Cattle Liveweight Estimation Using Machine Vision Assessment of Objective Body Measurements: First Results

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This paper describes first results in the development of a machine vision system that estimates the liveweight of cattle based on objective body measurements (i.e. body length and area). The apparatus has potential use in pasture and feedlot situations with application to automated drafting.

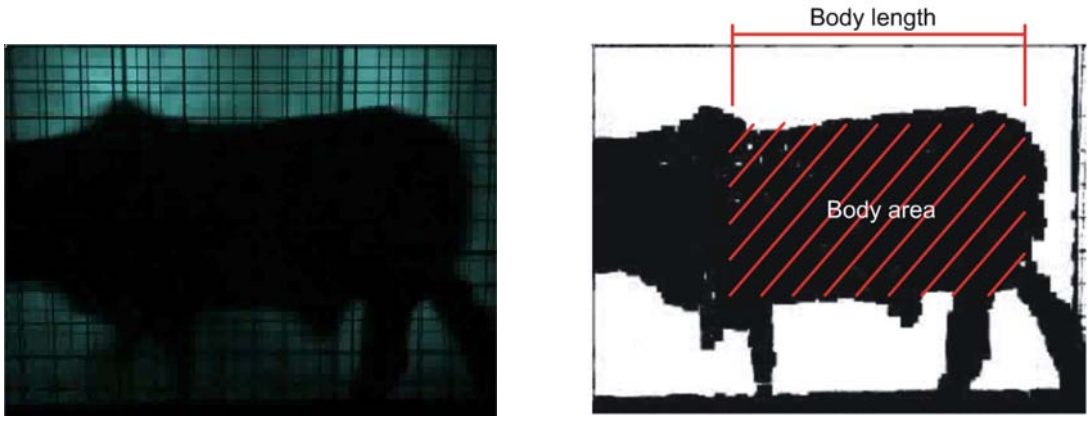
A trial conducted at Bengalla Station (42 km east of Goondiwindi, Queensland) consisted of video collection for thirty pasture-fed *Bos indicus* steers for one day in August 2009. Video apparatus was installed in a laneway enclosed in a shed through which the animals walked enroute to a watering point. Video recording was motion-triggered and indexed by cattle identifications from an electronic ear tag reader at the entry of the laneway. The animals were stationary-weighed the day before the video collection occurred.

The video apparatus comprised a single camera view of the laneway. The laneway was backlit with near-infrared (NIR) floodlights such that a silhouetted side view of the animal was acquired as the animal walked through the laneway. A camera fitted with a NIR optical filter logged video to a personal computer (typical image in Figure 1a). NIR wavelengths were used so the floodlights could be powered on and off automatically without disturbing the animals.

Image processing algorithms were written to automatically extract body length and area from the images. Firstly, dark pixels in the image were assigned as animal pixels and light pixels were assigned as the background. Body length was estimated as the distance between the approximate tailhead and shoulder positions in imagery (Figure 1b). Body area was estimated using the body height and length.

Body length and area measured by the developed method was linearly related to body weight with coefficients of correlation of 0.52 and 0.53, respectively. The results agree with the finding of Wanderstock and Salisbury (1946) that body length is correlated with liveweight. Further work includes improving the weight estimation by incorporating other body measurements and camera views, extending the system to estimate condition score and trialing different breeds.

The authors are grateful to the Australian Research Council, Bengalla Pastoral Holdings and Rural Pacific Marketing (RPM) Rural for funding support and to the latter two organisations for field trial support.



(a) (b)

Figure 1. Typical image from laneway: (a) *Bos indicus* walking through backlit laneway; and (b) image pixels corresponding to animal automatically extracted from *(a)* with body length and area measurements indicated

Wanderstock J.J. and Salisbury G.W. (1946). *J. Anim. Sci.* **5**, 264.

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