

JUDGING OF DAIRY PRODUCTS



Jump to...



B. Tech. (Dairy Technology) ► DT-8 ► Resources ► Lesson 18. SENSORY ATTRIBUTES OF RIPENED CHEESE

Module 5. Fermented milk and milk products

Lesson 18

SENSORY ATTRIBUTES OF RIPENED CHEESE

18.1 Introduction

Cheddar cheese is one of the most common types of cheese produced in the world. It is generally made from flash heated or pasteurized milk to which about 1.0 percent lactic starter culture has been added. The curd formed by the addition of coagulating enzyme is firmed by cooking at 39°C. The characteristic body of cheddar cheese is developed by a process of matting the curd known as cheddaring. The curd is pressed, paraffined and cured.

Mostly pasteurized milk cheddar cheese is marketed shortly after manufacture (<90days) as a mild cheese or for use in producing processed cheese. The ripening or curing of Cheddar cheese to develop characteristic cheddar flavour is a slow, complex, bacteriological, chemical and enzymatic process which requires several months. Unripened or fresh or 'green' Cheddar cheese has a flat flavour and relatively tough, curdy or corky body. Cheddar cheese properly cured for at least 3 months or longer has a moderate, slightly nutty, cheddar flavour and is called "young" or "mild" cheese. At 6 to 8 months, more of the distinct, aromatic cheddar flavour should be evident; such cheese is considered as semi or medium aged. Generally, 8-10 months are required to develop the fully aromatic or robust. Cheddar cheese flavour desired in an 'aged', or matured cheese.

18.2 Requirements for high quality cheddar cheese

18.2.1 Colour

It should always be uniform throughout the cheese, regardless of the chosen intensity.

Uncoloured cheese:	Light cream shade
Medium intensity coloured:	Deep cream colour or a pleasant yellow orange.

Colour should also exhibit some luster. Cheese surface colour should be slightly translucent, i.e. It should appear as one could actually see into the cheese interior for a short distance. The translucent quality of cheddar cheese is closely associated with desirable body and texture.

18.2.2 Common colour defects

Table 18.1 Common colour defects

Acid cut (bleached, faded)	A typical colour specks
Colour too high (unnatural)	mottled
seamy (uneven, wavy)	white specks

18.2.3 Finish and appearance

Cheese with desirable finish should generally show symmetrically parallel ends; square even edges; evenly folded, neat, closed fitting plastic film or wrapper free from wrinkles, a clean, thin, uniform, closed adhering coating of paraffin (if used) showing no blister or scales; a freedom from pinholes, tears breaks, cracks, mold, rot spots, or soiled areas.

Table 18.2 Defects with cheese wrapped with various types of protective coverings

Rindless, flexible-wrapped or non-paraffin cheese:	Damaged Covering Loosened Covering Soiled Covering Mold Growth
Pliable, wax coated cheese:	Blistered, Checked/cracked Rough, sandy.

18.2.4 Body and texture

Cheddar cheese with most desirable body and texture displays a full, solid, closed knit plug that possesses smoothness, meatiness, waxiness and silkiness, and is entirely free from gas holes or mechanical openings. Cheddar cheese with the above described quality attributes lends it to uniform slicing into thin, intact pieces.

Body of cheese refers to various physical attributes which primarily affect the relative firmness or softness of the cheese.

The term texture refers to the structure and arrangement of the various parts which make up the whole (the cheese unit) thus, texture in cheese is observed visually by the quantity: size: shape and distribution of openings and by the sense of touch (as in mealy/grainy) to uncover internal particles.

Table 18.3 More common body defects

Cork (dry, hard, tough)	Curdy (rubbery)
Crumbly (friable)	Greasy
Pasty (smeary, sticky, wet)	Spongy
Short (flaky)	Weak (soft)
Mealy/grainy (gritty)	Gassy (pin holes)
Slits (fish eyes, yeast, holes)	Sweet curd holes
Fissures (presence of elongated slit or extended separation of curd articles)	

18.2.5 Flavour

High quality cheddar cheese should possess the characteristic 'cheddar' flavour, which best described as clean, moderately aromatic, nutty like, and pleasantly acidic, while the same general flavour qualities are described in fresh, medium cured, and aged cheese, the intensity of characteristic cheddar flavour will primarily depend upon the extent of curing and actual curing condition. Usually, aged cheese has a sharp, aromatic intense flavour that is entirely lacking in young cheese. the flavour of high quality cheddar cheese has been linked to that of the freshly roasted peanuts by various investigators.

