machine calibration is off

Loaf touches lid

Check amount and/or type of yeast
Water temperature incorrect
Use more salt
Reduce sugar

Loaf has uneven or rough top

Not enough liquid

Loaf too moist

Remove from pan sooner
Use a darker setting for longer bake time

Flour clumps on crust

During kneading cycle, push flour clumps into dough with rubber spatula

Poor color

Not enough sugar

Add milk, liquid or dry

Source: *Grains of Truth about Bread Machines,* adapted by permission from Cindy Falk, Kansas Wheat Commission and Wheat Foods Council, revised 2005

Microwave Baked Products

Since foods cook so quickly in the microwave, baked products do not always have the appearance of their conventionally baked counterparts. Texture is finer and volume is greater due to exaggerated expansion of air cells and lack of crust to impede rising. Surfaces are moist and soft. Frequently, properly baked products are more tender. Flavor is similar in microwaved and conventionally baked products.

The most noticeable feature of a microwave-baked product is its pale appearance. Advances in microwave technology have added features that may help correct this. Conventionally baked foods brown because the prolonged dry heat acts on the surface of the food to drive off moisture, carbonize fats and caramelize sugars. The result is a crisp, crusty texture and dark color. Careful recipe selection or judicious alterations of a standard recipe can compensate for the lack of color.

Overcooking is easy when microwaving, but if baking time is precisely controlled and standing time is taken into account, the end product should be as moist, tender and flavorful as one baked in a conventional oven. Unbalanced recipes, careless measuring, improper mixing methods and poor quality ingredients will cause the same disappointing consequences in a microwave product as one baked conventionally.

Cakes

Characteristics of standard product

Appearance

Higher and lighter than conventionally baked

Symmetrical

Slightly uneven but rounded top

Surface is pale unless product includes spices, chocolate, molasses, brown sugar or other naturally colored ingredients or a topping

Texture

Light for weight

Velvety crumb

Even grain

Very tender

Soft outer surface

Problems with cakes and causes

Bottom underbaked

Cooled on wire rack instead of a flat, solid, heat resistant surface where retained heat can complete cooking

Tough

Batter too lean — not enough fat or sugar

Overbaked

Uneven surface

Baked as a sheet cake

Pan filled too full

Not rotated during baking to assure uniform cooking

Large air pockets

Batter not "cut through" with a knife or tapped to release air and produce an evenly filled pan

Recommendations for successful microwaved cakes

Recipes

Select rich formulas with whole eggs.

Good results are achieved with yellow, spice, or chocolate cakes and those containing oil

Bake angel and sponge cakes conventionally

Size and shape

Layer cakes bake more evenly than sheet cakes

Round and ring pans give a more uniformly baked product since there are no corners to overcook, and energy can penetrate from all sides

Pan preparation

Fill pans half full since batter expansion is greater in the microwave

Lightly grease pans — but do not flour them.

Do not use vegetable spray coating — it tends to form a gummy layer

Line dish with a single layer of wax paper cut to fit the bottom of pan if cake is to be turned out

If approved by manufacturer, shield corners of a square pan with foil to reduce microwaves received

Baking

Microwave one layer at a time

Rotate pan halfway through baking cycle, more often as necessary

Frequency of rotation depends on amount of batter

Microwave slowly so cakes rise less rapidly and bake more evenly

When done, top will spring back, cake will pull away from sides of pan, and a toothpick inserted in center (but not in a moist spot) will come out clean

Any moisture on the surface will evaporate upon cooling.

Cool cakes on a flat, solid, heat-resistant surface rather than a wire rack to finish baking with residual heat.

Do not overbake.

Pastry

Characteristics of standard product

Appearance

Light creamy color unless flavored or brushed with food coloring or egg yolk

Opaque, dry

Blistered top surface

Well shaped with attractive edges

Texture

Crisp and flaky

Tender but firm

Problems with pastry

Shrunken

Shell not pricked with fork prior to baking

Over-stretched when placed in pan

Soggy crust

Filling contains too much liquid.

