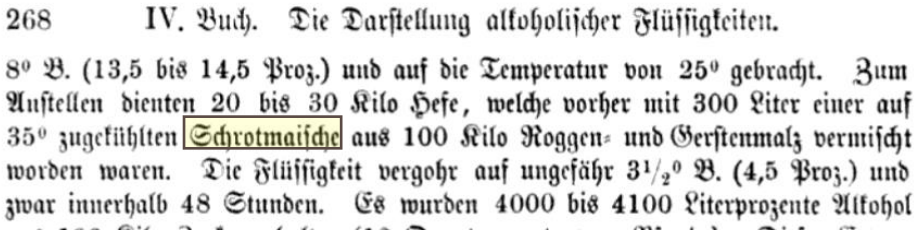
BRIESS®
MALT & INGREDIENTS Co.
All Natural Since 1876

Endosperm Brewing : Using the Heart of the Malt for Clean Flavor

Endosperm brewing

- What it is
- Where it came from
- How it’s done
- Why it works
- Fun uses for it
- How you can do it too

Endosperm mashing has been around for centuries and is still practiced today



268 IV. Buch. Die Darstellung alkoholischer Flüssigkeiten.

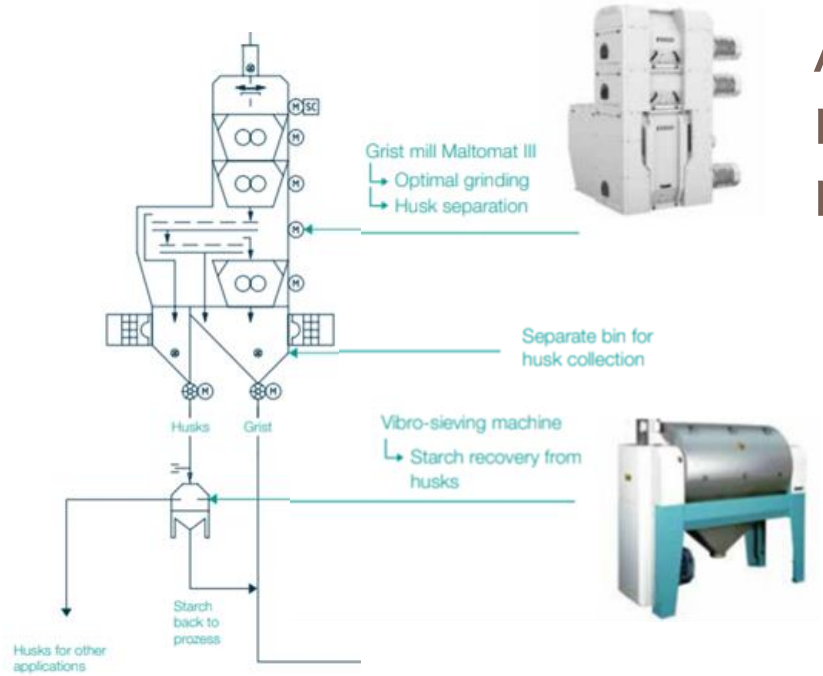
8° B. (13,5 bis 14,5 Proz.) und auf die Temperatur von 25° gebracht. Zum Anstellen dienten 20 bis 30 Kilo Hefe, welche vorher mit 300 Liter einer auf 35° zugekühlten Schrotmaische aus 100 Kilo Roggen- und Gerstenmalz vermischt worden waren. Die Flüssigkeit vergohr auf ungefähr $3^1/_2$° B. (4,5 Proz.) und zwar innerhalb 48 Stunden. Es wurden 4000 bis 4100 Literprozente Alkohol

Furthermore, we use the expensive Riegele technology for eliminating chaff from wholesome, nutritious grain, and our own Riegele 3-way mash brewing process. Our beers do not evolve in a fast-fermentation process. Instead, they ripen over the course of months in our underground beer cellars. And we are all passionate in our dedication; we brew knowledgeably.

BREWING TRUMER PILS

Brewing is the ultimate melding of art and science. With Trumer Pils we apply precision milling techniques to our barley malt, remove the husks to eliminate astringent bitterness and maximize smoothness, and gently swirl in noble hops for flavor and aroma. Cold fermentation and extended Krausening contribute breadth of character and effervescence. The result? A crisp, balanced, refreshing work of art.