Table 18.4 Possible flavour defects

High acid/sour	Metallic (Oxidized)
Bitter	Moldy (Rusty)
Fruity/fermented	Rancid (Lipase)
Flat (lacking flavour)	Sulfide (skunky)
Garlic/ onion (weedy)	Unclean (dirty after taste)
Heated (cooked)	Whey Taints (sour whey)

The cheddar cheese score card

The quality of cheese is determined by comparing the properties or characteristics of each cheese with their accepted standards of perfection. For this purpose a score card is used. The American Dairy Science Association has developed a score card for evaluating" Cheddar cheese.

Table 18.5 Score card for cheddar cheese

Score card for cheddar cheese	
Flavour	45
Body and texture	30
Finish (appearance and makeup)	15
Colour	10
Total	100

18.3 Tempering cheese

Before evaluation, cheese samples should be tempered at 10 °C to 15-5 °C for a sufficient length of time to ensure uniform temperature throughout the cheese. This usually required 1-2 hrs for small blocks (up to 3 kg) and 3-5 h for large ones. Generally a cheese plug taken from a warm cheese appears weak-bodied; by contrast a cold plug may appear brittle or corky.

18.4 Appearance

Typically, the first procedure in grading Cheddar cheese is visual examination of surface finish or packaging material. In general, the appearance should be clean, neat, attractive and symmetrical or the surface might be uneven, non parallel or rounded. The surface should also be free from holes, wrinkles and moulds.

18.5 Colour of Cheddar cheese

The evaluator should observe the colour of the cheese and determine whether the appearance is bright and clear or dull and lifeless. The colour of cheese should be uniform (free from mottled or light and dark portions) or whether there are curd seams or faded areas. The cheese plug appears to be translucent. Some of the colour defects associated with cheddar cheese is:

Acid-cut (bleached, faded), a typical colour specks, seamy (uneven wavy), colour too high (unnatural) and white specks.

18.6 Body and texture of cheddar cheese

Cheddar cheese with the most desirable body and texture displays a full, solid, close-knit plug that possesses smoothness, meatiness, waxiness and silkiness, and is entirely free from gas holes or mechanical openings. Such a product lends itself to uniform slicing into intact pieces. The common body defects are corky (dry, hard, tough), crumbly (friable), curdy (rubbery), greasy, pasty (smeary, sticky, wet), short (flaky), spongy and weak/soft. The texture defects are mealy, gritty, slits, gassy, fissures and open (mechanical holes).

18.7 Flavour of Cheddar cheese

High quality Cheddar cheese should possess the characteristic "cheddar flavour", which is best described as clean, moderately aromatic, nutty like and pleasantly acidic while the same general flavour qualities are desired in fresh, medium-cured and aged cheese, the intensity of the characteristic cheddar flavour will primarily depend upon the extent of curing and actual curing condition. The flavour of high-quality Cheddar cheese has been likened to that of freshly roasted peanuts or hazelnuts by various investigators. Flavour defects in cheddar cheese could be listed as follows: High acid (sour), bitter, fruity, flat, garlic/onion (weedy), heated, malty, metallic, mouldy(rusty), rancid, unclean, yeasty etc.

18.8 Swiss cheese

Swiss cheese, also known as Emmental, Emmentaler, Schwaizer, or Sweitzer cheese, is a type of hard cheese made from clean, fresh milk. The specific manufacturing conditions are employed which differ widely from those for cheddar cheese. The utilization of thermophilic lactic bacteria and *Propionibacterium shermanii* for milk fermentation results in a cheese having flavour, body and texture and appearance characteristics peculiar to itself. High-quality Swiss cheese is characterised by (i) a cream yellow colour (ii) a shiny surfaced round gas holes, and (iii) a characteristic "sweet hazelnut" flavour.

18.9 Requirements of Quality Swiss Cheese

18.9.1 Flavour

A good quality Swiss cheese should have a clean, distinctive, pleasing, sweet hazelnut flavour. Unique to this cheese variety, appropriate 'eye' formation in Swiss cheese is considered a good indication of typical Swiss cheese flavour. The common flavour defects found in Swiss cheese are as follows: flat, rancid, stinker, unclean, unnatural etc.