Unthickened filling not precooked

Filling seeped through crust prior to thickening because the prick holes were not sealed before the filling was added

Recommendations for successful microwaved pastry

Recipe

Pies that have separately cooked crust and filling are best suited for microwaving

Double crust pies should not be microwaved, bottom crust doesn't bake properly

Fruit pies can be prepared open face and topped with streusel crumbs or prebaked pastry cut-outs

Size and shape

A high, fluted pastry edge helps retain bubbly fillings

Pan preparation

Pastry should be crisp, flaky before filling is added

Precook fillings that contain a large amount of liquid

Baking

Place wax paper in the bottom of the oven to simplify clean-up in case filling bubbles over

Lift glass plate to visually check for doneness. Bottom should appear opaque and dry, the top dry and blistered

Fruit pies are done when filling is hot and has started to cook in center

Cooking will continue during cooling

Cookies

Characteristics of standard product

Appearance

Bars

Even height

No thin, crisp top crust

Cookies

Well shaped

May be larger due to greater spread

Texture

Rich and moist

Refrigerator cookies may not be crisp

Problems with cookies and causes

Interior brown spots

Develop in small cookies — cooking begins below the surface and causes some areas to overbake.

Overcooked

Too much fat — fat quickly melts over batter, absorbs microwaves and causes areas to overcook

Recommendations for successful microwaved cookies and bars

Recipes

Moist bar cookies and brownies microwave well because fat and sugar attract microwaves — formulas containing too much fat tend to overbake

Large batches cannot be accommodated by the microwave; drop cookies may be more efficiently baked in conventional oven

Oatmeal, peanut butter and sugar cookies, and cookies that do not brown normally (i.e. Russian tea cookies) microwave well

Cookies with colorful ingredients or toppings are appealing

Stiff cookie dough retains shape best

Size and shape

Bar cookies microwave more evenly

Drop cookies should be arranged in circle for uniform baking

Pan preparation

Grease bottom of pan lightly

Don't grease sides of pan when baking bars

If approved by manufacturer, shield top corners of bars with foil triangles to prevent overbaked, dried edges

Baking

Elevate baking sheet on inverted saucer to promote more uniform cooking

Dense, heavy foods (brownies or bars) take longer to bake than light, porous, cake-like bars

Cool bars on heat-proof surface rather than a wire rack to finish baking

Brownies and other dense batters may require up to 30 minutes standing time

Quick Breads

Characteristics of standard product

Appearance

Even contour

Pale unless dark ingredients or toppings are used

Higher volume than conventionally baked, since there is no crust to inhibit rising

Raisins, fruit and nuts, if used, should be uniformly distributed

Texture

Fine, even grain with no tunnels

Soft crumb and crust

Problems with quick breads and causes

Edges overcooked

Baked at too high a power, dense heavy batters should be microwaved slowly to promote optimum rise and to cook center before edges become overdone

"Fry line" edge on top crust

Sides of pan were greased

Soggy bottom surface

Underbaked

Pan not elevated during baking

Product not allowed to stand in pan after removing from oven so trapped heat can continue baking bottom

Heavy, wet

Too much fruit or oil

Recommendations for successful microwaved quick breads

Recipe

Use recipes with natural color or creative toppings

Size and shape

Round pans and ring molds work well for quick coffeecakes

Arrange muffins in circle if specially designed muffin ring is unavailable

Select pans with straight sides for uniform baking

Pan preparation

Line loaf pans with wax paper to facilitate removal from pan

Don't grease sides of pan

Use double cupcake liners to absorb excess moisture

Fill muffin cups ⅓ full and other pans ⅓ to ½ full to allow for greater batter expansion

If approved by manufacturer, shield ends of loaf with foil strips to avoid overcooked edges

Baking

Coffee cakes with heavy toppings or topping in bottom of pan should be set on inverted dish or saucer to ensure thorough baking

Rotate muffins and quick breads midway through baking cycle for faster, more uniform cooking

Remove foil strips during last few minutes of baking

When done, no unbaked batter should be present at center of dish.

