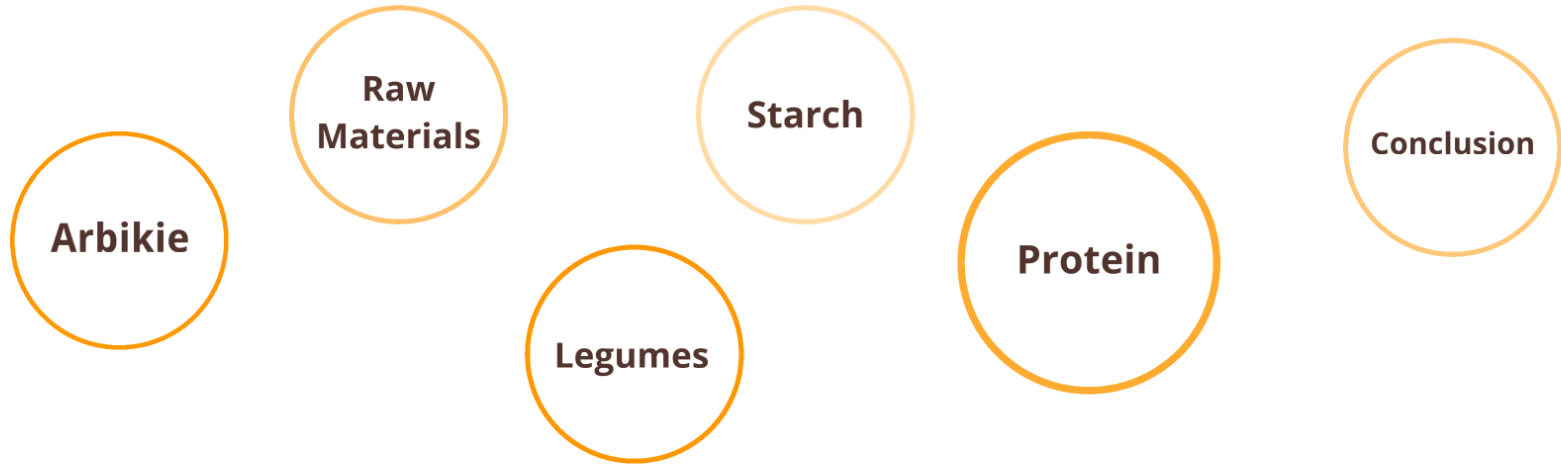
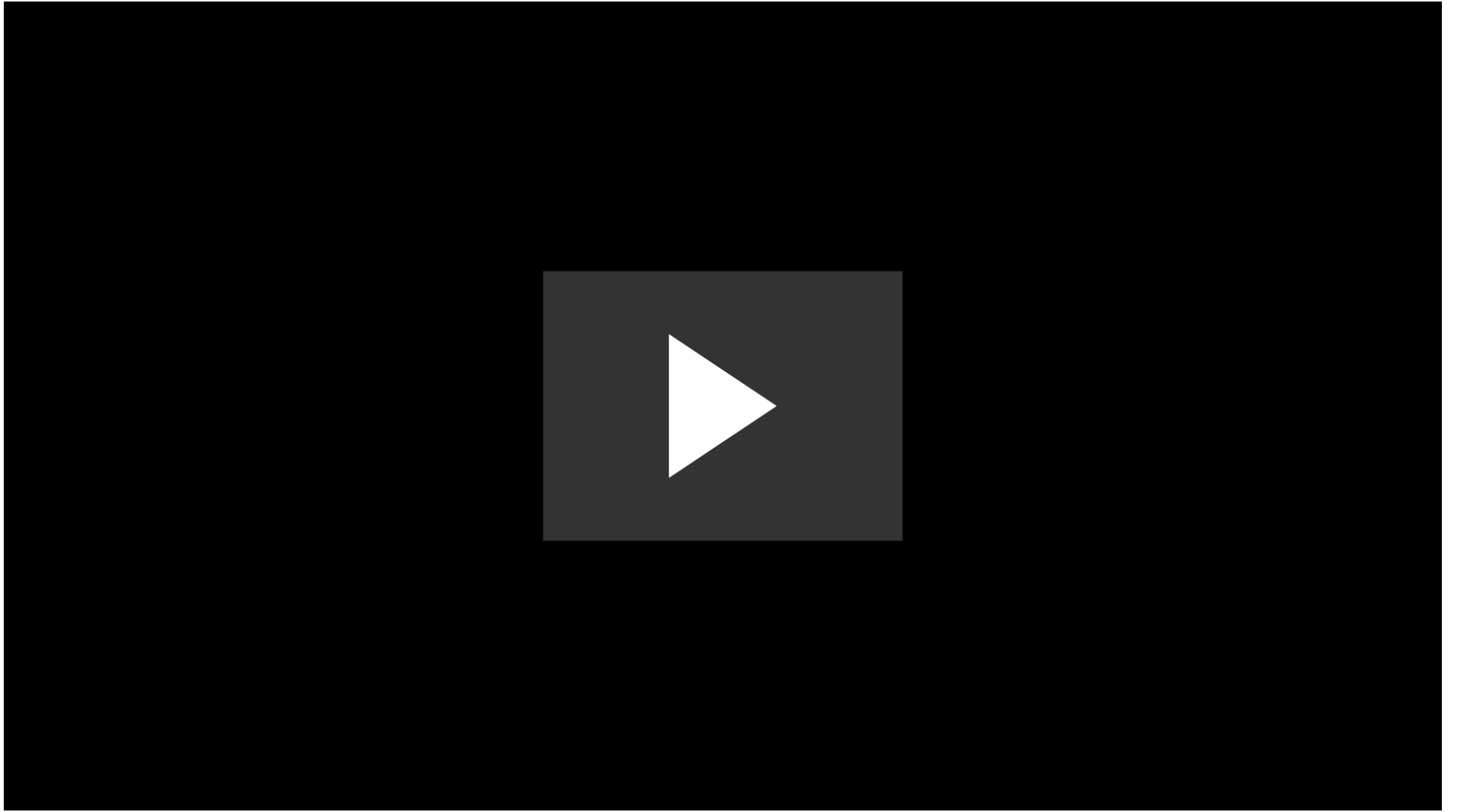


