



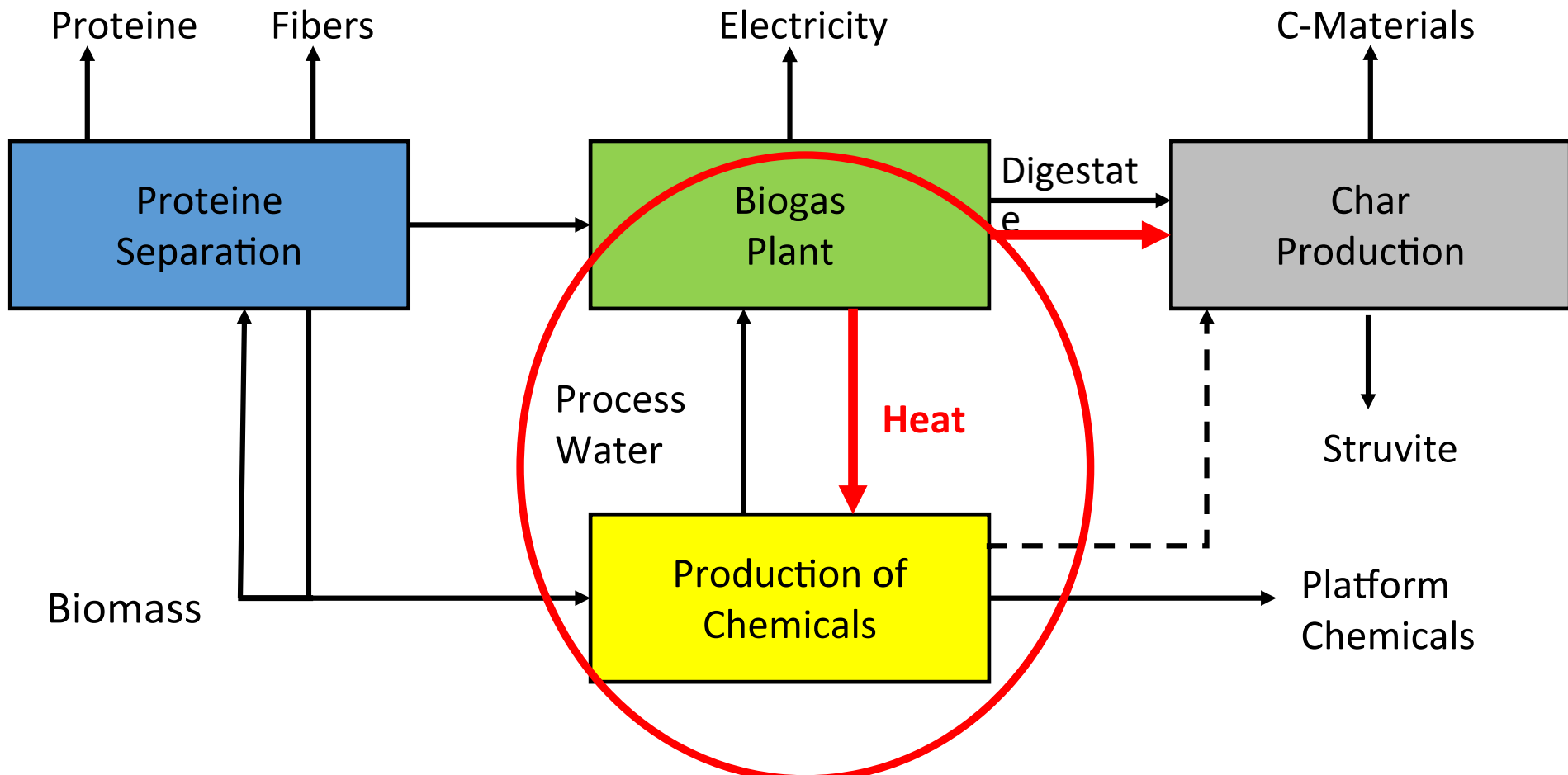
UNIVERSITY OF
HOHENHEIM

From Agricultural Residues To Bio-Plastic

Andrea Kruse



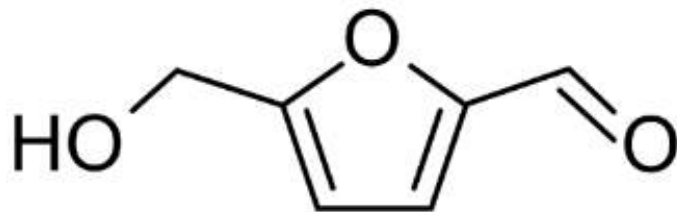
©Universität Hohenheim/ Jan Winkler





UNIVERSITY OF
HOHENHEIM

The Platform Chemical Hydroxymethylfurfural (HMF)



