GTA Brews - Off Flavour Session

Based on the BJCP 12 vial kit manufactured by Siebel

Acetaldehyde (1)

- Perception/Info:
  - Green apple, cut grass, latex paint, cut pumpkin/squash
- Causes/Controls:
  - Intermediate fermentation byproduct to be converted to ethanol
  - Oxidation may reverse the process and re-create acetaldehyde
  - Present in beer removed from the yeast too early
  - Bacterial contamination (zymomonas, acetobacter)
  - Incomplete fermentation from under-oxygenation
- Appropriate/Inappropriate Styles:
  - Appropriate in Kellerbier
  - Background levels (appropriate) in Budweiser due to use of beechwood chips to precipitate yeast
- Threshold: 10-20 mg/L, Dosed Concentration: 45 mg/L

Butyric Acid (5)

- Perception/Info:
  - Baby vomit, bile, putrid
  - Becomes more intense with lower pH
  - Commonly confused with isovaleric acid (which is sweaty feet / rancid cheese)
- Causes/Controls:
  - Produced by anaerobic bacteria like clostridium butyricum and others
  - Acidifying <4.5 pH before adding bacteria to suppress clostridium
  - Still under active study
- Appropriate/Inappropriate Styles:
  - Never appropriate
  - Found in some fast soured beers
- Threshold: 3 mg/L, Dosed Concentration: 7.5 mg/L

Diacetyl (9)

- Perception/Info:
  - 2,3 butanedione
  - Butterscotch, artificial butter, toffee
  - Slick sensation on the palate
  - Some tasters are completely blind to diacetyl
- Causes/Controls:
  - Fermentation byproduct that is usually reabsorbed by yeast and converted to diols
  - Separating beer from yeast too early, low FAN levels, yeast mutation
  - Bacterial contamination (pediococcus)
  - Diacetyl rest can help clean up
- Appropriate/Inappropriate Styles:
  - Appropriate in some Czech Lagers and English Ales
- Threshold: 0.1-0.2 mg/L, Dosed Concentration: 0.6 mg/L

DMS (8)

- Perception/Info:
  - Dimethyl sulfide
  - Cooked vegetables (corn, celery, cabbage), tomato sauce, boiled shrimp water
- Causes/Controls:
  - Created by the heat-induced conversion of malt derived SMM (s-methyl-methionine) to DMS in the boil
  - Usually this evaporates during the boil or volatilizes during fermentation
  - Weak boil or slow fermentation
  - Contamination (Wild yeast, zymomonas)
- Appropriate/Inappropriate Styles:
  - Appropriate in most Pils-based lagers (Esp. American Lager), Cream Ale
- Threshold: 25-50 ug/L, Dosed Concentration: 200 ug/L

Earthy (10)

- Perception/Info:
  - 2-ethyl fenchol
  - Geosmin, soil-like
- Causes/Controls:
  - Water contamination of algae/geosmin
  - Damp cellar where microbes migrate through packaging
- Appropriate/Inappropriate Styles:
  - Never appropriate
- Threshold: 5 ug/L, Dosed Concentration: 15 ug/L

Ethyl Acetate (11)

- Perception/Info:
  - Ester
  - Solvent, nail polish remover
  - Pear (low levels)
- Causes/Controls:
  - Esterification of acedic acid and ethanol
  - Contamination (wild yeast, brettanomyces, acetobacter) + aerobic conditions
  - Fermentation conditions:
    - Yeast strain selection, high fermentation temperature, low pitch rate, low oxygenation, high gravity, excess fatty acids from trub, etc…
- Appropriate/Inappropriate Styles:
  - Appropriate in some styles as pear:
    - Belgian Golden Strong, Australian Sparking Ale, Belgian IPA
  - Always inappropriate as solvent/nail polish
- Threshold: 20-40 mg/L, Dosed Concentration: 60 mg/L

Ethyl-Hexanoate (12)

- Perception/Info:
  - Ester (very common)
  - Aniseed, red apple, licorice
- Causes/Controls:
  - Esterification of caproic acid and ethanol
  - Fermentation conditions:

        - Yeast strain selection, high fermentation temperature, low pitch rate, low oxygenation, high gravity, excess fatty acids from trub, etc...
- Appropriate/Inappropriate Styles:
    - Appropriate at low levels in most ales
- Threshold: 0.2 mg/L, Dosed Concentration: 0.6 mg/L

Geraniol (13)

- Perception/Info:
    - Geranyl alcohol
    - Floral, geranium flowers, rose-like, rose-water
- Causes/Controls:
    - Component of hop oil (like myrcene, humulene, etc...)
    - Esterification with acedic acid creates geranyl acetate (geranium aroma)
    - Esterification with butyric acid creates geranyl butyrate (cherry aroma)
    - Amount determined by hopping rate, boil strength, fermentation activity
- Appropriate/Inappropriate Styles:
    - Appropriate in any style where floral hop aroma is allowed
- Threshold: 100-200 ug/L, Dosed Concentration: 450 ug/L

Indole (16)

- Perception/Info:
    - Farmyard, fecal, jasmine
    - Septic when present with DMS
- Causes/Controls:
    - Contaminant coliform bacteria
    - Occurs commonly with DMS & DMTS (dimethyl trisulphide)
- Appropriate/Inappropriate Styles:
    - Never appropriate
- Threshold: 10-20 ug/L, Dosed Concentration: 55 ug/L

Isovaleric Acid (18)

- Perception/Info:
    - 3-Methylbutanoic acid
    - Stale/rancid cheese, parmesan, sweaty socks
    - Commonly confused with butyric acid (which is bile/vomit)
- Causes/Controls:
    - Use of old/oxidized hops
    - Created by contaminants (brettanomyces, wild yeast, Streptococcus) processing leucine (amino acid present in beer)
    - Brett can convert into ethyl isovalerate (fruity/berry)
- Appropriate/Inappropriate Styles:
    - Never appropriate
- Threshold: 1.0 mg/L, Dosed Concentration: 3.0 mg/L

Papery (23)

- Perception/Info:
    - Trans-2-nonenal (an aldehyde)
    - Wet cardboard, oxidized, recycled paper
- Causes/Controls:

    - Not fully understood, still under study
    - Amino acid precursors from the boil release T2N when beer pH changes (HSA)
    - Oxidation of “free radicals” (higher alcohols)
    - Excess oxygen introduced to finished beer
- Appropriate/Inappropriate Styles:
    - Never appropriate
- Threshold: 0.5 ug/L (very low), Dosed Concentration: 2 ug/L

Spicy (24)

- Perception/Info:
    - Eugenol, 2-methoxy-4(2-propenyl)phenol
    - One of many phenolic compounds in beer
    - Allspice, clove-oil
- Causes/Controls:
    - Oxidation of fusel alcohols
    - Extracted from wood (barrels)
    - Created by POF+ yeast strains
    - Contamination of wild yeast
- Appropriate/Inappropriate Styles:
    - Appropriate in Belgian Ales
- Threshold: 40 ug/L, Dosed Concentration: 120 ug/L

Bonus Info: THP (tetrahydropyridine)

- No flavour standard available yet
- Perception/Info:
    - 2-acetyl-3,4,5,6-tetrahydropyridine
    - Mousy, urine (high levels)
    - Breakfast cereal, cracker/biscuit (low levels)
    - Detected in the aftertaste, and can linger
- Causes/Controls:
    - Released by brettanomyces in the presence of oxygen (packaging)
    - Produced by hetero lactobacillus, especially when acetaldehyde is present
    - Ages out over months
- Exactly how and why is still being studied
- Follow the Milk the Funk wiki page to stay up to date

References:

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