

Running a pico-brewery

Pete McAllister

February 2, 2018



HRFFFM:TMN



HRÆFNENE ALU
Hræfnene ealu
est. 2013



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Hræfnene ealu
est. 2013

(our kitchen and shed)

- Ingredients
- Process
- Equipment
- Economics
- Pitfalls
- Recipe design
- Resources



- Ingredients
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Malt

Germinated barley



Plus sometimes other grains



Malt

Or not barley at all



Hops



Yeast

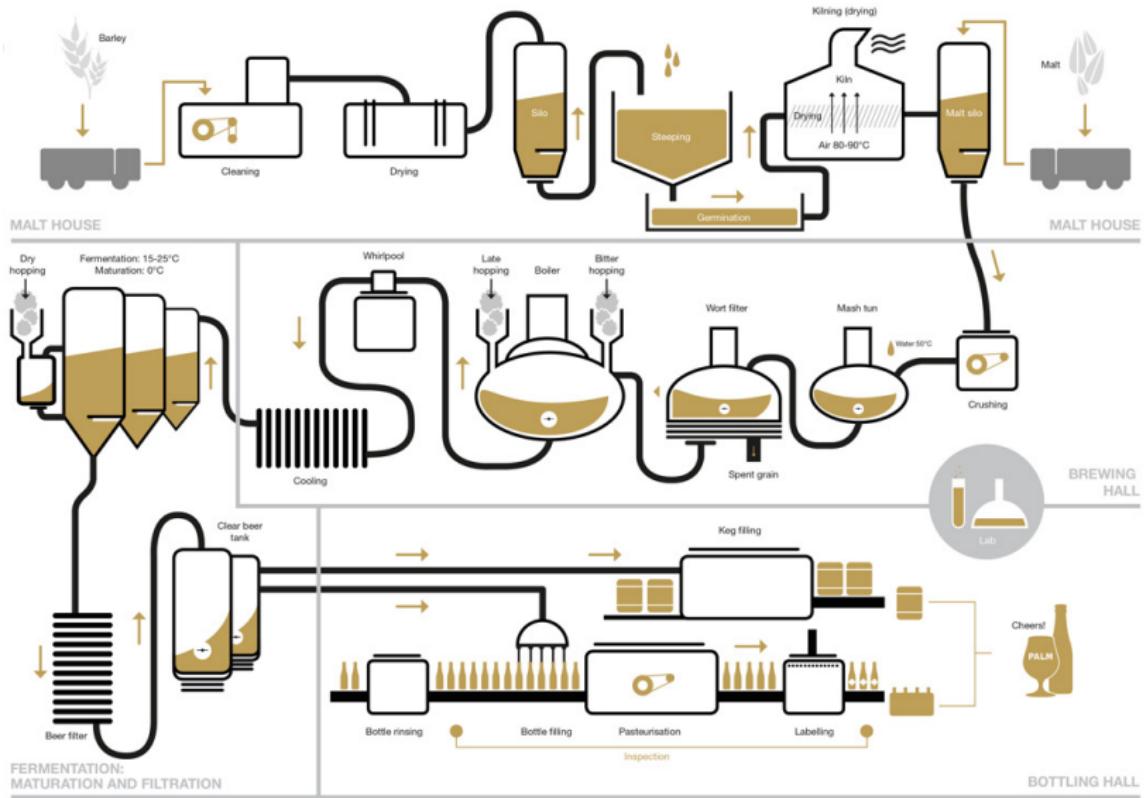


Water

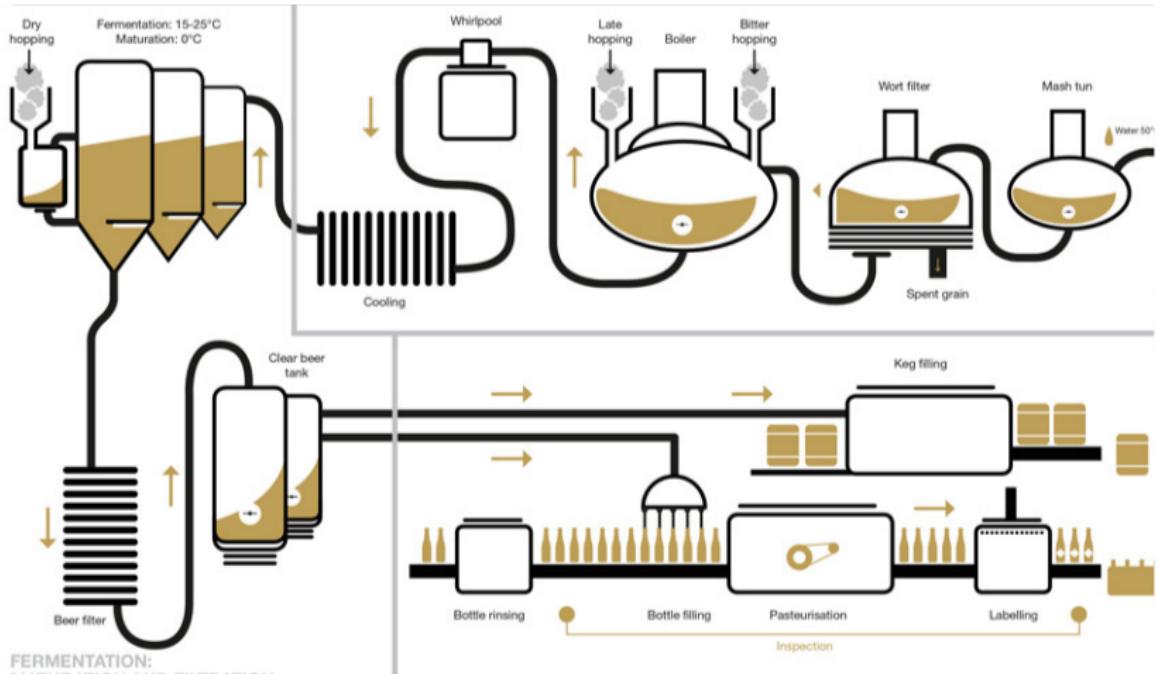


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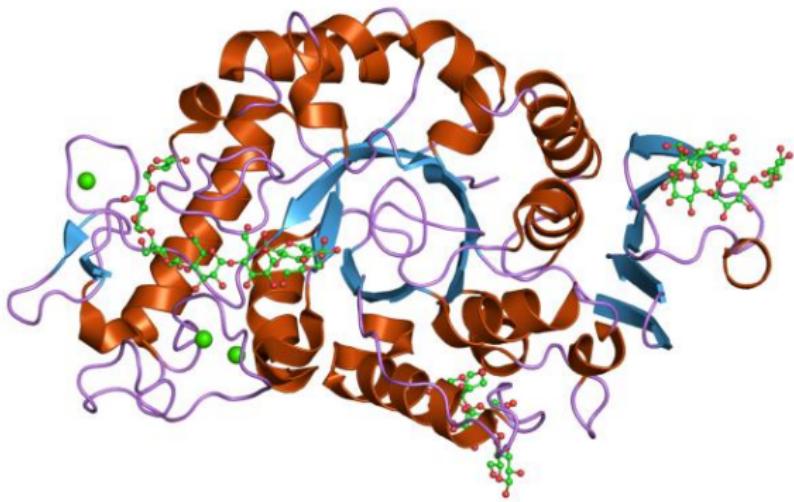
Commercial brewing