Endosperm Mashing and Husk recovery



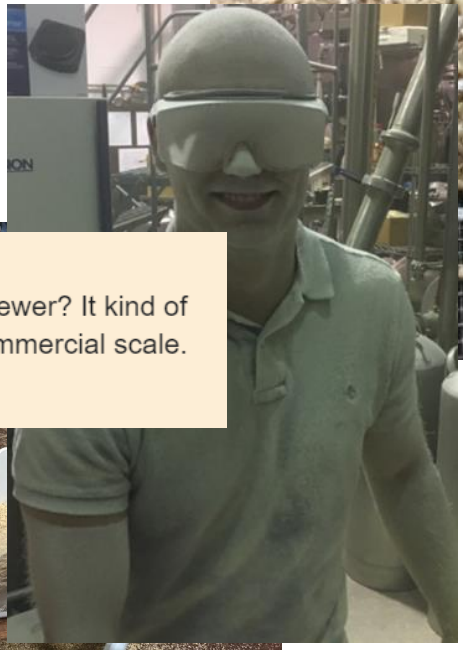
An option in modern dry mills

- Requires additional equipment

Husk Removal

- Separate Husk
  - Mechanical Sifting
  - Aspiration
  - Combination

Why sift?



Dustin Miley

So... This is geared more towards a homebrewer? It kind of seems impractical, if not impossible on a commercial scale.

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Milling for Endosperm Brewing

- Milling objectives
  - Separate husk from endosperm
  - Limit fines and flour

Additional Particle Classification

- Malt Fractions
  - Milling creates a wide range of particle sizes
  - Arbitrary Categories
    - Husk

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    Flour
    Fine Grits

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Coarse Grits

Attributes of Malt Fractions

Malt Fraction	Approx %	Extract (as-is)	Filtration Speed	Sensory
Standard Grind	100	78%	Typical	typical, malty, grainy, ☺

Husk

- Contains Polyphenols
  - Astringency
  - Drying finish
  - Bind Water
  - Hay-like flavor

Endosperm Mashing

- Brewing to limit husk exposure
  - Remove husk and mash as usual
  - Avoid mash off temperatures
  - Re-introduce a portion of husk to assist in lautering (25-100%)

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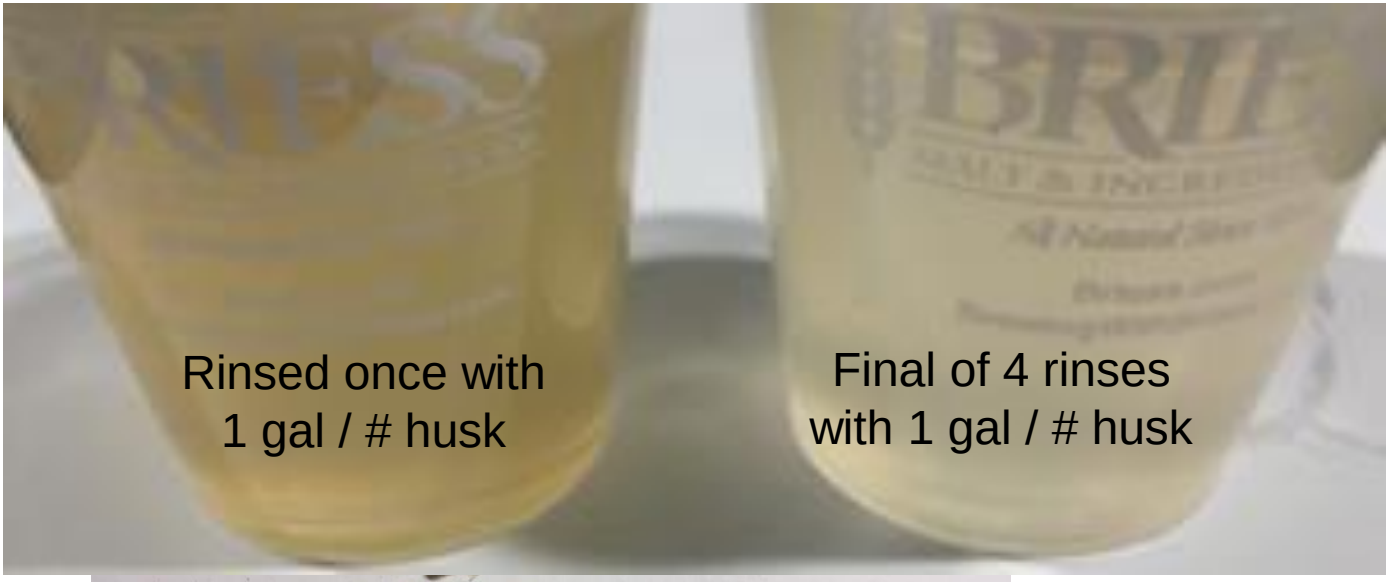
  - [Optional] Pre-wash husk to extract polyphenols



