Judge’s Guide for Foods and Nutrition Exhibits
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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. Some 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, bring a bottle of water.

**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 shortening or oil 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
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 or thick 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

Pie 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 (i.e., 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 fat

Meringue (a perishable product)

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 (a perishable product)
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 (a perishable product)
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 (a perishable product)
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

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

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

Flavor
Good fruit flavor
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

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

Missshapen, 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 fat

**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. 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. The result is a smooth, rounded crust. 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

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. More tips and troubleshooting solutions can be found from Red Star Yeast at https://redstaryeast.com/ and Fleischmann’s at http://www.breadworld.com/.

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.

Yeasts

Instant, active dry and bread machine yeasts are available for use in bread machines. Consult the manual for recommendations. Bread machine yeast is specially made for use in bread machines. 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. Liquid 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 rise**
- 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

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).

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 airtight 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.

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, websites, 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
<table>
<thead>
<tr>
<th>Type</th>
<th>Characteristics</th>
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| 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 a 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 |