Tail biting is a major welfare and economic problem for pig producers worldwide. Low tail posture is an early warning sign which could reduce tail biting unpredictability. Based on this, we developed a precision livestock farming approach, using Time-of-flight 3D cameras to automate the measurement of pig tail posture. Commercial partner Innovent Technology Ltd processed raw 3D ‘point cloud’ data with machine vision algorithms to find pigs and measure tail posture. Validation of the 3D algorithm found it to be reasonably accurate, particularly at detecting low vs. not low tails. 23 groups of 29 pigs per group were reared with intact (not docked) tails under typical commercial conditions over 8 batches. 15 groups had tail biting outbreaks, following which enrichment was added to pens and biters and/or victims were removed and treated. 3D data from outbreak groups showed the proportion of low tail (3D angle = 0°) detections increased pre-outbreak and declined post-outbreak (see figure). Pre-outbreak, the increase in low tails occurred at an increasing rate over time, and low tails was higher one week pre-outbreak (-1) than 2 weeks pre-outbreak (-2). Within each batch, an outbreak and a non-outbreak control group were identified. Outbreak groups had more low tail (3D = 0°) detections in weeks -1, +1 and +2 than their matched controls. Comparing 3D tail posture and tail injury scoring data, a greater proportion of low tails was associated with fewer pigs with uninjured tails and with more injured pigs. Low tails might indicate more than just tail biting as tail posture varied between groups and over time and low tails increased when pigs were moved to a new pen. The use of 3D machine vision to automate tail posture detection has considerable potential for commercial application as an early warning of tail biting. More generally, the automatic collection of behavioural data from either 2D and 3D video has considerable potential in animal welfare science, including applications in research and for various real-world settings such as on farm.