A toothpick inserted in center comes out clean, and top springs back when touched

Top surface may appear moist, but will dry upon cooling

Cool muffins on wire racks

Let loaf breads and coffee cakes stand 5 to 10 minutes on heat-resistant surface before removing from pan, and cool on wire rack

Yeast Breads, Rolls and Coffeecakes

Characteristics of standard product

Appearance

Pale, unless prebaked to desired degree of brownness in conventional oven or topped with colorful ingredients

Dry, gently rounded surface

Evenly shaped

Higher volume than conventionally baked bread since there is no firm crust to inhibit rising

Texture

Soft, dry crust — not crisp

Uniform cell structure

Problems with yeast products and causes

Collapsed, uneven shape

Pan too small

Large air pockets, formed during oven rise, cause bread to fall

Yellow or brown spots

Frequent penetration by microwaves in one area

Soggy bottom crust

Bread dish not elevated during baking

Tough, dry

Overbaked

Baked at too high a power

Recommendations for successful microwaved yeast products

Recipe

Moist, rich coffee cakes microwave well because of high sugar and/or fat content

Select recipes with ingredients that contribute color, such as rye or whole wheat flour, molasses or dark spices

Yeast products can be brushed with milk or melted butter and topped with cheese, poppy seeds, nuts, brown sugar, cinnamon streusel, or cracker crumbs before baking

Glaze or garnish after baking for color; apply toppings generously since surface expands about three times during rising and baking

Size and shape

Yeast dough can be shaped into loaves or rolls and baked in microwave-safe ring molds, round or bundt pans, pie plates or standard loaf pans

Pan preparation

Grease pan lightly and sprinkle with crushed bread or cracker crumbs, wheat germ, herbs or seeds (ingredients not only add color and texture, but absorb excess moisture that forms between the bread and dish during baking)

Baking

To prevent condensation and soggy bottom surface, set baking dish on roasting rack or inverted saucer to elevate above oven floor

Bake one loaf at a time

Rotate pan every 2 to 3 minutes

When done, bread should feel firm and well set, yet spring back when touched

Gluten-Free Baked Goods

Baking without gluten (as found primarily in wheat flour) can be challenging because gluten contributes important properties to various types of baked products like cookies, cakes, pastries and breads. Gluten development is not as important for cookies as it is for cakes, so gluten-free flours can be substituted with similar results. Cakes and other types of batter-based products, like pancakes, need gluten for its gas-retaining ability that produces a light and airy interior structure and a tender crumb.

Recipes calling for 2 cups of flour or less are more successful with gluten-free flour products. Those that use cake flour are easier to adapt as well, because that type of flour contains lower amounts of gluten. White rice flour and starches can be stored in the pantry but because of a higher fat and protein content, whole grain flours and meals should be purchased in smaller quantities and stored in refrigerator or freezer to prevent rancidity. Some types of flours are flour blends. Flours with stronger flavors would make up no more than 25 to 30 percent of the total blend and should be balanced with neutral flours and starches. It is not advised to use stronger flavored flours, such as bean flours, in delicate recipes. A higher percentage of these flours may be used in baked goods that include nuts, chocolate, or a high level of spice. Flour blends for quick breads often contain ½ teaspoon xanthum gum per cup of flour while yeast breads require ¾ teaspoon per cup.

Wheat/gluten-free flour dough will be stickier, heavier and softer than regular wheat flour dough because there is little to no elasticity to the dough without the gluten. For these reasons, using a batter beater, not a dough hook, and a heavy-duty stand-up mixer to beat extra air into the dough and help blend it thoroughly.

Gluten-free baking can be a trial-and-error process. Here are some tips that can help achieve successful results.

To Increase Nutrition

- Use a variety of gluten-free flours in combination to maximize nutrition (Table 1).
- Use whole grain or enriched, gluten-free flours (vitamins and minerals have been added).
- Substitute up to ¼ cup ground flaxseeds plus ¼ cup water for ¼ cup flour in a recipe (flax will absorb more moisture).