HMF

2022:
~ 30 kg HMF (> 80 wt.%)



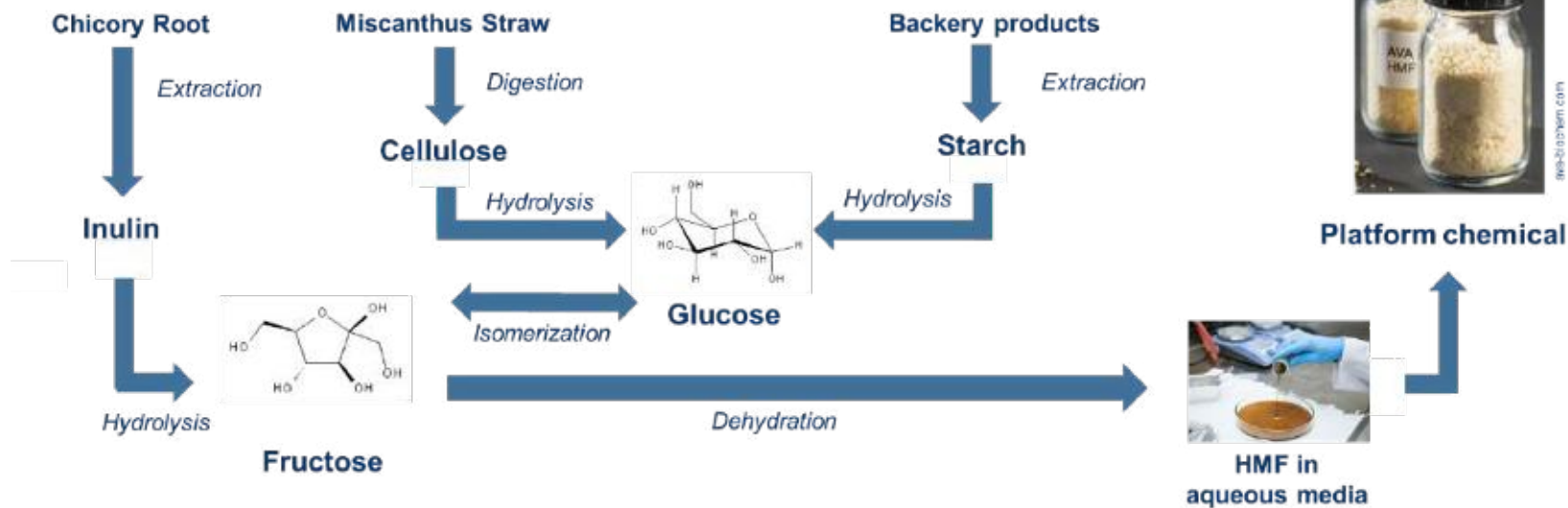
UNIVERSITY OF
HOHENHEIM

The (Green) Chemistry



*Hydrothermal =
In water!*

Environmentally
safe





UNIVERSITY OF
HOHENHEIM

The Feedstock

Starch, Inulin or lignocellulosic biomass, examples:

- Potato-Waste, **Chicory roots**, Apple Pomace.....



No
competition
with food



Protecting
biodiversity



- Wood residues....
- Straw, Grass, **Miscanthus**...
- Meadow cut after flowering, Paludicultures...