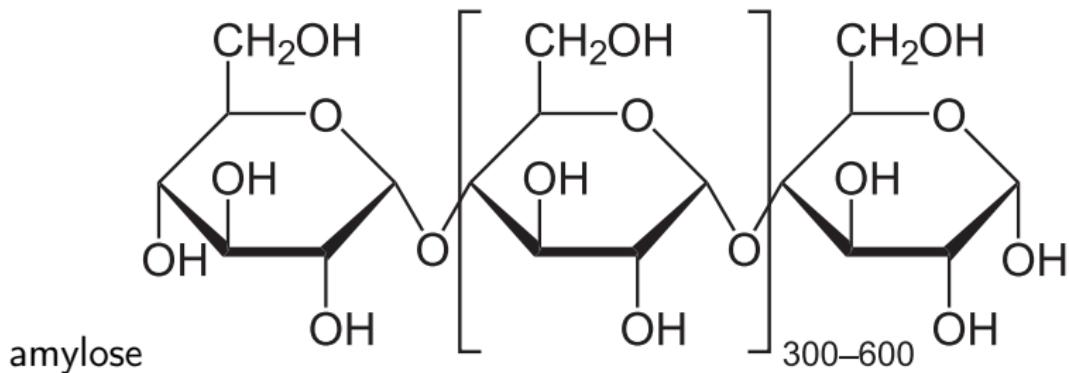
Commercial brewing



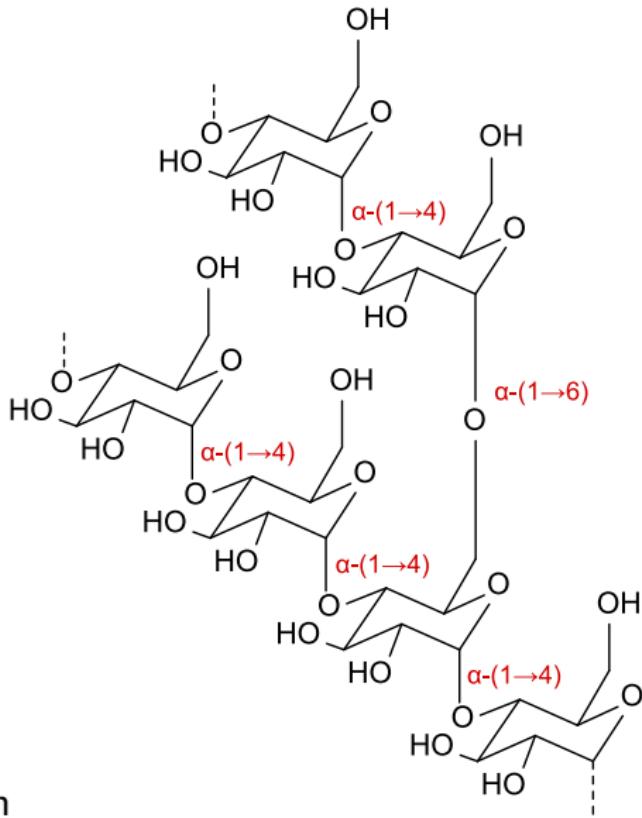
Mashing chemistry



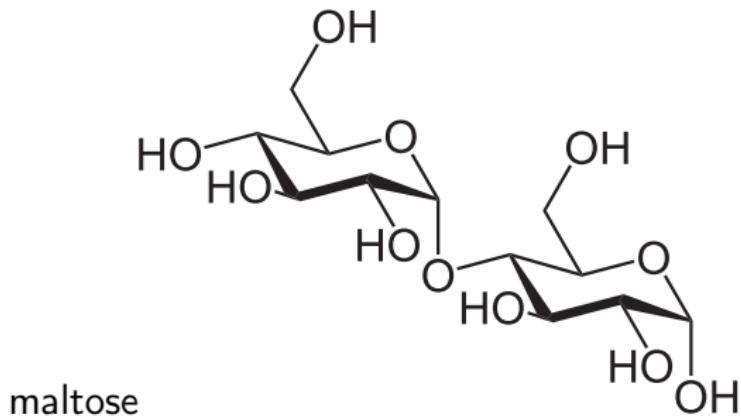
α -amylase



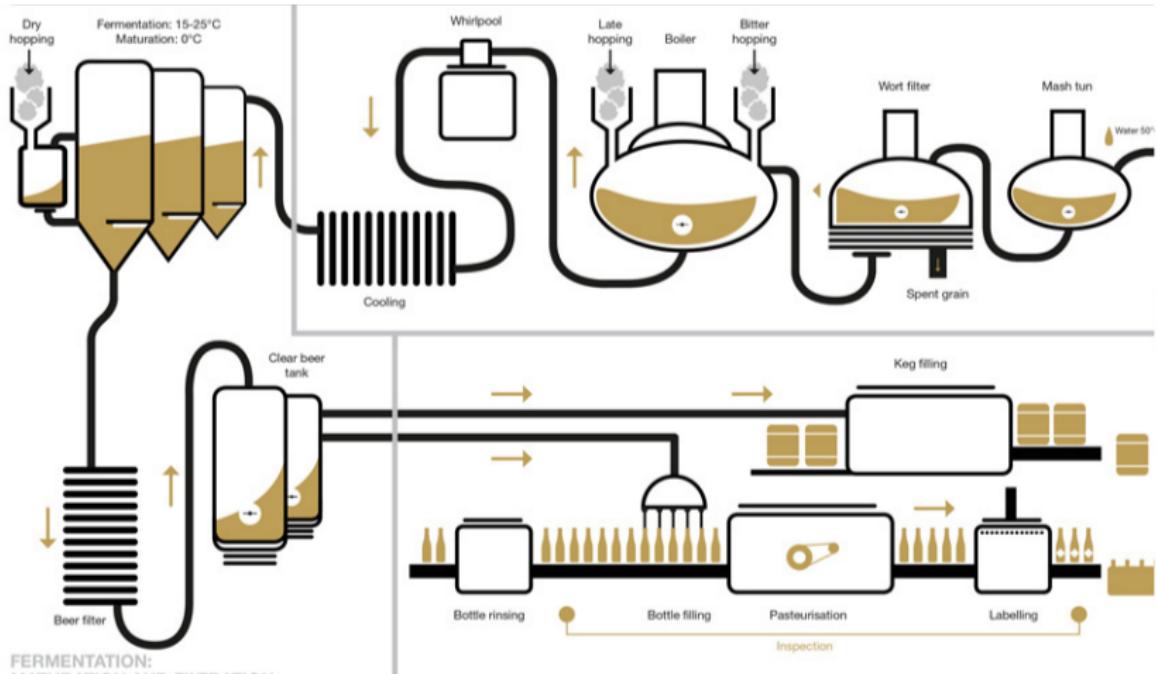
Mashing chemistry



dextrin



Commercial brewing



Home-brewing methods

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① All-Grain

- ① All-Grain
- ② Malt extract/brew-in-the-bag

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- ③ Instant extract kit

- Ingredients
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- ⑥ Primary Fermentation
- ⑦ Secondary Fermentation
- ⑧ Packaging
- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

- ⑥ Primary Fermentation
- ⑦ Cooling
- ⑧ Packaging
- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

Fermentation vessels

- Plastic bucket

Fermentation vessels

- Plastic bucket
- Carboy/demijohn

Fermentation vessels

- Plastic bucket
- Carboy/demijohn
- Fancy temperature-controlled steel cone

- ⑥ Primary Fermentation
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- Thermometer
- Hydrometer
- Scale

- Thermometer
- Hydrometer
- Scale
- Water chemistry
- Pressure gauge
- Hop spider
- Filter bag
- Bottle capper
- Siphon

- ⑥ Primary Fermentation
- ⑦ Secondary Fermentation
- ⑧ Packaging
- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

- ② Mashing
- ④ Boiling
- ⑤ Cooling
- ⑥ Primary Fermentation
- ⑧ Packaging
- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

- Saucepan

- Saucepan
- Insulated vessel

- Saucepan
- Insulated vessel
- Insulated + heating element (dedicated mash tun)

- ② Mashing
- ④ Boiling
- ⑤ Cooling
- ⑥ Primary Fermentation
- ⑧ Packaging
- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

- Saucepan(s)

- Saucepan(s)
- Boiler

- Saucepan(s)
- Boiler
- All-in-one

Otto



- ② Mashing
- ④ Boiling
- ⑤ Cooling
- ⑥ Primary Fermentation
- ⑧ Packaging
- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

- ① (Water Treatment)
- ② Mashing
- ③ Sparging
- ④ Boiling
