MEASUREMENTS WITH A Pedometer OF Distances WALKed BY SHEEP

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The pedometers used ("Stridemaster"; Smiths Industries Ltd, 46 Ferndell St. Guildford, NSW 2161) resemble a man’s pocket watch of 50 mm diameter. These are clipped onto the waistband of human subjects so that the face is in a vertical plane. A pendulum within, similar to the "hammer" of a self-winding watch, has a return spring attached to one side; it oscillates between two stops in response to movement, and advances hands on the face graduated to 20 km x 25 m. A stride-length adjustment varies distance between the stops. When 10 pedometers with adjustments set to 50 on the 0-100 scale were clipped vertically to a 300 mm square board and shaken by hand the CV about a mean reading of 1 km was ±15%. The pedometers were individually adjusted until the CV was <2%, the settings varying from 62 to 80, and five were attached vertically to a board on each side of a girth strap on a 70 kg Border Leicester (BL) sheep. It, with three companions, was walked slowly 13 times 800 m along a 6 m wide roadway. Its meandering path was followed with a surveyor's wheel; pedometer readings (PR) per actual km varied from 441 to 1486 m, the CV among pedometers in a walk varied from ±30% to ±50%, and for a pedometer (n=13) from ±4 to ±24%. The CV were similar in similar tests with five BL, 39 to 74 kg, that carried one pedometer on each side.

The same five sheep carried their same two pedometers when they grazed a 90 x 40 m paddock pegged to mark 10 m squares. The paths of each sheep were observed on 19 occasions, charted, and measured with an opisometer, and averaged 335 m. The PR varied from 420 to 1416 m per observed km, and within-pedometer CV were greater (x1.5 approx.) than in the road tests. Regression analysis showed that PR paddock = 0.89(± 0.04) PR road (P < 0.001; intercept was non-significant), indicating the sheep moved with less vigorous action in the paddock.

In all tests, within-pedometer CV decreased with increasing PR per km. In pedometers with the highest CV, the return spring may have intermittently restrained the pendulum from travelling the full distance between the stops causing low and variable PR; those that gave high PR may have had a weaker, less restraining, spring.

The manufacturers instruct that Stridemasters should be adjusted individually by wearers for their own stride length when walking and when jogging etc., so that PR equal distances travelled. If used on animals these pedometers could be adjusted and calibrated as described above, but variability in the road tests remained large, increased when the same sheep/pedometer combinations were at pasture, and the road:paddock PR ratio might be different in other circumstances. The PR per actual km increased when, in hot humid weather, the sheep panted and when one pedometer was transferred from one sheep to another. Tests were made only on level terrain; in hilly terrain it would be important to measure distance ascended because energy expenditure per m per kg liveweight is about 10 times greater for the vertical than for the horizontal component of movement. In the initial tests, PR did not alter when the 10 pedometers on the shaken board were tilted in the vertical plane by up to 22° either to right or to left; while movement on undulating ground would be recorded there appears to be no simple method for distinguishing the vertical component. It is concluded the instrument is not suited to the study of movement by grazing animals.

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