Using legumes in the production of alcoholic drinks

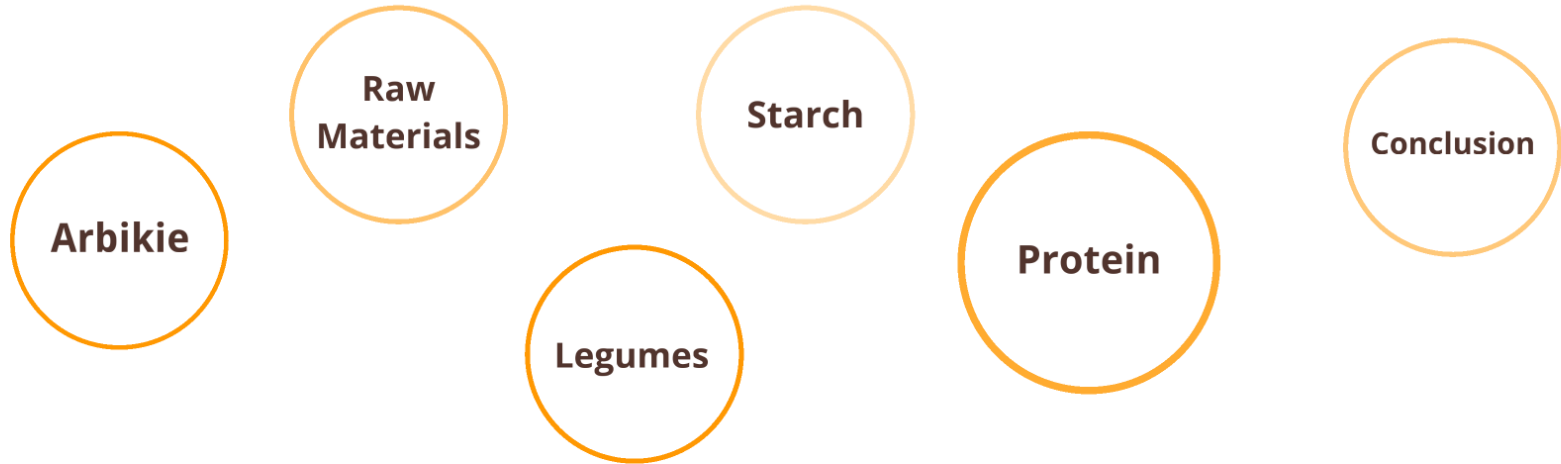


Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019





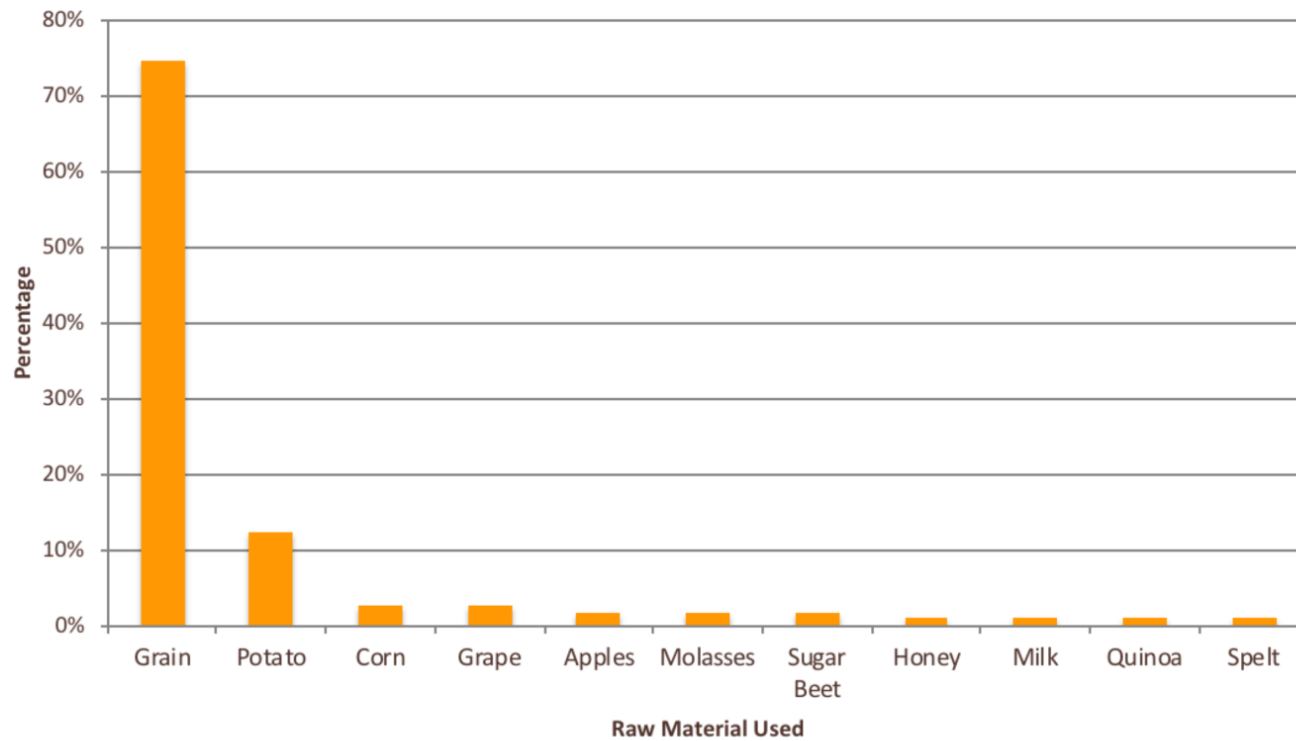
Using legumes in the production of alcoholic drinks



Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019

Beverage Alcohol Inputs

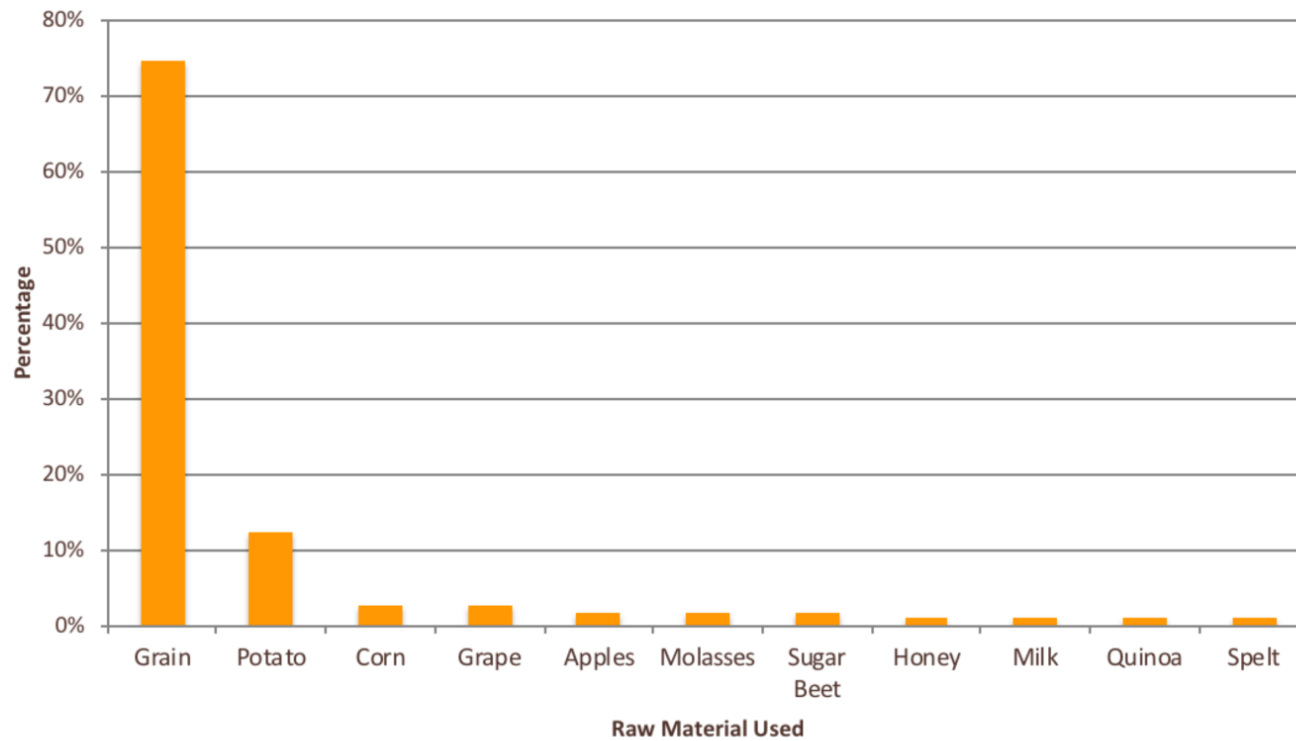
Common raw materials utilized in the production of vodka
(based on a review of 122 vodka brands for sale in the UK)



Note: grain = barley, wheat & rye

Beverage Alcohol Inputs

Common raw materials utilized in the production of vodka
(based on a review of 122 vodka brands for sale in the UK)