- ⑤ Cooling
- ⑥ Primary Fermentation
- ⑦ Secondary Fermentation
- ⑧ Packaging

- ⑨ Sanitation
- ⑩ Measurement & Miscellaneous

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- ② Mashing
- ③ Sparging
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- ⑩ Measurement & Miscellaneous

- Nothing

- Nothing
- Bag sparging

- Nothing
- Bag sparging
- Remashing

- Nothing
- Bag sparging
- Remashing
- Fly sparging

- ① (Water Treatment)
- ② Mashing
- ③ Sparging
- ④ Boiling
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(Based on batch size of 23l)

Instant kit: ~£30/batch=£1300/kl

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Grist: £5–9

Hops: £1–3

Yeast: £2–12

(Based on batch size of 23l)

Instant kit: ~£30/batch=£1300/kl

Grist: £5–9

Hops: £1–3

Yeast: £2–12

Electricity: ~6–7kWh

Water: ~60l

(Based on batch size of 23l)

Instant kit: ~£30/batch=£1300/kl

Grist: £5–9

Hops: £1–3

Yeast: £2–12

Electricity: ~6–7kWh

Water: ~60l

Total: ~£11/batch=£470/kl

Setup i: bare-bones

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FV: ~£20, lasts 60 brews

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Measuring and miscellaneous: ~£30

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FV: ~£20, lasts 60 brews

Measuring and miscellaneous: ~£30

Upfront: ~£50

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FV: ~£20, lasts 60 brews

Measuring and miscellaneous: ~£30

Upfront: ~£50

Amortized: ~£0.5/batch=£21/kl

Setup ii: basic full-mash

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Mash tun: ~£100, lasts 120 brews

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Boiler: ~£90, lasts 120 brews

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Boiler: ~£90, lasts 120 brews

FV: ~£20, lasts 60 brews

Cooling: Home-made or improvised? £10?

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Mash tun: ~£100, lasts 120 brews

Boiler: ~£90, lasts 120 brews

FV: ~£20, lasts 60 brews

Cooling: Home-made or improvised? £10?