18.9.2 Eye development in Swiss cheese

The shape, size, and distribution of the "eyes" in Swiss cheese have an aesthetic appeal to consumers in addition to a possible association with typical Swiss cheese flavour. Round, symmetrical eyes are preferred in Swiss cheese, but a slightly elliptical or oval shape may be accepted without objection. The ideal frequency distribution of eyes in cheese tends to fade towards the edge of the cheese block. The majority of eyes should be about 1 cm in diameter. The defective cheese has too large eyes or numerous small eyes and sometimes absence of eyes. These defects are designated as blind, dull, irregular, miszler, pressler, overset / cabbage / blow holes etc.

18.9.3 Body and texture

The body and texture of high quality Swiss cheese should be firm, closed, moderately flexible when bent and free from such defects as glass, pinholes, sponginess or bloats. Occasional picks (small, irregular or ragged openings) and checks (short cracks) may be tolerated, provided they are within 2 cm of the surface.

18.9.4 Finish and appearance of swiss cheese

Swiss cheese should be symmetrical with a smooth, even, clean, dry and closed surface. The ends of cheese pieces should be parallel neither bloated nor sunken, with surfaces free from cracks, nor all edges square. It is most undesirable for cheese edges to exhibit long tabs or a cracked, open edge (frog mouth).

18.10 Defects in Cheese

18.10.1 Flavour Defects

18.10.1.1 Slight (lacking in flavour development)

Flavour detected only upon critical examination

Causes: inactive starter, bacteriophages, inhibitors, too high cooking temp., insufficient starter, not increasing temp. to 70 F.

18.10.1.2 Flat

Insipid, practically devoid of any characteristic cheese flavour.

Causes: inactive starter, insufficient development of acid, high salt content which retards ripening, cheese being kept at 40 F or below during ripening, insufficiently cured & low moisture cheese.

18.10.1.3 Acid/sour

Sharp & puckery to taste, characteristic of lactic acid

Causes: high % of starter, large no. of lactic acid producing bacteria, adding starter too early before setting, too fast increase in cooking temp., too high % of acid at time of draining of whey.

18.10.1.4 Bitter

Distasteful, similar to the taste of quinine. Is mostly found in aged cheese

Causes: due to undesirable bacteria e.g. *S. liquefaciens* by the breakdown of proteins, high acid & moisture in cheese, growth of yeasts & too high acid in whey at draining & high amount of rennet addition

18.10.1.5 Fruity

Sweet fruit like flavour resembling apples increases during ageing.

Causes: Low grademilk, inferior starter, too much moisture, slow expulsion of whey, low salt %, unclean equipment and high ripening temp. (60-70 F), presence of *Ps. Fragi*

18.10.1.6 Utensil/ unclean

Flavour is suggestive of the improper or inadequate washing & sterilization of equipments

Causes: Low grade milk containing the undesirable bacteria, inferior starter, unclean and improperly washed equipments.

18.10.1.7 Yeasty

Flavour indicative of yeast fermentation

Causes: Unsanitary conditions of milk production, not cooling milk, yeasty starter, using yeast infested hoops, cloths etc., unsanitary cheese factory surroundings, no fly proofing done.

18.10.1.8 Rancid

Flavour suggestive of butyric acid due to lipase action on fat, sometimes associated with bitterness.

Causes: Late lactation milk in winters, presence of *Ps. fragi* and other psychrotrophs.

18.10.1.9 Whey taint

Slightly acid flavour & odour characteristic of the fermented whey.

Causes: Slow expulsion of whey, inactive starter, too much application of heat during cooking, uneven cutting & cooking, improper handling of curd.

18.10.1.10 Metallic

Flavour is suggestive of metal imparting a puckery sensation.

Feed: Feed flavours such as alfalfa, sweetclover, silage in milk is carried into the cheese.

18.10.1.11 Weedy

Flavour due to milk having common weedy flavour. Present when cattle has eaten weedy hay, weed infested pastures.

18.10.1.12 Branny

Flavour characteristic of the odour of the cattle shed.

18.10.1.13 Sulfide

An objectionable flavour of hydrogen sulfide similar to the flavour of water with high sulfur content.