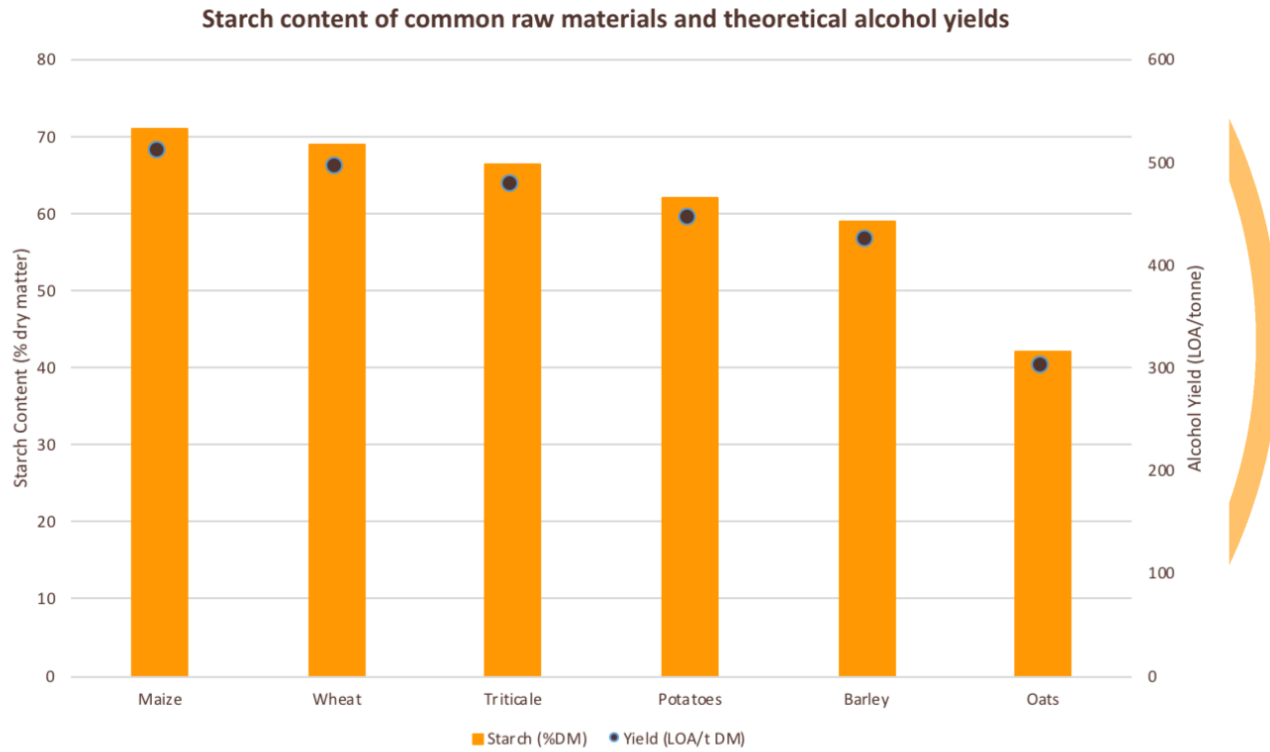
Note: grain = barley, wheat & rye

Beverage Alcohol Inputs

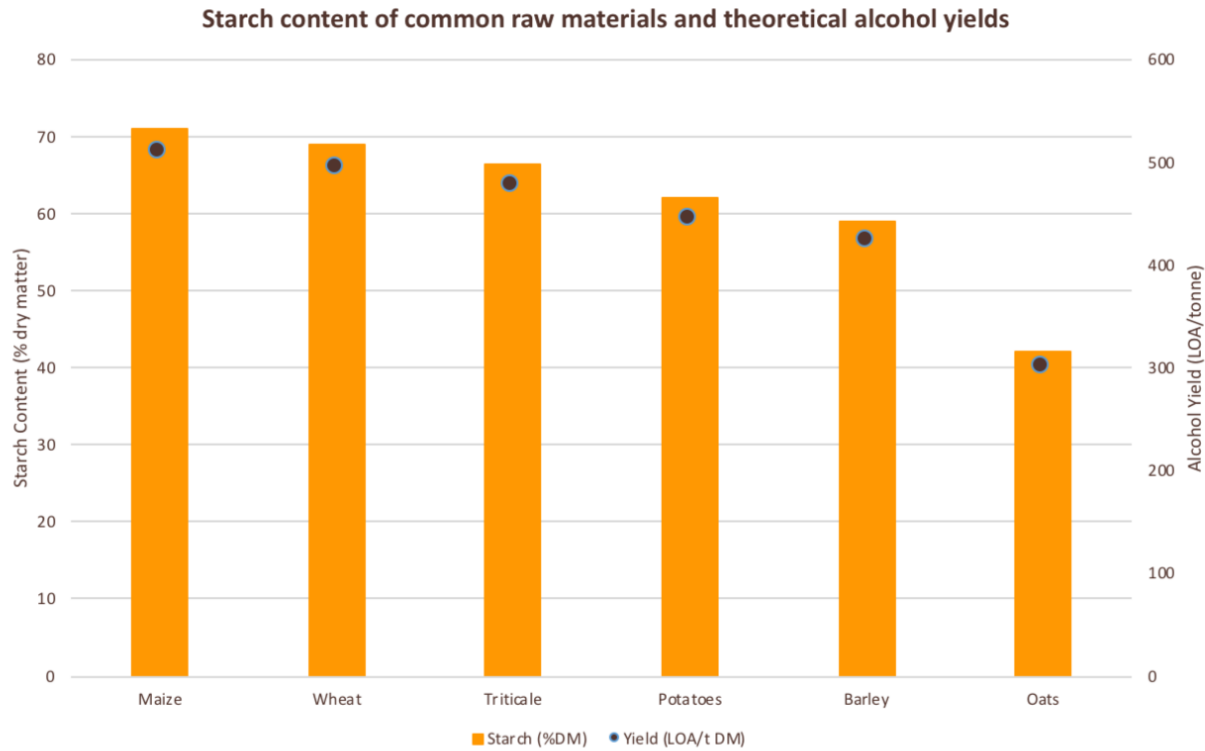
Beer -

- malted barley
- + adjuncts

Beverage Alcohol Inputs



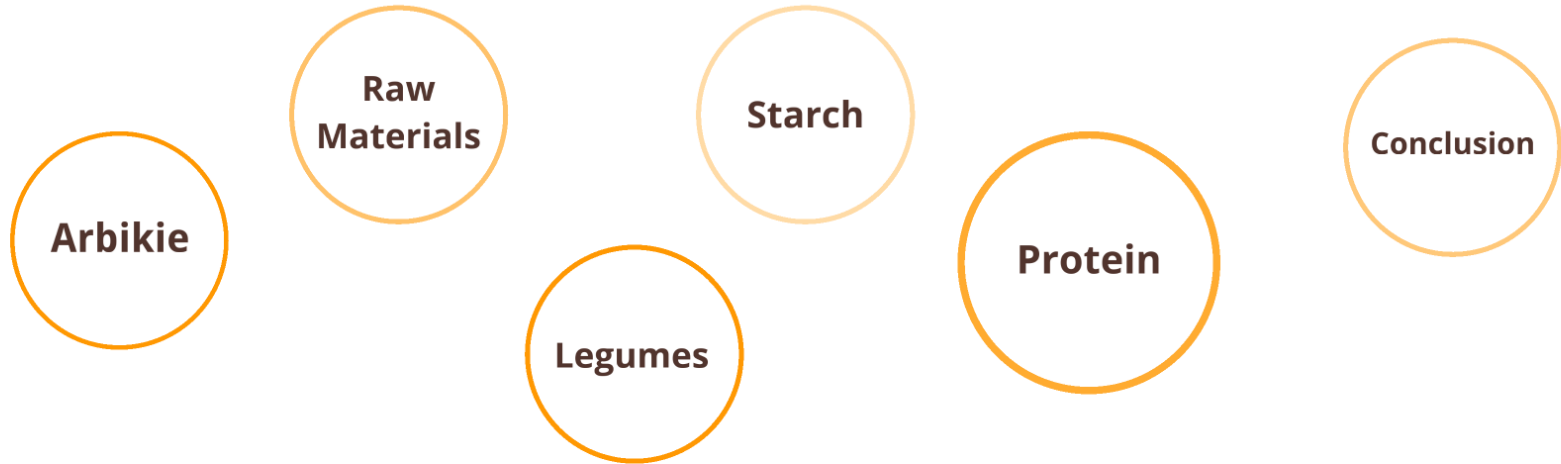
Beverage Alcohol Inputs



Considerations in raw material selection

- 1) Availability
- 2) Starch content
- 3) Flavour

Using legumes in the production of alcoholic drinks



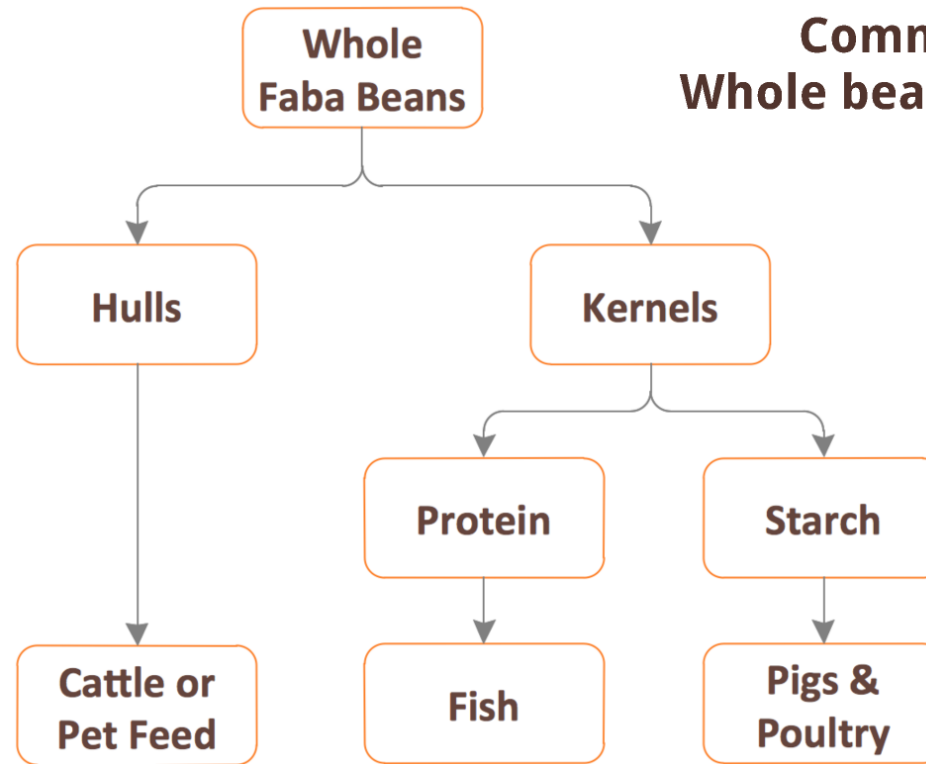
Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019

Existing alcoholic beverages

- **Protein** - mouthfeel, beer head and yeast nutrition
- **Starch** - alcohol yield