Fine Grit Makeup

- Endosperm
- Husk
- Acrospires

Fine Grit Makeup

- Endosperm
- Husk
- Acrospires
  - Contain bitter proteins
  - Sprout, vegetal flavor

The Chemical Composition, the Nutritive Value and the Functional Properties of Malt Sprout and its Components (Acrospires, Rootlets and Husks)

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(Received 27 August 1996; revised version received 13 December 1996; accepted 3 March 1997)

Abstract: The components of malt sprouts were effectively separated by manual winnowing into acrospires (15·3%), rootlets (40·1%) and husks (43·7%). The bitter taste was located in the acrospires. Percent recovery of protein and fibre was, respectively, 95·2 and 87·2 of malt sprouts. The acrospires were rich in protein (30·3%) and sugars (45·7%) but low in calcium (1·94 g kg^{-1}), fibre content (4·6%) and essential amino acids. They had moderate functional proper-

Malt Flour

- The most friable portion of malt
  - Most modified portion of malt
  - Low Beta Glucan
  - High S/T
- High extract yield
- Clean flavor

Standard Malt & Coarse Grit

Why it works

- No dough from flour
- Good particle integrity
  - Springy
- Coarse semi-ridged particles make for large spaces within grist matrix

➢Process with high inclusion of adjuncts (Even Oat Flakes!)

➢Rapid lauter with low Differential Pressures

Fun With Coarse Grit Brewing

- High Adjunct Beer
  - Successfully brewed 50% oat flake IPA, named the Jellyfish due to the viscous-slimy nature of wort
    - Non-Starch Polysaccharides able to move through grain
    - Processing was difficult through 1st worts but eased as wort thinned
- Commercial Brewing Trials
- High Gravity Beer

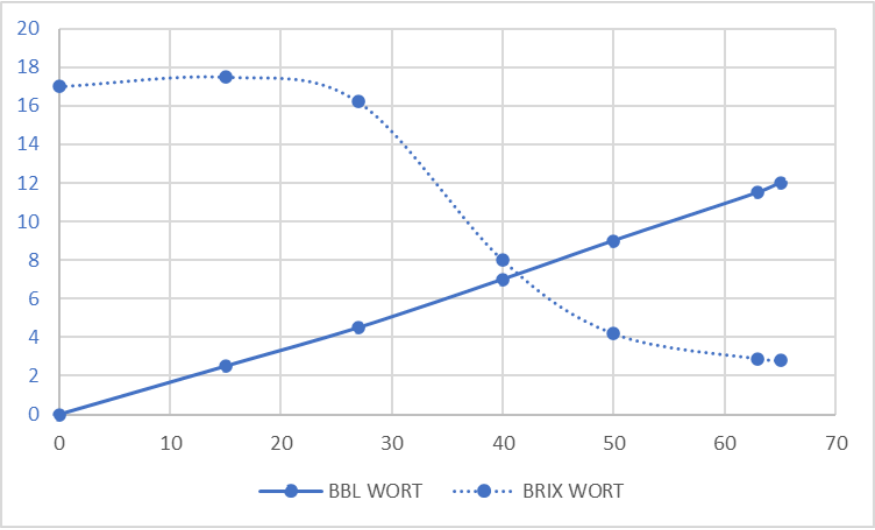
Commercial Trials

- 3bbl (BrauKon)
- 7bbl
- 10bbl
- 15bbl (Sprinkman)

- NO issues in processing
  - Grain conveyance
  - Lauter
  - Trub pile
  - Fermentation

Commercial 10bbl Brew, 90% malt grits

- 475# Brew (90% malt grits, 10% specialty malts)
- The collection took place over 65 minutes.
- Wort at kettle full was 10.3 brix (12bbl)
  - 1# malt yielded 0.7# extract
- Processed like a typical brew
- Achieved target yield
- Unique clean flavor



