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An analysis of the forces required to drag sheep over various surfaces

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Abstract

Some occupational health and safety hazards associated with sheep shearing are related to shearing shed design. One aspect is the floor of the catching pen, from which sheep are caught and dragged to the shearing workstation. Floors can be constructed from various materials, and may be level or gently sloping. An experiment was conducted using eight experienced shearers as participants to measure the force exerted by a shearer when dragging a sheep. Results showed that significant changes in mean dragging force occurred with changes in both surface texture and slope. The mean dragging forces for different floor textures and slopes ranged from 359 N (36.6 kg) to 423 N (43.2 kg), and were close to the maximum acceptable limits for pulling forces for the most capable of males. The best floor tested was a floor sloped at 1:10 constructed of timber battens oriented parallel to the path of the drag, which resulted in a mean dragging force 63.6 N (15%) lower than the worst combination.

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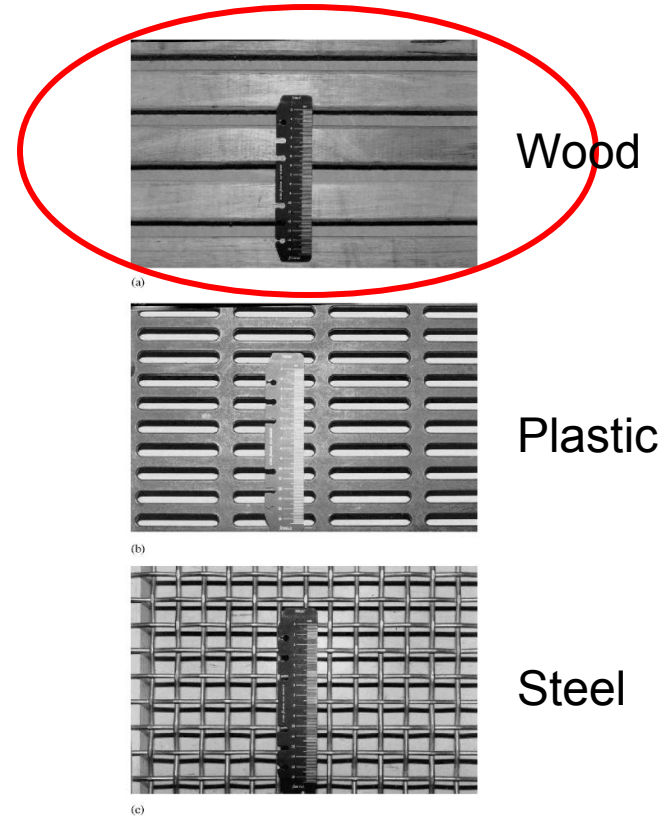
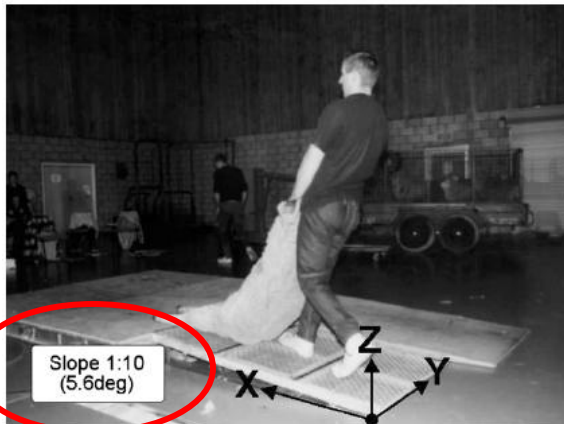


Fig. 1. Floor surfaces. (a) Wood battens. (b) Plastic battens (plastic tiles) (c) Steel mesh.

Dragging force:

$$F = \frac{\mu_k W}{\cos \alpha + \mu_k \sin \alpha}$$