Legume fractionation



Commercial value
Whole bean < Components

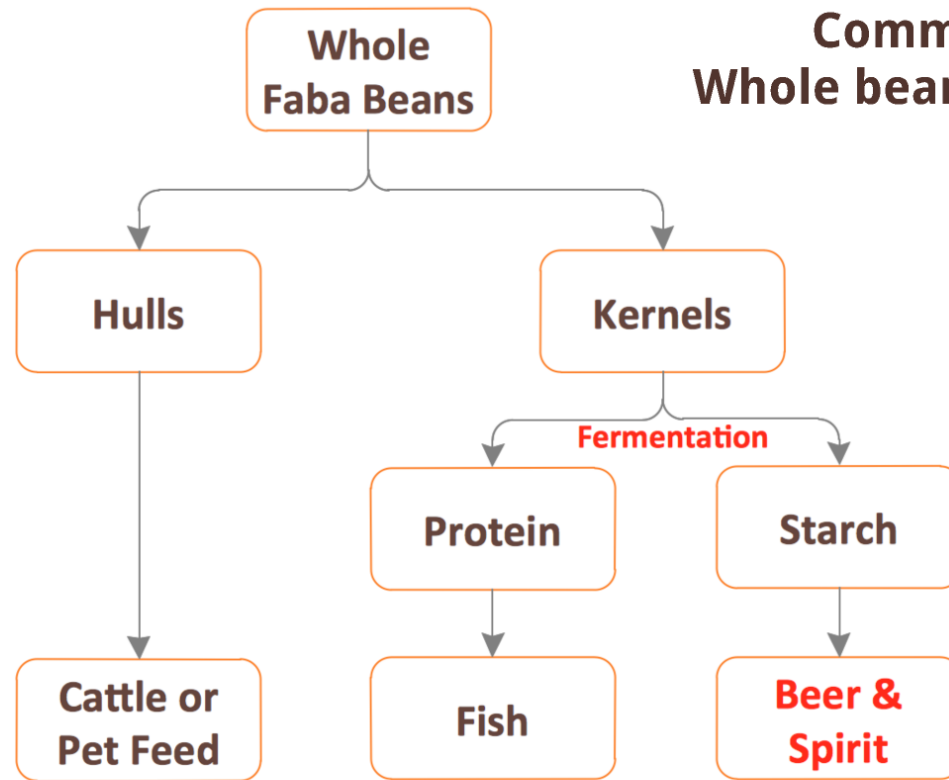


Legume fractionation

Commercial value
Whole bean < Components



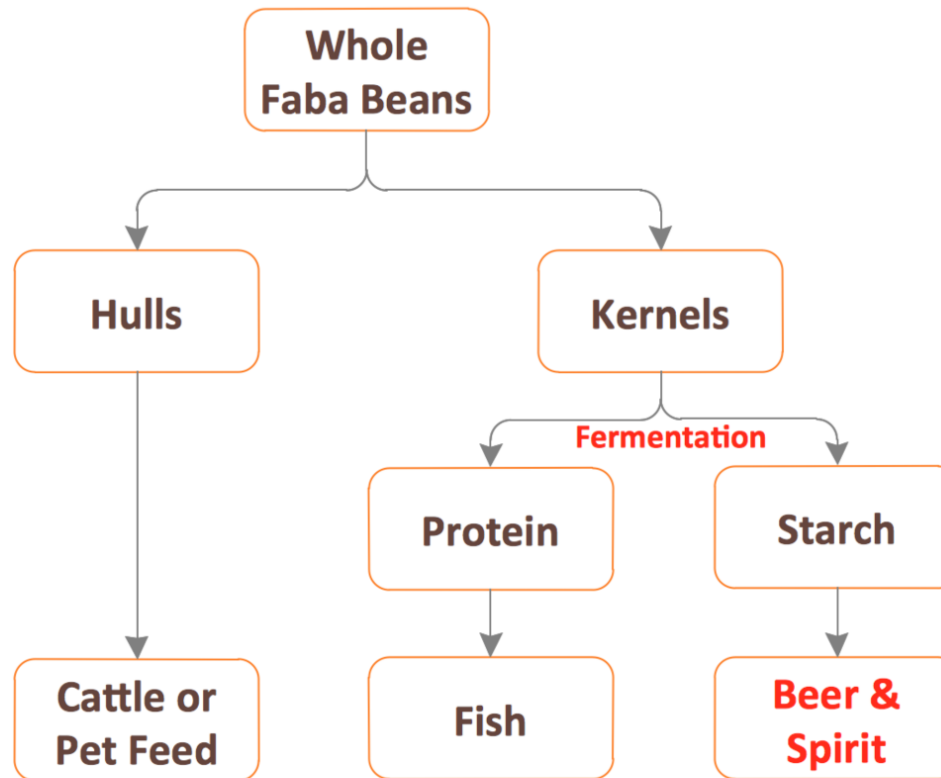
Legume fractionation



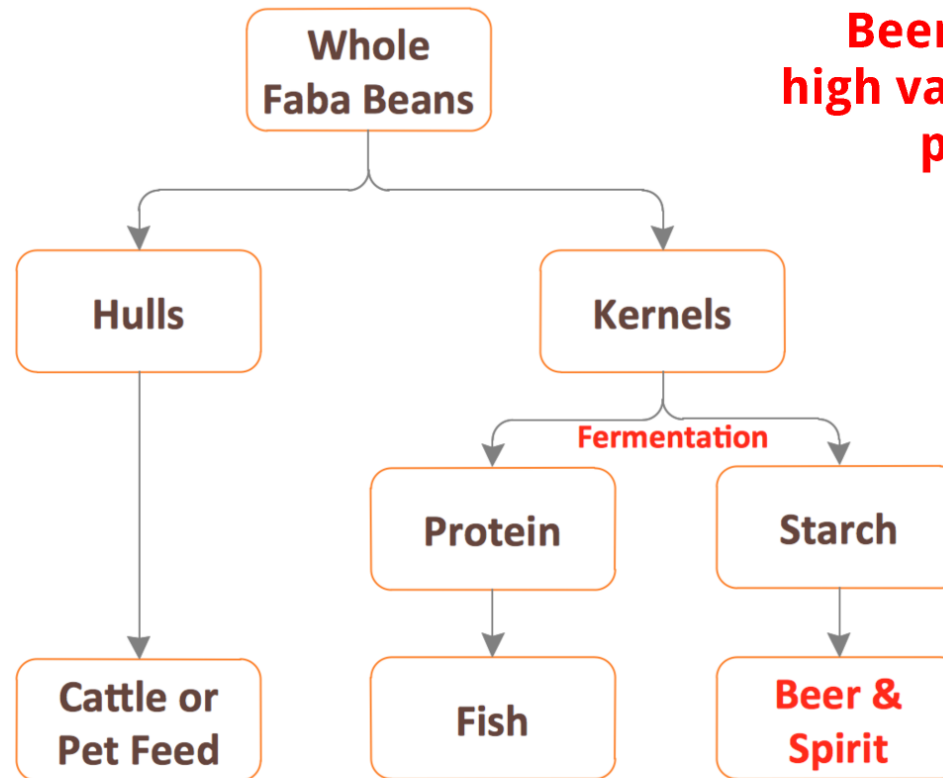
Commercial value
Whole bean < Components



