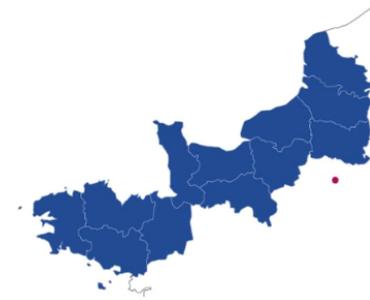


Sustainable Construction Materials from agricultural co-products: Optimising straw bale insulation

Dr Shawn Platt and Prof. Pete Walker

BRE Centre for Innovative Construction Materials, University of Bath



- Research Centre in partnership with BRE since 2006
- 20 academic staff; 40+ researchers
- Research fields:
 - Low carbon cements and concrete materials
 - Innovative concrete structures
 - Timber Engineering
 - Eco-materials (bio-based; mineral based)
 - Energy performance materials
- Facilities include:
 - Scientific laboratories
 - Structures laboratories
 - Building Research Park/HIVE

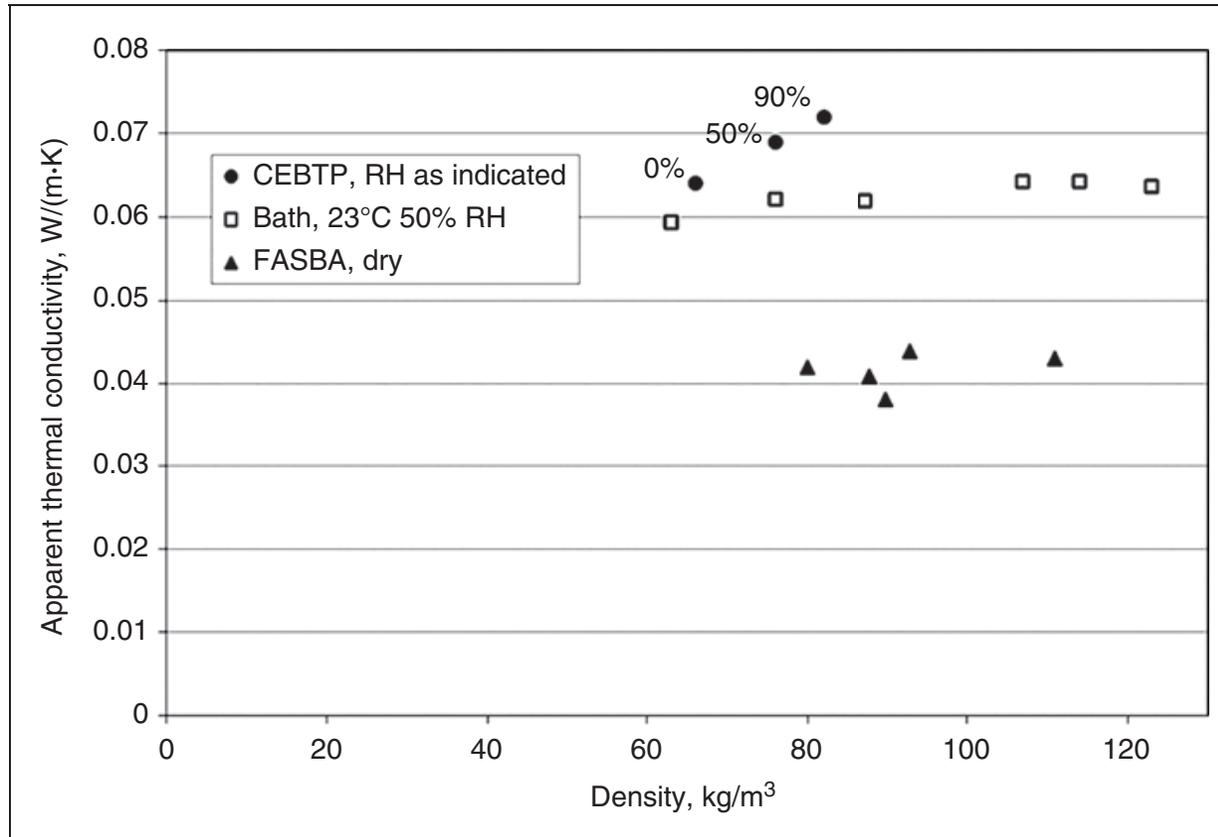
Straw bale construction



To develop a novel prototype straw bale insulation product, suitable for a wider range of non-loadbearing building applications, with optimal thermal resistance properties.