Table 1: Profiles of Alternative Grains and Pseudo-cereals: Gluten-free Flours and Starches

Type	Characteristics
Amaranth	Pseudo-cereal native to South America Higher in protein, fiber and iron than most grains Provides structure and binding capability Pleasant, peppery flavor Best used in combination with other gluten-free flours
Arrowroot	Used as thickener and in baking similarly to cornstarch
Bean/Legume	Legume flours include fava beans, garbanzo beans, soybeans Good source of protein and fiber Best used in combination with other gluten-free flours to balance taste and texture Bean flours complement sorghum flour
Buckwheat	Nutritious grain rich in B-vitamins, magnesium, dietary fiber and antioxidants Strong, somewhat bitter flavor Best used in pancakes or yeast breads in combination with neutral gluten-free flours
Chia (Salba)	Like flax, ground chia seeds can add nutritional value to baked goods Neutral in flavor
Corn flour	Used in breads, waffles, and tortillas
Corn meal	Used in spoon breads and baking powder-leavened breads
Corn starch	Works well in combination with tapioca starch
Flax	Ground flax seeds increase nutritional value High in soluble fiber which allows gel formation; retains moisture and gives spongy texture to baked goods Nutty, bold flavor Adds color to baked goods
Millet	Powdery consistency, color similar to cornmeal Delicate, sweet flavor Suitable for use in flatbreads and muffins
Montina (Indian rice grass)	Milled from a grass native to Montana High in fiber and protein
Nut	Nut flours include almond, pecan, walnut, hazelnut, filbert, and chestnut Contribute flavor and nutrition to baked products Best used in combination with other gluten-free flours to balance taste and texture
Quinoa	Pseudocereal native to South America Good source of protein, folate, copper and iron Mild, slightly nutty flavor Suitable for cookies, cakes and breads
Potato flour	Neutral flavor Blends well with stronger flavored flours
Potato starch	Provides a light consistency to baked products Helps retain moisture, combines well with eggs Bland flavor, low in fiber and nutrients
Rice, Rice bran	Comes in brown, white and sweet varieties Best used when combined with other gluten-free flours and binders or gums Neutral flavor Sweet rice flour is used in pie crusts and as a thickener
Sorghum (milo)	Tropical cereal grass native to Africa Sweet, nutty flavor Best when used with other neutral gluten-free flours and gums
Teff	Small cereal grain native to Africa Taste similar to hazelnuts Very high in nutrients Ability to gel makes it a good thickener
Tapioca	Starchy, sweet flavor Adds chewy texture to breads Used in blends to improve color and crispiness of crusts

To Increase Moisture

- Add gelatin, extra egg or oil to the recipe.
- Honey or rice malt syrup can help retain moisture.
- Brown sugar often works better than white.
- Dough enhancers improve tenderness and staling resistance.

To Enhance Flavor

- Add chocolate chips, nuts, or dried fruits.
- Double the amount of spices.

To Enhance Structure

- Use a combination of gluten-free flours and mix together thoroughly before adding to other ingredients.
- Add dry milk solids or cottage cheese into recipe.
- Use evaporated milk in place of regular milk.
- To reduce grainy texture, mix rice flour or corn meal with liquid. Bring to a boil and cool before adding to recipe.
- Add extra egg or egg white if product is too crumbly.
- Do not over beat; kneading time is shorter since there is no gluten to develop.
- When using a bread machine, use only one kneading cycle.

Leavening

- Starch flours need more leavening than wheat flours.
- Rule-of-thumb: start with 2 teaspoons baking powder per cup of gluten-free flour and adjust downward as need for altitude.
- If baking soda and buttermilk are used to leaven, add 1⅛ teaspoon cream of tartar for each ½ teaspoon baking soda used to neutralize acid.
- For better rise, dissolve leavening in liquid before adding to other ingredients or add a little extra baking powder.

Texture/Lightness

- Sift flours and starches prior to measuring. Combine and sift again (together) after measuring to improve the texture of the product.
- Hold gluten-free dough at least 1/2 hour (up to overnight) in the refrigerator to soften and improve the final texture of the product.
- In products made with rice flour or corn meal, mix with the liquid called for in the recipe. Bring to a boil and cool before adding to recipe to help reduce grainy texture.

Baking Pans and Utensils

- Bake in smaller-than-usual portions at a lower temperature for a longer time (small loaf pans instead of standard size; use mini-muffins or English muffin tins instead of large muffin tins).
- Use dull or dark pans for better browning.
- Keep a separate sifter to use with gluten-free flours to prevent crosscontact with gluten.