Legume fractionation



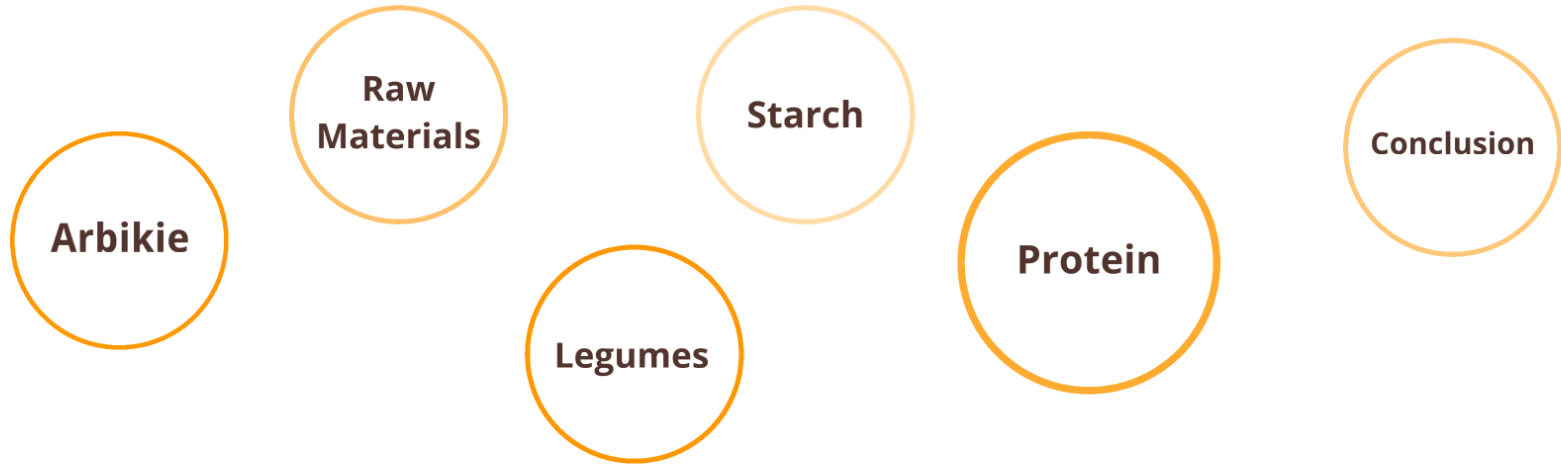
Legume fractionation



**Beer & spirits =
high value, premium
products**



Using legumes in the production of alcoholic drinks



Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019

Distillery Processes



Brewery Processes

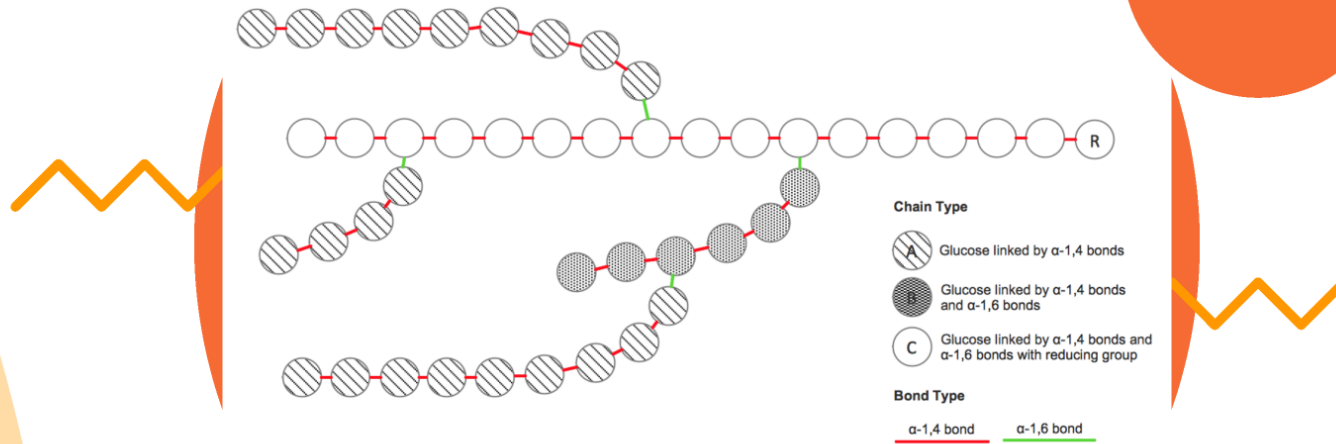


Mashing - conversion of carbohydrate to simple sugars

Legume
Starch

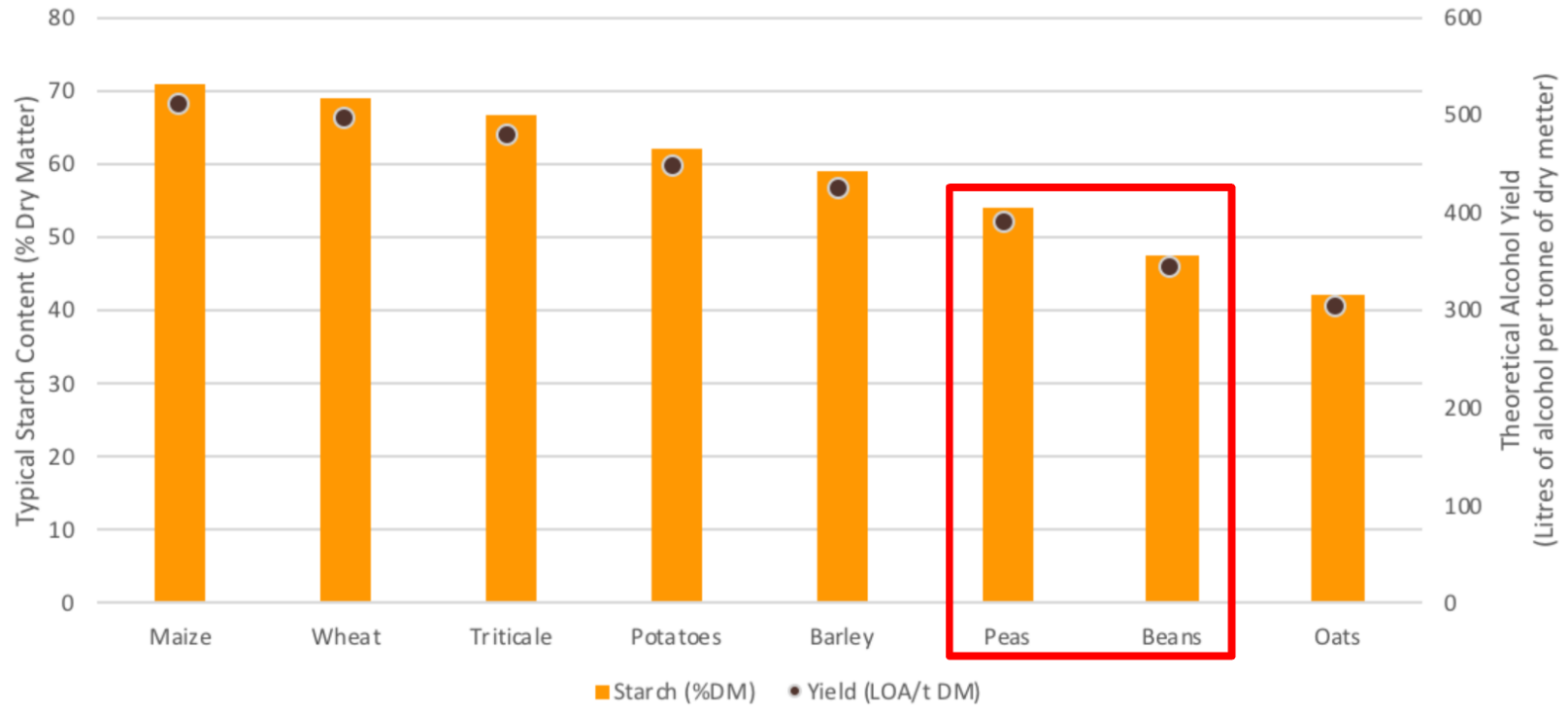