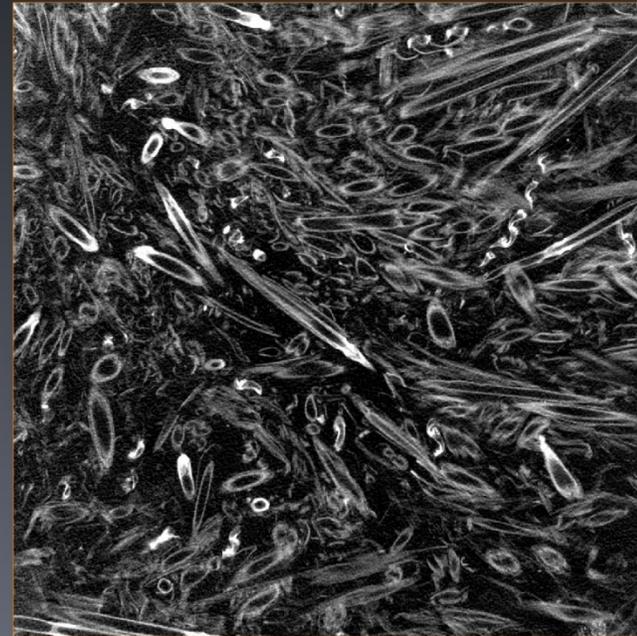
Previous work: Thermal conductivity of straw bales



'Evaluation of the thermal performance of an innovative prefabricated natural plant fibre building system' Andy Shea, Katharine Wall and Pete Walker. Building Services Engineering Research, 2013.

Figure 8. Thermal conductivity versus density for a range of straw samples in dry and humid states. RH: relative humidity; CEBTP: Centre d'Expertise du Bâtiment et des Travaux Publics; and FASBA: Fachverband Strohballenbau.

Orientation of straw



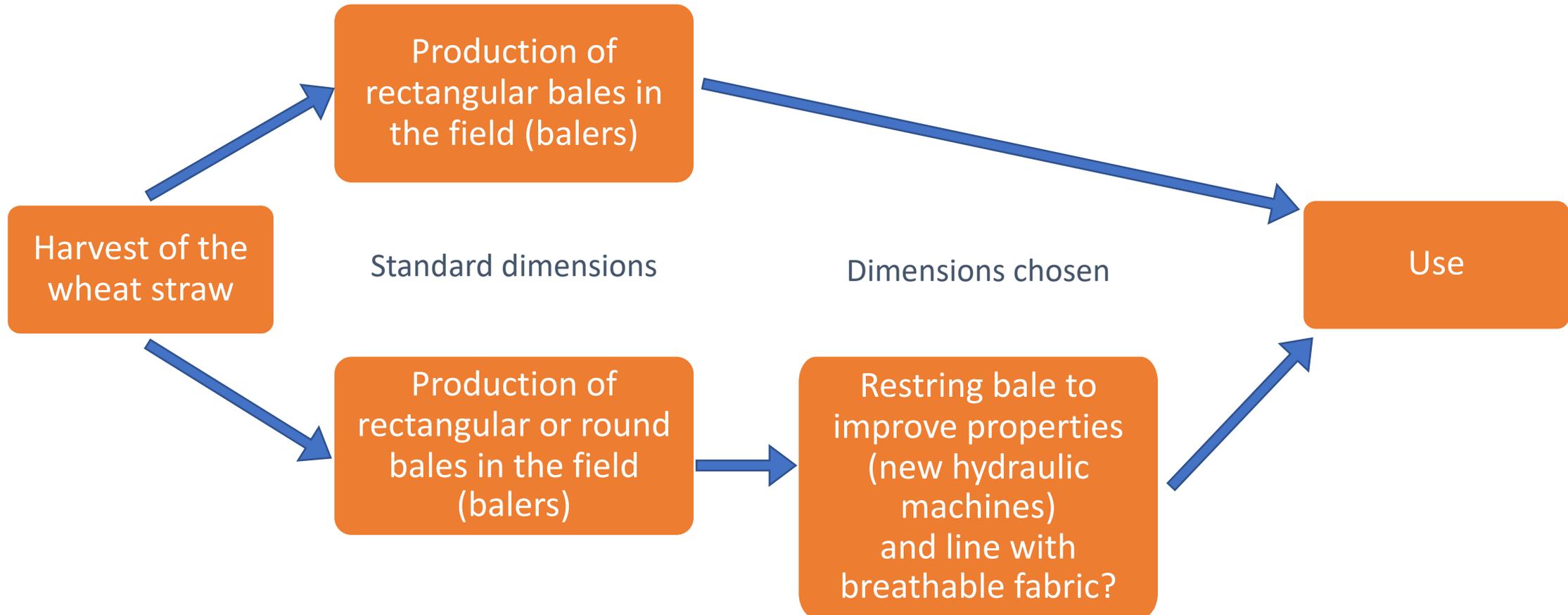
Previous work: Thermal conductivity of straw bales

- RH and temperature have a significant impact on the measured thermal conductivity.
- A least squares regression model for the determination of apparent thermal conductivity as a function of density results in a thermal conductivity value of 0.064 W/mK at 120 kg/m^3 .
- Thermal conductivity depends on straw orientation:
 - 0.064 W/mK (straw oriented parallel to direction of heat flow)
 - 0.045 W/mK (straw perpendicular to direction of heat flow)

Prototype concept



Manufacture process





- Refine prototype manufacture process
- Characterise properties:
 - Density
 - Mechanical properties
 - Thermal conductivity
 - Fire resistance
- Demonstrate performance at full-scale
- Develop proposals for up-scaling prototype production
- Disseminate results

Any questions?

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