

Innovative concept building design using passive technology to improve resource efficiency

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In conventional finishing pig buildings, extreme hot and cold weather conditions have a direct negative effect on feed conversion efficiency and animal welfare. The design of typical UK fan ventilated finishing pig buildings has remained largely unaltered since their first introduction in the 1930s and is generally based on minimum external temperature to ensure the internal environment does not fall below the specified lowest temperature required for the pigs. This approach can have a detrimental effect on the quality of the internal air, due to the overriding factor for the ventilation system controller being the minimum temperature set point. The SPATHE (Solar, PAssive, Thermal, Heat Exchange) concept building takes account of historic, current and future building technology to provide an optimum enclosed environment for pigs to thrive. The building is designed in such a way as to reduce the solar heat gains entering the space in summer, whilst capturing solar rays in winter to take advantage of free heating. Further passive design elements include the integration of thermal labyrinths to deliver heat exchange to the incoming fresh air, thus providing free cooling in summer and free heating in winter, as well as promoting better winter air quality and reducing the peak summer and winter internal temperatures. The SPATHE is a modular building designed to house 250 pigs in each room. The building has the option for easy integration of sustainable technologies such as Solar PV & thermal and rainwater harvesting to further reduce utility bills. The SPATHE concept specification was used to create a dynamic thermal model which was directly compared to the previous model of a standard fully slatted finisher building, to explore how this innovative approach to building design can improve resource efficiency and welfare of pigs.