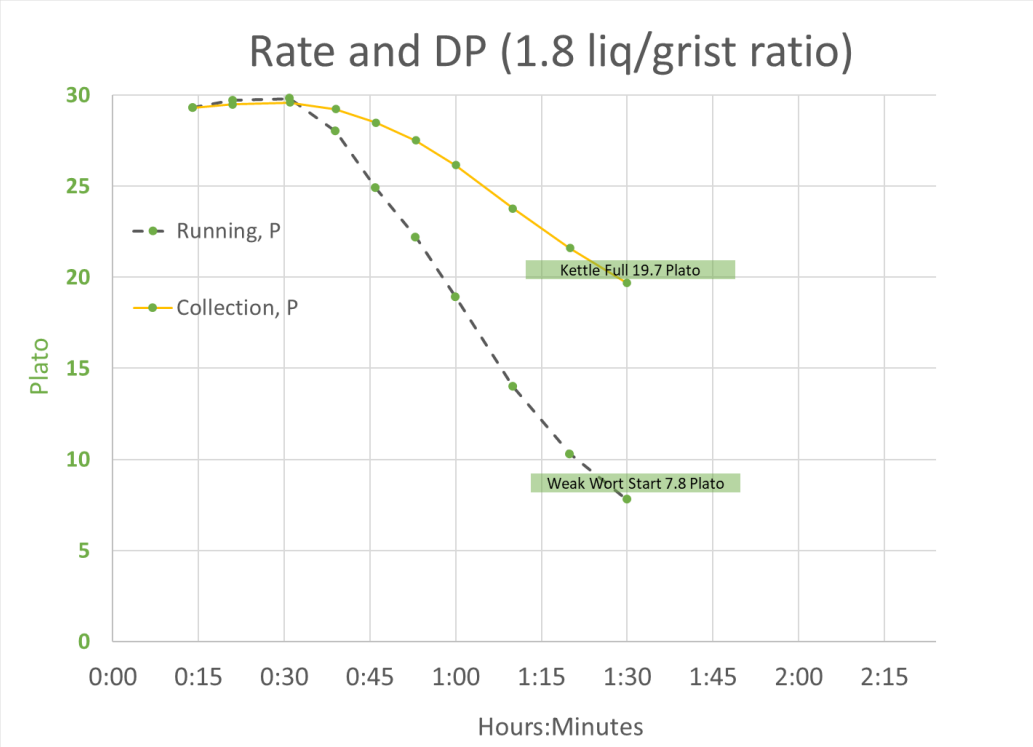
High Gravity Brewing

- Husk material has a high capacity to bind water, by leaving it out the brewer will have more available water for the same amount of malt
  - Husk retains 4-5x the moisture of starchy endosperm
  - 5% husk will increase water uptake 20%
  - Standard Grind 15% more volume in lauter tun from Coarse Grit

Item	Liq/grst	1st Wort P	BH Capacity
Standard Grind	2.5	23.0	100%
Coarse Grit	2.5	23.4	102%
Coarse Grit	2.05	26.6	116%

- Coarse Grit at 2.05l/g appeared thinner and pulled less DP than Standard Grind at 2.5l/g

Ultra High Gravity Processing



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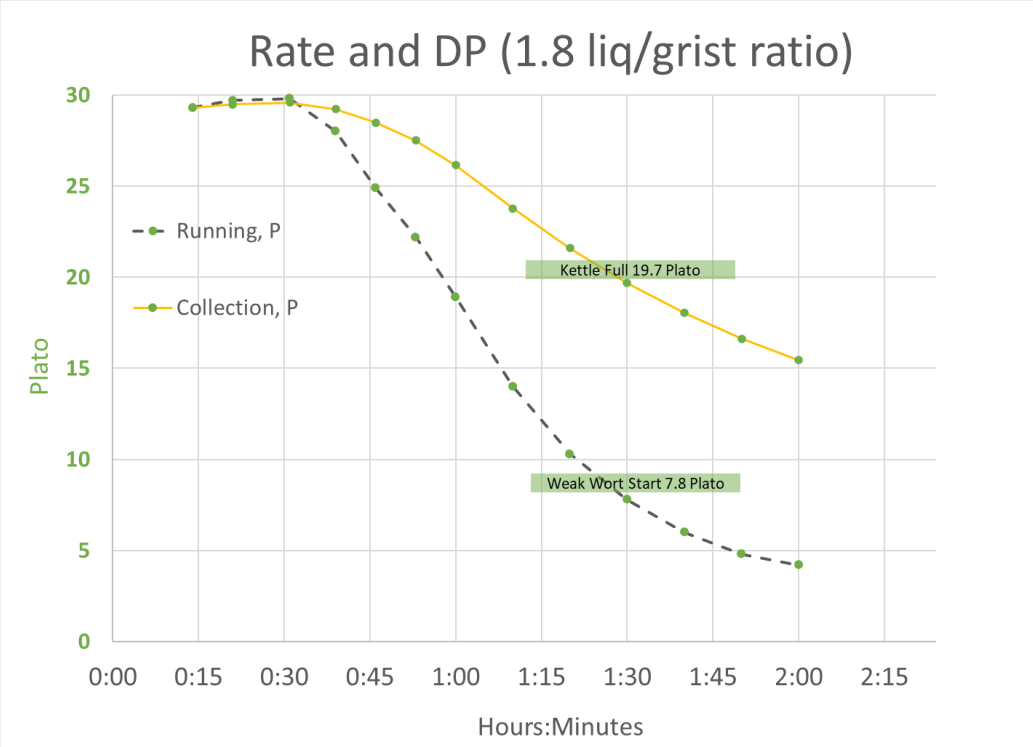