Starch > Simple Sugars

Yields



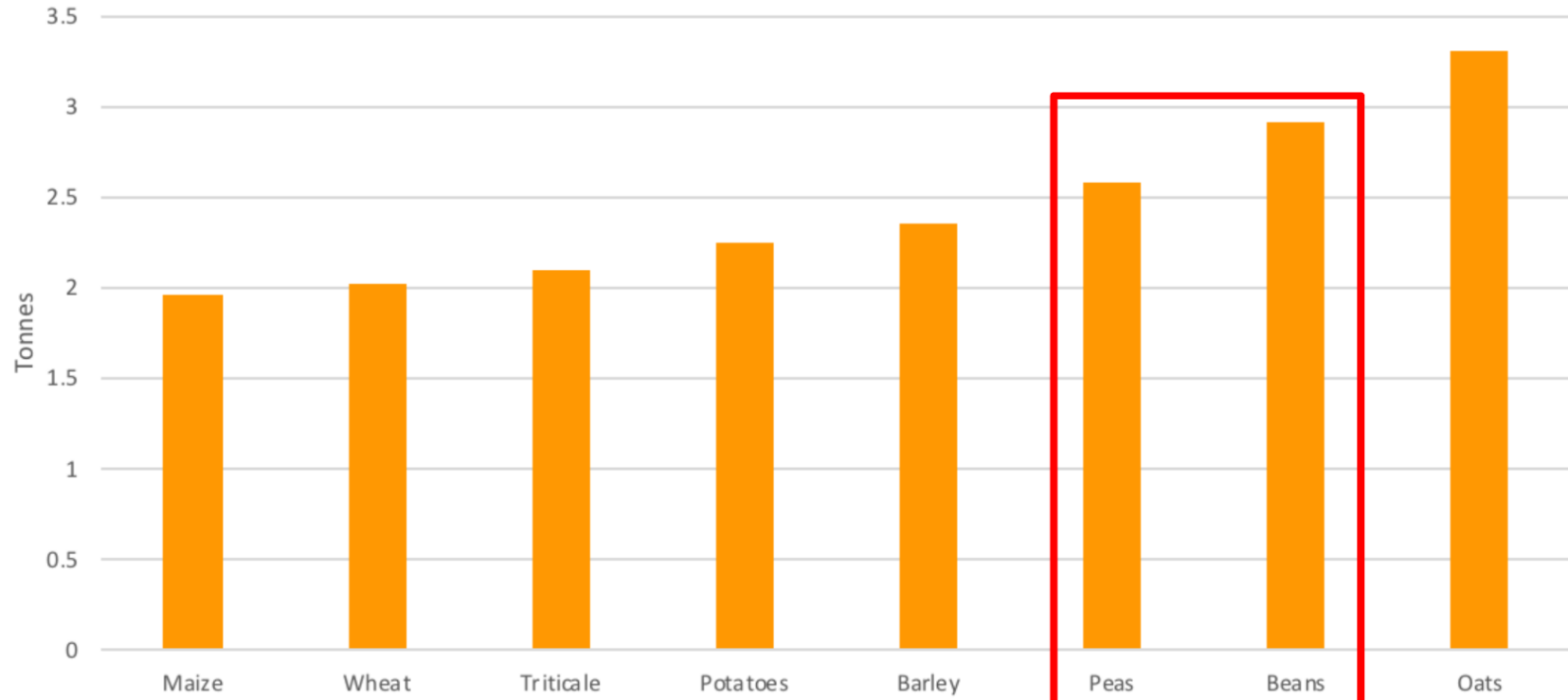
Gelatinisation > Liquefaction > Saccharification

Starch content of common raw materials and theoretical alcohol yields

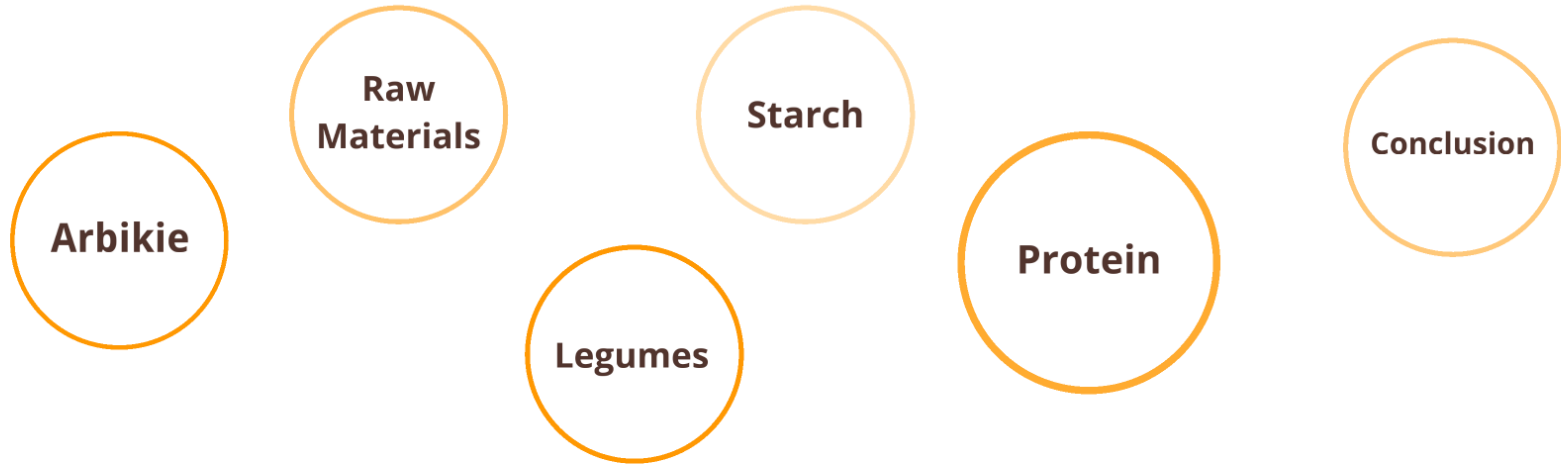




Raw material required to produce 1000 litres of pure alcohol



Using legumes in the production of alcoholic drinks



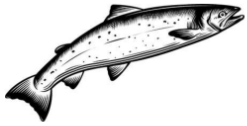
Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019