Measuring and miscellaneous: ~£30

Setup ii: basic full-mash

Mash tun: ~£100, lasts 120 brews

Boiler: ~£90, lasts 120 brews

FV: ~£20, lasts 60 brews

Cooling: Home-made or improvised? £10?

Measuring and miscellaneous: ~£30

Upfront: ~£260

Setup ii: basic full-mash

Mash tun: ~£100, lasts 120 brews

Boiler: ~£90, lasts 120 brews

FV: ~£20, lasts 60 brews

Cooling: Home-made or improvised? £10?

Measuring and miscellaneous: ~£30

Upfront: ~£260

Amortized: ~£2/batch=£83/kl

Setup iii: Grainfather

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All-in-one mash tun, boiler, chiller: ~£675

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All-in-one mash tun, boiler, chiller: ~£675

FV: ~£20, lasts 60 brews

Measuring and miscellaneous: ~£30

Setup iii: Grainfather

All-in-one mash tun, boiler, chiller: ~£675

FV: ~£20, lasts 60 brews

Measuring and miscellaneous: ~£30

Upfront: ~£750

Setup iii: Grainfather

All-in-one mash tun, boiler, chiller: ~£675

FV: ~£20, lasts 60 brews

Measuring and miscellaneous: ~£30

Upfront: ~£750

Amortized: ~£5/batch=£220/kl

Setup iii: Grainfather

All-in-one mash tun, boiler, chiller: ~£675

FV: ~£20, lasts 60 brews

Measuring and miscellaneous: ~£30

Upfront: ~£750

Amortized: ~£5/batch=£220/kl

(Or scale up to 50l for ~£2200)

Setup iv: Fancy higher-scale

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75l Mash tun: £465

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120l Boiler: £480

Setup iv: Fancy higher-scale

75l Mash tun: £465

120l Boiler: £480

155l Fermenter: £1200

PET bottles: ~£0.41, reusable 3–4 times

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Reuse bottles you've bought (1l mixers, beer)

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Glass bottles: ~£0.80, reusable 6–8 times

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Reuse bottles you've bought (1l mixers, beer)

Glass bottles: ~£0.80, reusable 6–8 times

Barrel: ~£30 (not recommended)

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Reuse bottles you've bought (1l mixers, beer)

Glass bottles: ~£0.80, reusable 6–8 times

Barrel: ~£30 (not recommended)

18 l keg system: ~£150

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- Cleanliness

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- Yeast health

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- Yeast health
- Mashing temperature control

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- Mashing temperature control
- Fermentation temperature control

- Cleanliness
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- Bottle bombs

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- Bad record-keeping

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- Cleanliness
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- Mashing temperature control
- Fermentation temperature control
- Bottle bombs
- Bad record-keeping
- Recipe mistakes
- Physical mistakes

- Ingredients
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Recipe design

- Base malts
 - Maris Otter, Wheat malt, Pilsner malt, Vienna malt...
- Roasted malts
 - Chocolate malt, black malt...
- Caramelized malts
 - Carafa, Crystal malts, Caramalt...
- Weird malts
 - Rauchmalz, peated malt...
- Adjuncts
 - Torrified wheat, roasted barley, dextrose, honey...
- Other grains
 - Rye, sorghum, rice, corn...

- Bittering hops
- Flavour hops
- Dry hopping
- Yeast strains
 - *Saccharomyces pastorianus*, *S. eubayanus*, *S. carlsbergensis*
 - *Brettanomyces bruxellensis*
- Bacterial cultures
 - *Lactobacillus*, *Pediococcus* . . .
- Wild yeast
- Racking, lagering, conditioning

- Finings & Body
 - Isinglass, Irish moss, maltodextrin, lactose...
- Fruit
- Nuts & Spices
 - Hazelnut
 - Cardamom
 - Coriander
 - Chili
 - Juniper
- Coffee
- Resin & bark
- Chocolate
- Wood chips and barrel aging

- You can improvise
- You can find loads of recipes
- ... or make them up
- The startup costs needn't be too bad
- You will get more out of drinking beer

Research



- Ingredients
- Process
- Equipment
- Economics
- Pitfalls
- Recipe design
- Resources

Books

- Palmer, *How to Brew* (1st ed. free online)
- Hummel, *The Complete Homebrew Book*
- CAMRA's *Brew your own British Real Ale*

Blogs, fora, calculators

- Brewer's Friend Calculators
- Homebrew Talk
- American Homebrewers Association
- BeerSmith

(Links are live in the slide deck)

Thanks!

Questions?