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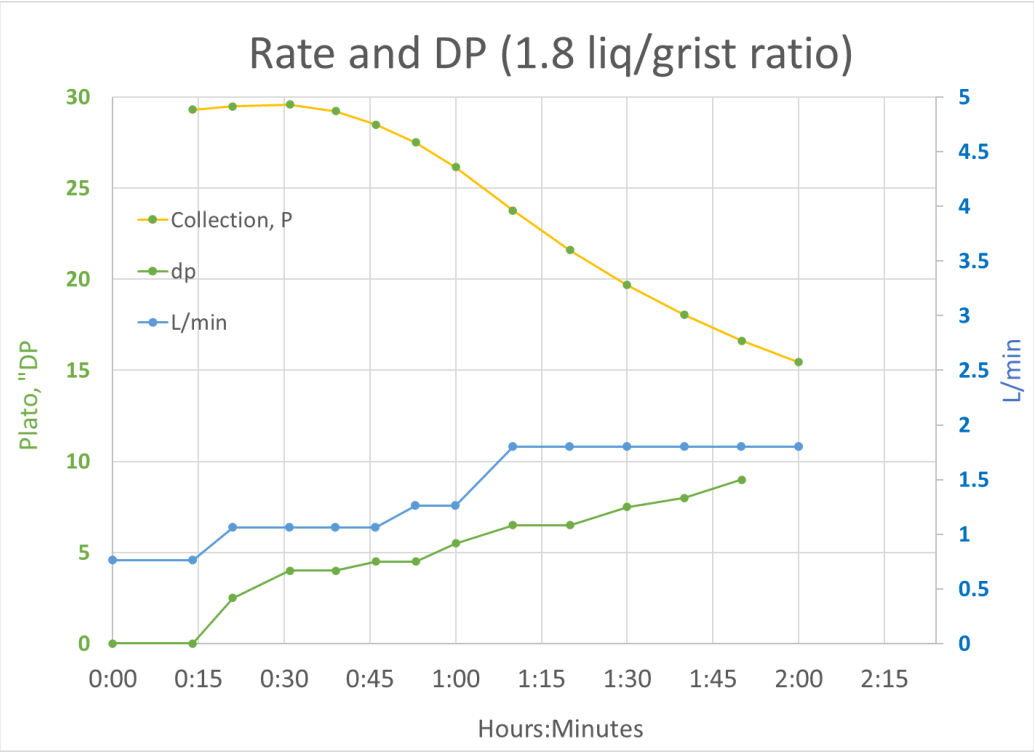

Conclusions

- Endosperm brewing is a recognized technique for producing very clean tasting wort and interesting brewing processes
- Removal of the husk removes unwanted flavor and mass from the process.
- Endosperm can be recovered from normal dry milling by modifying the process.

Introducing MaltGems ™

Synergy Select Pilsen MaltGems™

- European-style Pilsen Malt,

  Premium Pre-gound Format

Applications

- Single varietal base malt for all beer styles
- Perfect for exceptionally clean Pilsners, Light ales and Sessions
- High gravity brewing

Sensory Characteristics

Color: Light Golden Color

Flavor: Clean, sweet, mild malty, very low astringency and bitterness

Discussion

BRIESS®
MALT & INGREDIENTS Co.
All Natural Since 1876

THE ORIGINAL
AMERICAN
CRAFT MALTSTER™