

# Ultrasonic Sensing of Pasture Biomass

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## Abstract

The ability to accurately measure pasture biomass can have a significant effect on the profit farms can achieve from their pastures. There are a range of techniques that have been used to measure pasture biomass [1]. This includes measurement of pasture height using ultrasonic transducers [2]. These have been attached to farm bikes. The pasture height is then obtained by measuring the distance that the transducer is above the pasture top and assuming that the ground is a set distance below this. However, tilting and bouncing of the farm vehicle can mean that the assumed ground height is incorrect leading to errors in pasture height measurements. Also, variations in pasture density can lead to additional biomass estimation errors.

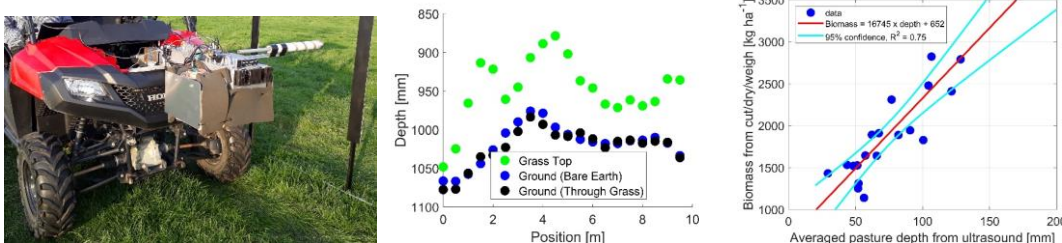


Figure 1: Photo (a) shows the ultrasonic measurement system on a farm bike. Plot (b) show the averaged ultrasonic measurements of pasture top and ground. Plot (c) provides the fit between measured pasture biomass and ultrasonic height obtained using ground measurements.

Here we present recent work where novel ultrasonic arrays have been developed for measuring pasture biomass. Field trials were performed where the system was operated from a farm bike at speeds of up to 20 km/h. In addition to measuring the top of the pasture, the arrays also simultaneously obtained measurements vertically through the pasture to the ground. The measurement of the ground location allowed pasture height measurements to be made that were independent of the tilting and bouncing of the farm vehicle. This provided improvements in  $R^2$  from 0.60 to 0.75 [3]. The echoes from within the pasture also allows variations in the vertical pasture density to be used for improving the accuracy of biomass estimation [4].

## References

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