Protein > Feed

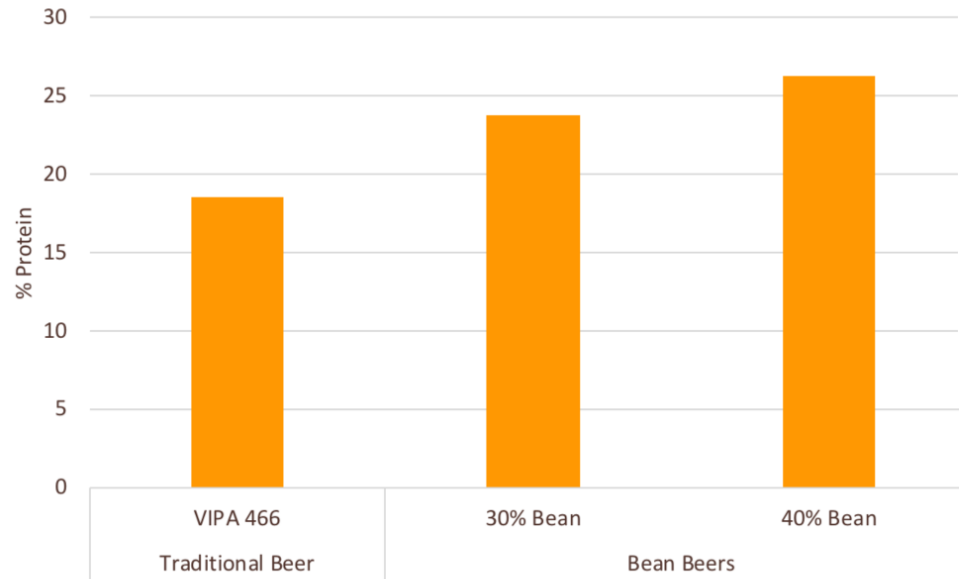
Brewery = spent grain
• 20-25% protein

Distillery = draff or pot ale
• draff - 20-25%
• pot ale - 35% protein



Protein > Feed

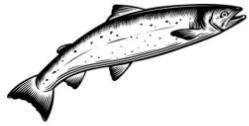
Brewery spent grain protein content



Brewery = spent grain
• 20-25% protein

Distillery = draff or pot ale
• draff - 20-25%
• pot ale - 35% protein

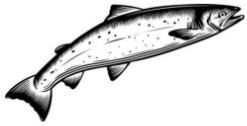




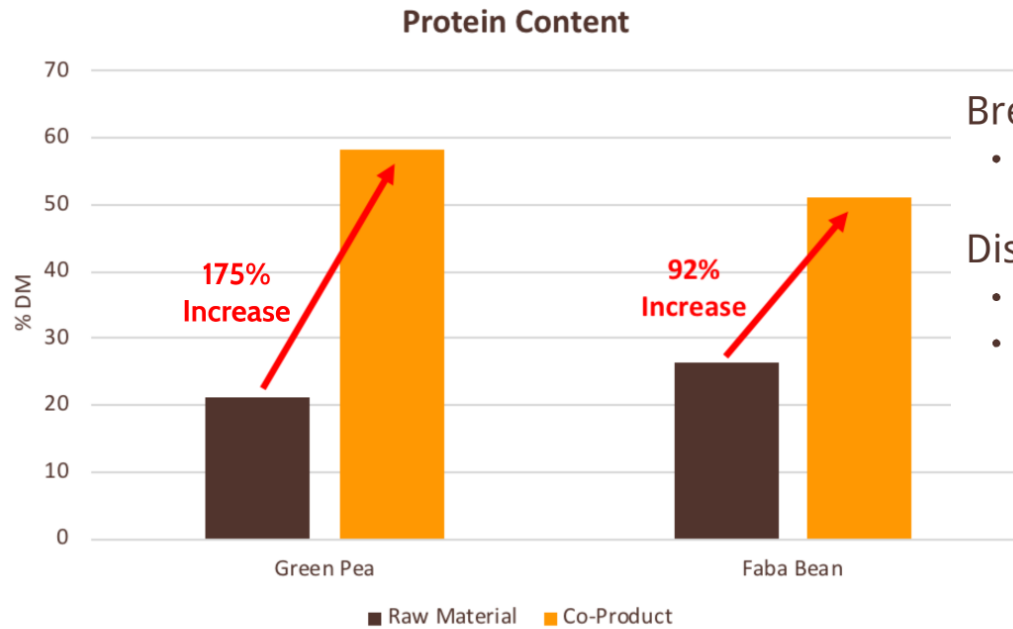
Protein > Feed

Brewery = spent grain
• 20-25% protein

Distillery = draff or pot ale
• draff - 20-25%
• pot ale - 35% protein



Protein > Feed



Brewery = spent grain
• 20-25% protein

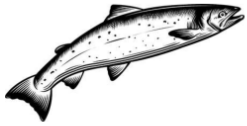
Distillery = draff or pot ale
• draff - 20-25%
• pot ale - 35% protein



Protein > Feed

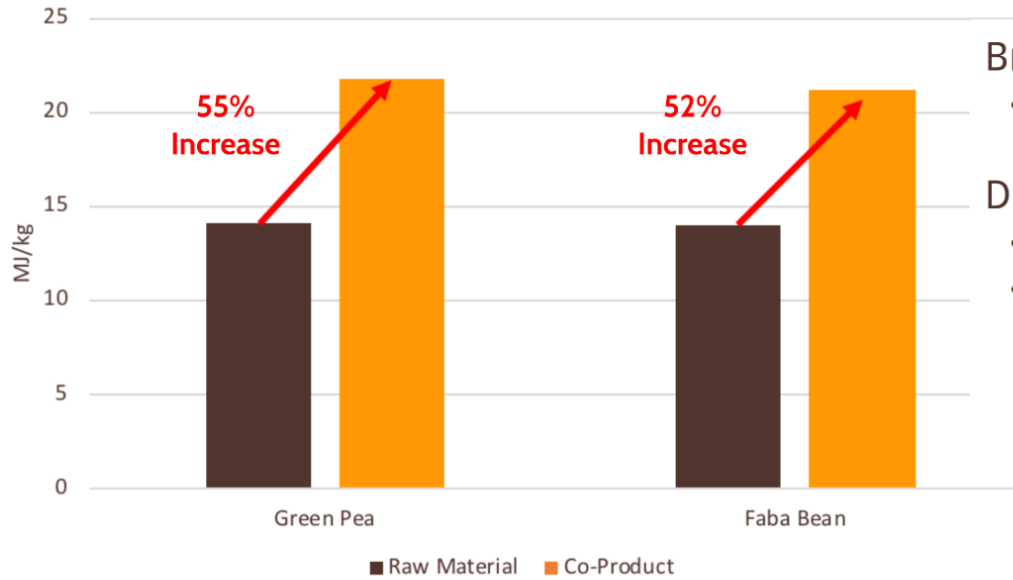
Brewery = spent grain
• 20-25% protein

Distillery = draff or pot ale
• draff - 20-25%
• pot ale - 35% protein



Protein > Feed

Gross Energy

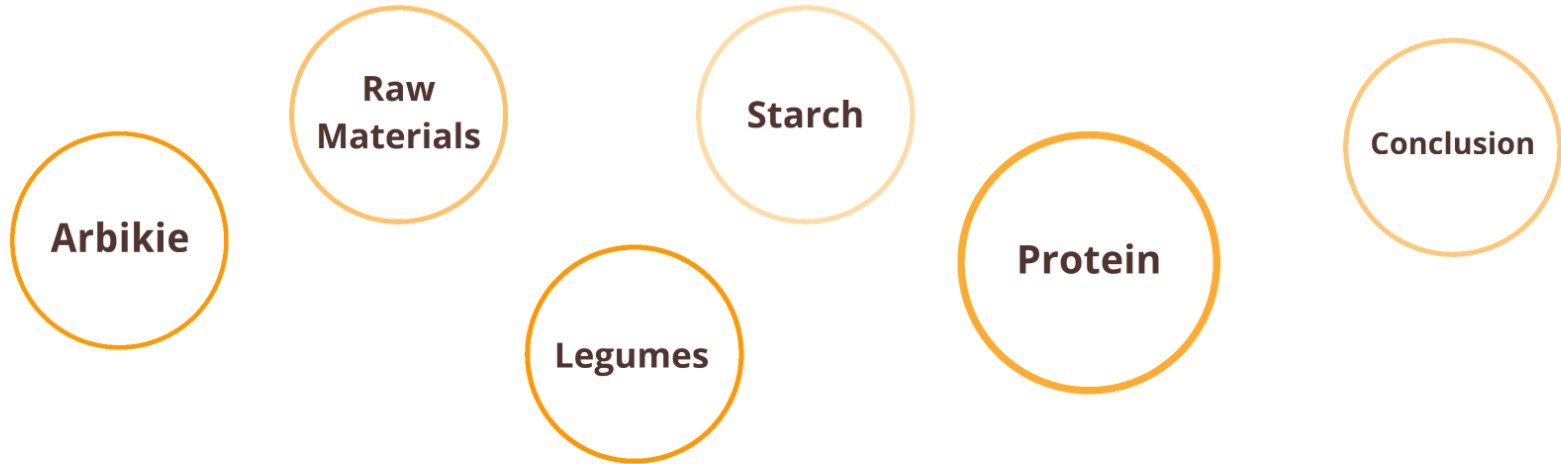


Brewery = spent grain
• 20-25% protein

Distillery = draff or pot ale
• draff - 20-25%
• pot ale - 35% protein



Using legumes in the production of alcoholic drinks



Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019

Conclusions

If legumes are made available to breweries and distilleries they have the potential as: -