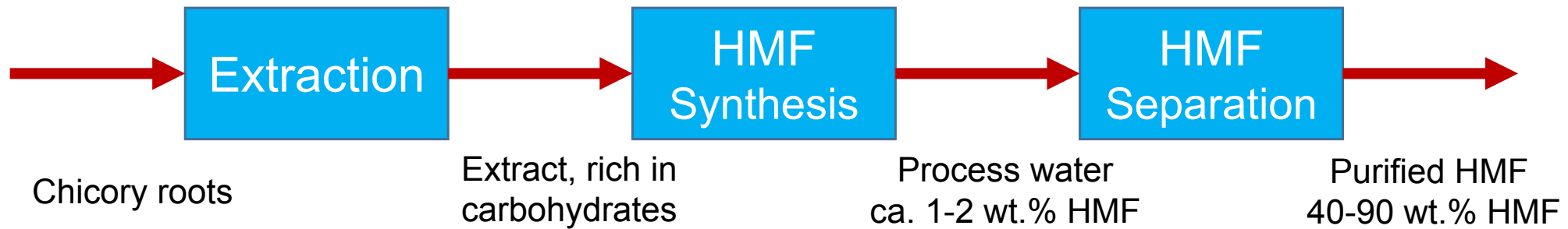
Pictures: [©Universität Hohenheim](#)



UNIVERSITY OF
HOHENHEIM



Chicory roots – HMF value chain





UNIVERSITY OF
HOHENHEIM

Counter-current extractor

- Throughput:
water **5-40 L/h**
biomass **1-20 kg/h**
- Operating temperature: **40-100 °C**
- Operating pressure: **atmospheric**



ons
Technologien



UNIVERSITY OF
HOHENHEIM

HMF synthesis unit

- Throughput: ca. **20 L/h**
- Operating temperature: **180-220 °C**
- Operating pressure up to **25 bar**





UNIVERSITY OF
HOHENHEIM

Separation units





UNIVERSITY OF
HOHENHEIM

10

The Final Products

Additives for food and pharmaceuticals



[CC BY-SA 3.0](#)

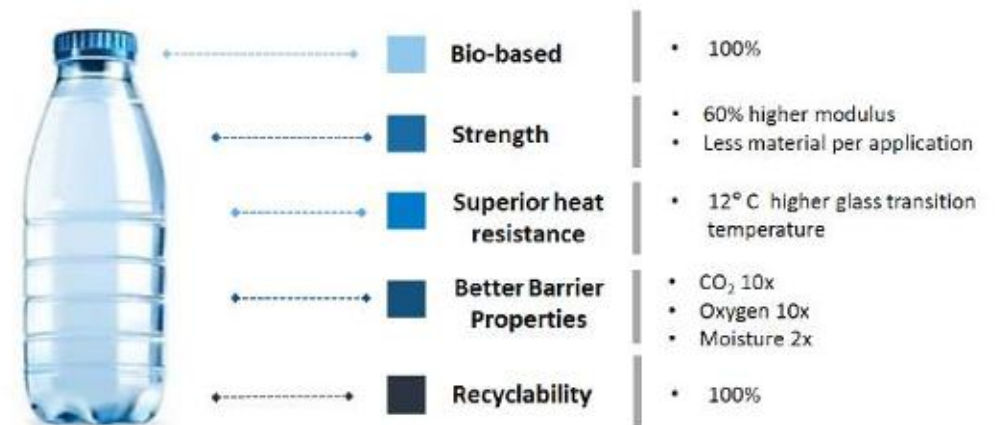


Foto von Simon Migaj von Pexels

Polymers:

- Bottles and packaging materials
- Clothes
- Parts, e.g. for cars

synthetic resins, e.g. for plywood
and chipboard



AVABIOCHEM

Konversions
Technologien



UNIVERSITY OF
HOHENHEIM

Conclusion:

Sustainable biomass use:

- Low CO₂ emission
- Low fertilizer/water use
- Protecting biodiversity
- Environmentally safe

No competition with food

Economically competitive

Strengthening rural areas



©Universität Hohenheim



UNIVERSITY OF
HOHENHEIM



Baden-Württemberg

MINISTERIUM FÜR LÄNDLICHEN RAUM UND VERBRAUCHERSCHUTZ



VolkswagenStiftung



PROJEKTTÄGER FÜR DAS



Bundesministerium
für Bildung
und Forschung



Bundesministerium
für Ernährung
und Landwirtschaft



FACCE SURPLUS
SUSTAINABLE AND RESILIENT AGRICULTURE
FOR FOOD AND NON-FOOD SYSTEMS



Horizon 2020
European Union Funding
for Research & Innovation