18.10.1.14 Onion

Flavour is indicative of thearoma of the onions, garlic or leeks. Due to cattle eating these substances.

18.10.2 Finish/ Appearance defects

18.10.2.1 Cracked rind

Openings or breaks in the rind

Causes: dropping cheese, rough handling and its incorrect cheddaring, excessively drying cheese before profiting if no bandage or cloth circle is used on cheese & by bandage or press cloth wrinkled during profiting.

18.10.2.2 Checked rind (bruised surface)

Numerous small cracks or breaks in the rind, sometimes following outlines of curd particles, sometimes referred to as “curd openings”.

Causes: Injuring the rind when removing the cheese from the hoop, rough handling.

18.10.2.3 Wrinkled/ burst/ torn/ irregular bandage

Severance of the bandage at the side seam or bandage irregularly placed or wrinkled with loose fitting.

Causes: careless work when dressing cheese.

18.10.2.4 Mould spots

Mould spots or areas that have formed under the wrapper or under the bandage/ paraffin or on the surface of the cheese.

Causes: insufficiently pressed cheese, cracked, checked or bruised rind, cheese improperly paraffined, high humidity temp & mould infested shelves in the curing room.

18.10.2.5 Soiled/ unclean surface

Milk stones, rust spots or other discolouration & dirt on the surface of the cheese.

Causes: using unclean hoops, utensils, equipments, soiled bandage, handling cheese with dirty hands, placing cheese on dirty trucks, shelves, dirt & insects in curing room.

18.10.2.6 Rind rot

Soft spots on rind that have become discolored & have decayed or decomposed.

Causes: dipping cold, damp cheese in paraffin for too brief a period, low temperature of paraffin.

18.10.2.7 High edges

Rim or ridge on the follower side of the cheese, which is raised in varying degrees or might be even bent over in extreme cases.

Causes: uneven position of pressing hoops, adding too much cheese to hoop, poor press cloths & fitting followers.

18.10.2.8 Defective coating

Brittle coating or paraffin that breaks & peels off in form of scales/ flakes, flat or raised blisters or bubbles under surface of paraffin, cracked or breaks in coat.

Causes: if butterfat granules are formed in milk i.e. if milk is not properly cooled, rough handling of milk may cause churning. Blisters are formed by dipping paraffin before the cheese surface has dried or due to gas formation in cheese.

18.10.2.9 Lopsided/ uneven

One side of the cheese is higher than the other side.

Causes: improper dressing, pressing & handling of cheese cubes.

18.10.2.10 Soft spots

Soft to touch & spots are usually faded & moist.

18.10.2.11 Huffed

Swollen surface because of gas fermentation. The cheese becomes rounded/ oval in shape instead of flat shape.

18.10.2.12 Weak rind

Thin & possessing little or no resistance to the pressure.

18.10.2.13 Sour rind

A fermented rind condition usually confined to the faces of the cheese.

18.10.2.14 Wet rind

A rind in which moisture adheres to the surface & which may or may not soften the rind or cause colour defect i.e. discolouration.

18.10.2.15 Rough surface

Lacks smooth, clean, glossy & even surface.

18.11 Colour Defects

18.11.1 Acid cut

Bleached or faded appearance which sometimes varies throughout the cheese appearing most often around the mechanical openings.

Causes: high acidity, moisture, curing room temperature.

18.11.2 Mottled

Irregular shaped spots in which portions are light coloured & others are highly coloured.

Causes: uneven colouring, cutting, drying of cheese, curdy starter, mixing old curd to salted cheese.

18.11.3 Colour specks

Specks of varying taints of white, yellow etc.

Causes: due to curd specks from starter, dry curd particles from sides of vat, dirt specks, frozen cheese colour, growth of colour producing yeasts and bacteria.

18.11.4 Seamy/ white lines

Thread like white lines that form in the pieces of curd.

Causes: bruising curd before milling, adding salt before temp. is reduce to 90 F, adding salt in one installment, pressing curd too quickly.

18.11.5 Unnatural

Deep orange/ pink/ reddish colour.

Causes: Annatto cheese colour is reddish if the cheese solution is acidic due to reaction with casein under acidic conditions.

18.11.6 Unattractive

Abnormal or unappetizing appearance, dull or faded or having bleached surface.

18.11.7 Salt spots

Large light coloured spots or areas of salt due to high concentration

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DT-8