- A viable starch source for the production of alcohol
- A method of protein concentration

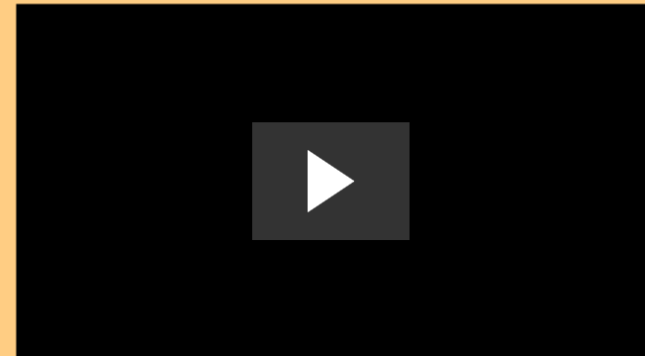
Thank you



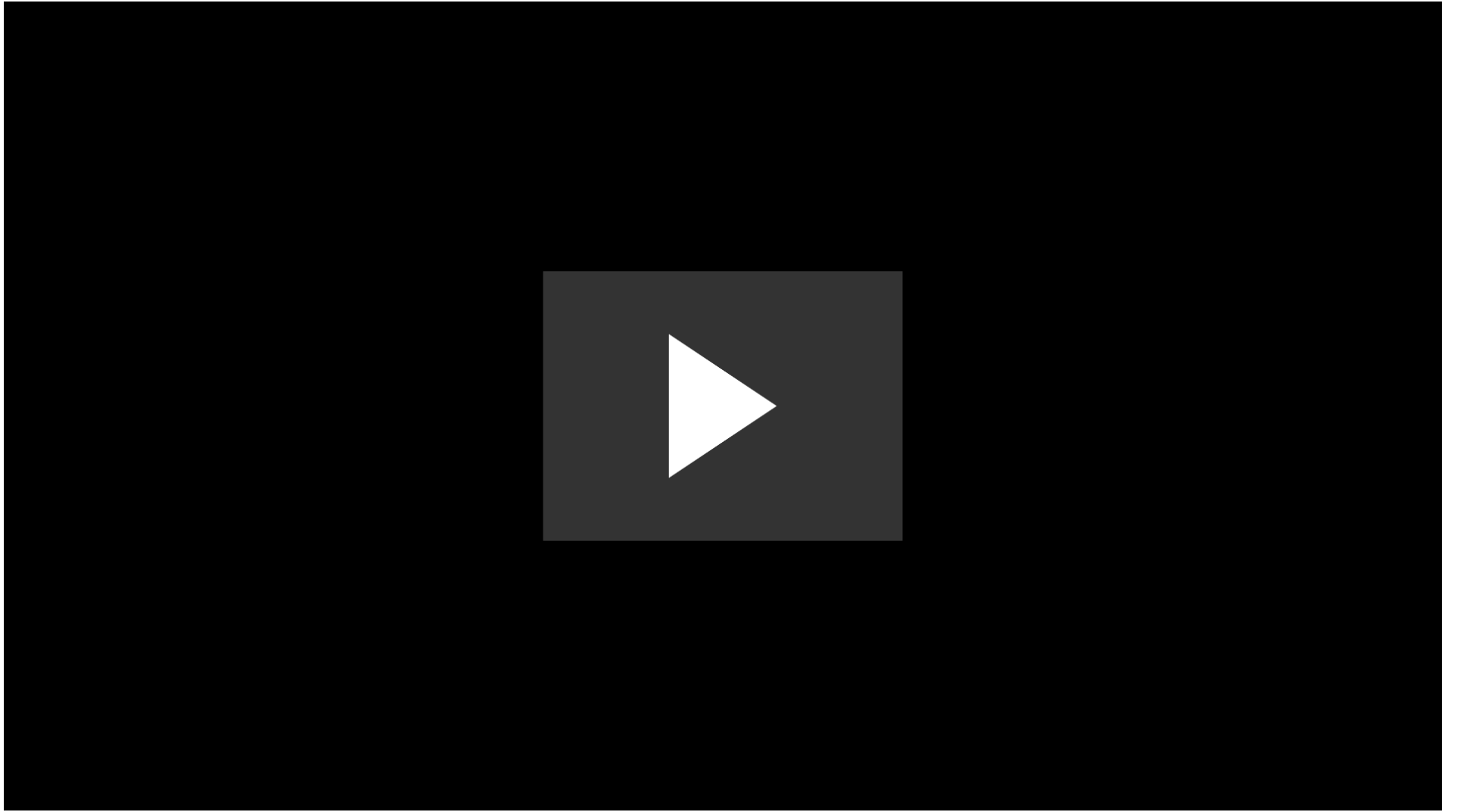
Thank you



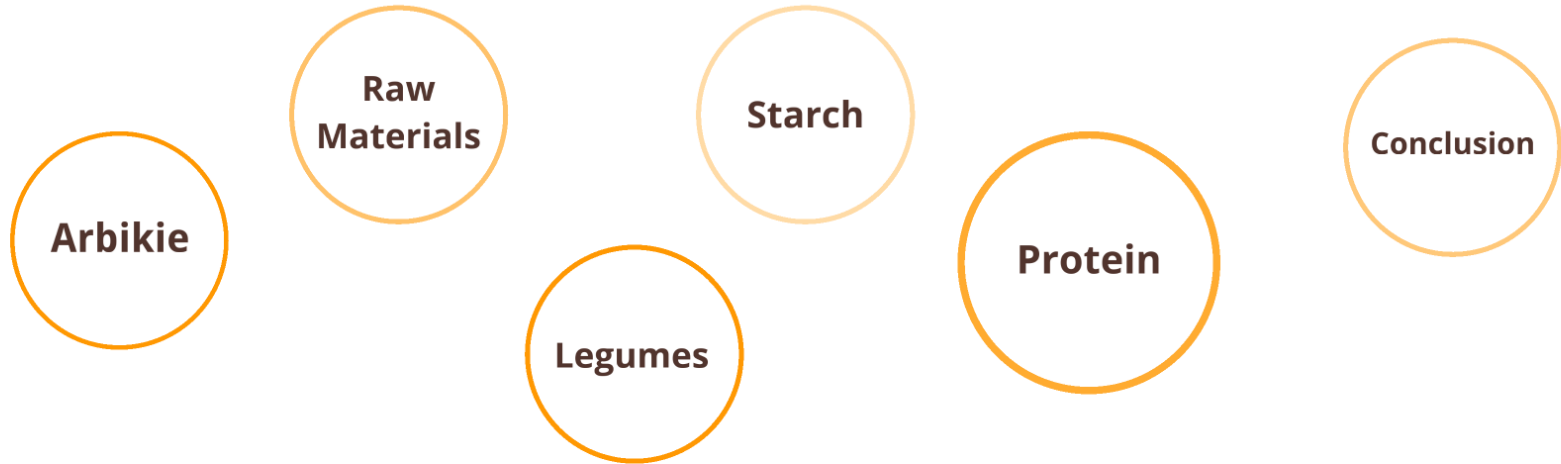
Abertay
University®



This Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 727973



Using legumes in the production of alcoholic drinks



Kirsty Black
Arbikie Distilling Ltd
ALIN, Nyborg, 7 May 2019