Freshness

- Gluten-free baked goods can lose moisture and quality quickly. Wrap them tightly and store in the refrigerator or freezer in an air-tight container to prevent dryness and staling.
- Refrigerate all flours for freshness and quality but bring to room temperature before measuring.

Troubleshooting

For bread machine breads

Bread top craters

Too much liquid, add more flour mixture 1 tablespoon at a time

Bread top mushrooms

Too much yeast, reduce by ½ teaspoon

Bread top rough

Not enough liquid. Add more, 1 tablespoon at a time.

Not enough sugar. Add more, 1 tablespoon at a time. Another option is to add more cornstarch to the flour blend.

Bread underbaked

Adjust bread machine cycle.

Bake in conventional oven.

Bake in smaller pans.

For cookies

Cookies spread

Refrigerate dough

Use shortening or part shortening

Butter temperature should be at room temperature

Bake on parchment paper lined cookie sheets

Use cool cookie sheets to slow spread

Browning of cookies

Dark cookie sheets make darker cookies

Baking too long.

Real butter browns best

For muffins and quick breads

- For more height, use a mixer to add more air to batter.

Sources: *Gluten-Free Baking*, Colorado State University, 2009. *http://www.ext.colostate.edu/pubs/foodnut/09376.html*

4-H Foods Judging Guide, University of Nebraska-Lincoln Extension. *http://saline.unl.edu/c/document_library/get_file?uuid=18cfbf76-56cf-4718-9507-3e5023085cb2&groupId=135030*

1,000 Gluten-Free Recipes. Carol Fenster. John Wiley & Sons

Evaluating Educational Exhibits

See the scorecard on the state 4-H website, which describes the standards for educational exhibits. These criteria can be applied to posters or free-standing exhibits. The message should make a strong connection to some aspect of the Foods and Nutrition project.

Judges and members should be aware of copyright issues. According to the 4-H Division of the Kansas State Fair premium book, "Exhibitors should avoid using copyrighted materials whenever possible by originating his/her own work. Exhibitors should use with caution a copyrighted and/or trademarked product or service (a brand name, label or product). The intent of using the copyright or trademark materials for educational purposes such as an exhibit, educational poster/display or public presentation is acceptable under the Fair Use (legal use) provision. Fair Use is a provision of the current copyright law that allows reproduction without payment or permission of limited portions of a copyrighted work for educational and other public interest purposes. Regardless of the Fair Use provision, the inference that a specific name brand product is good or bad inherently or through comparison must be done cautiously, using acceptable research/comparison methods and have a disclaimer that the conclusions are those of the participant and not those of K-State Research and Extension. A copyright and trademark are legal methods used by writers, artists, corporations and others to protect their original work. Protected items may range from books to music, logos to computer graphics. Copyrighted and/or trademarked materials used in banners, displays, demonstrations, posters or other activities for endorsement or promotion instead of educational purposes will be disqualified and will not be displayed or receive ribbons or premium. The use and inclusion of specific brand names for educational purposes does not imply endorsement or refusal by the Department of 4-H Youth Development, Kansas State University Agriculture Experiment Station and Cooperative Extension Service or the State of Kansas."

Food Gift Packages

This class is growing in popularity at many counties and at the Kansas State Fair. The purpose of the class is to provide exhibitors an opportunity to demonstrate citizenship, food safety, creativity, and food science skills. Many advanced members use this as a way to broaden their foods and nutrition learning experiences. In their desire to experiment, they may, however, choose some unsafe products or techniques. Some 4-H'ers have picked up ideas from popular magazines or craft books for making "fad" food products. These may not be safe food choices.

No alcoholic beverages will be accepted in the gift package class. See the Kansas State Fair Foods and Nutrition Evaluation score card on the State 4-H website for the evaluation standards for this class. Gift packages should be food products appropriate for human consumption.

All items exhibited within the gift basket must conform to the rules and regulations of the foods division. The entry form must include the recipe, the intended use for human consumption, and food safety precautions taken during and after preparation. Entries will count as non-perishable food products, not as an educational exhibit.

Judging Scorecards

All scorecards for the Foods and Nutrition project can be found on the Kansas 4-H website at *www.kansas4h.org*

Notes

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