Gait and posture discrimination in sheep using a tri-axial accelerometer

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Supplementary Table S1. Discriminant function and canonical correlation analysis for the significant acceleration categories (AC) and discriminant functions (roots) for gait discrimination – supplementary data of Table 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Vertical axis | | | | | Horizontal axis | | | | | | Total acceleration | | | | |
| *Discriminant function analysis* | | | | | | | | | | | | | | | | |
| AC | (0, 1] | (1, 2] | | (2, 3] | (-3, -2] | (3, 4] | (-4, -3] | (2, 3] | | (-2, -1] | (1, 2] | (0, 1] | (1,2] | (2, 3] | (5, 6] | (3,4] |
| Wilks’ λ | 0.32 | 0.18 | | 0.12 | 0.11 | 0.26 | 0.11 | 0.12 | | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.09 |
| Partial Wilks’ λ | 0.33 | 0.60 | | 0.90 | 0.96 | 0.33 | 0.82 | 0.75 | | 0.89 | 0.89 | 0.86 | 0.94 | 0.87 | 0.93 | 0.96 |
| F-remove (2.70) | 71.40 | 23.85 | | 4.13 | 1.36 | 70.97 | 7.84 | 11.84 | | 4.50 | 4.40 | 5.60 | 2.10 | 5.35 | 2.73 | 1.41 |
| P | <0.001 | <0.001 | | <0.05 | 0.26 | <0.001 | <0.001 | <0.001 | | <0.05 | <0.05 | <0.01 | 0.13 | <0.01 | 0.07 | 0.25 |
| Tolerance  (1-R2) | 0.46 | 0.36 | | 0.19 | 0.35 | 0.13 | 0.09 | 0.27 | | 0.03 | 0.19 | 0.54 | 0.61 | 0.35 | 0.28 | 0.69 |
| *Canonical correlation analysis* | | | | | | | | | | | | | | | | |
| Root | 1 | | 2 | | | 1 | | | 2 | | | 1 | | | 2 | |
| Eigenvalue | 5.08 | | 0.57 | | | 6.56 | | | 0.52 | | | 5.64 | | | 0.68 | |
| Canonical correlation | 0.91 | | 0.60 | | | 0.93 | | | 0.59 | | | 0.92 | | | 0.64 | |
| Wilks’ λ | 0.11 | | 0.64 | | | 0.09 | | | 0.66 | | | 0.09 | | | 0.60 | |
| χ2 | 163.32 | | 32.50 | | | 175.96 | | | 30.31 | | | 173.58 | | | 37.32 | |
| Df | 8 | | 3 | | | 10 | | | 4 | | | 10 | | | 4 | |
| P | <0.001 | | <0.001 | | | <0.001 | | | <0.001 | | | <0.001 | | | <0.001 | |

**Supplementary Table S2.** Squared Mahalanobis Distances (SMD) of misclassified cases in the classification matrix on the vertical and horizontal axes and the total acceleration

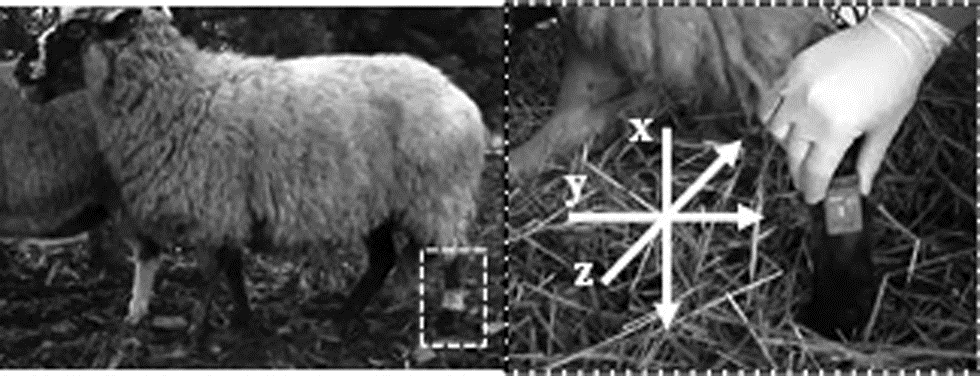
|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Misclassified cases1 | | | | | | | | |
|  | Gait | Walking p=0.34 | SMD | | Trotting p=0.31 | SMD | | Galloping p=0.35 | SMD | |
| False | True | False | True | False | True |
| Vertical Axis | Trotting | 1 | 4.67 | 4.93 |  |  |  | 3 | 3.36 | 7.86 |
| 26.14 | 26.69 |
| 4.96 | 5.67 |
| Galloping |  |  |  | 4 | 0.78 | 8.19 |  |  |  |
| 4.34 | 6.55 |
| 4.81 | 9.37 |
| 2.33 | 7.08 |
| Horizontal Axis | Trotting | 4 | 3.43 | 5.04 |  |  |  | 1 | 6.76 | 10.67 |
| 6.58 | 7.05 |
| 3.93b | 3.81 |
| 3.58 | 4.44 |
| Galloping |  |  |  | 2 | 0.48 | 11.63a |  |  |  |
| 6.50 | 7.20 |
| Total Acceleration | Walking |  |  |  | 1 | 2.83 | 5.32 |  |  |  |
| Trotting | 2 | 9.33 | 10.07 |  |  |  | 3 | 4.01 | 5.74 |
| 4.87 | 10.00 |
| 4.81 | 5.10 | 3.25 | 6.84 |
| Galloping |  |  |  | 4 | 0.86 | 5.93 |  |  |  |
| 9.22 | 10.76 |
| 4.83 | 13.19a |
| 3.28 | 9.46 |

p = *a priori* group probability set up (proportional to the group size);

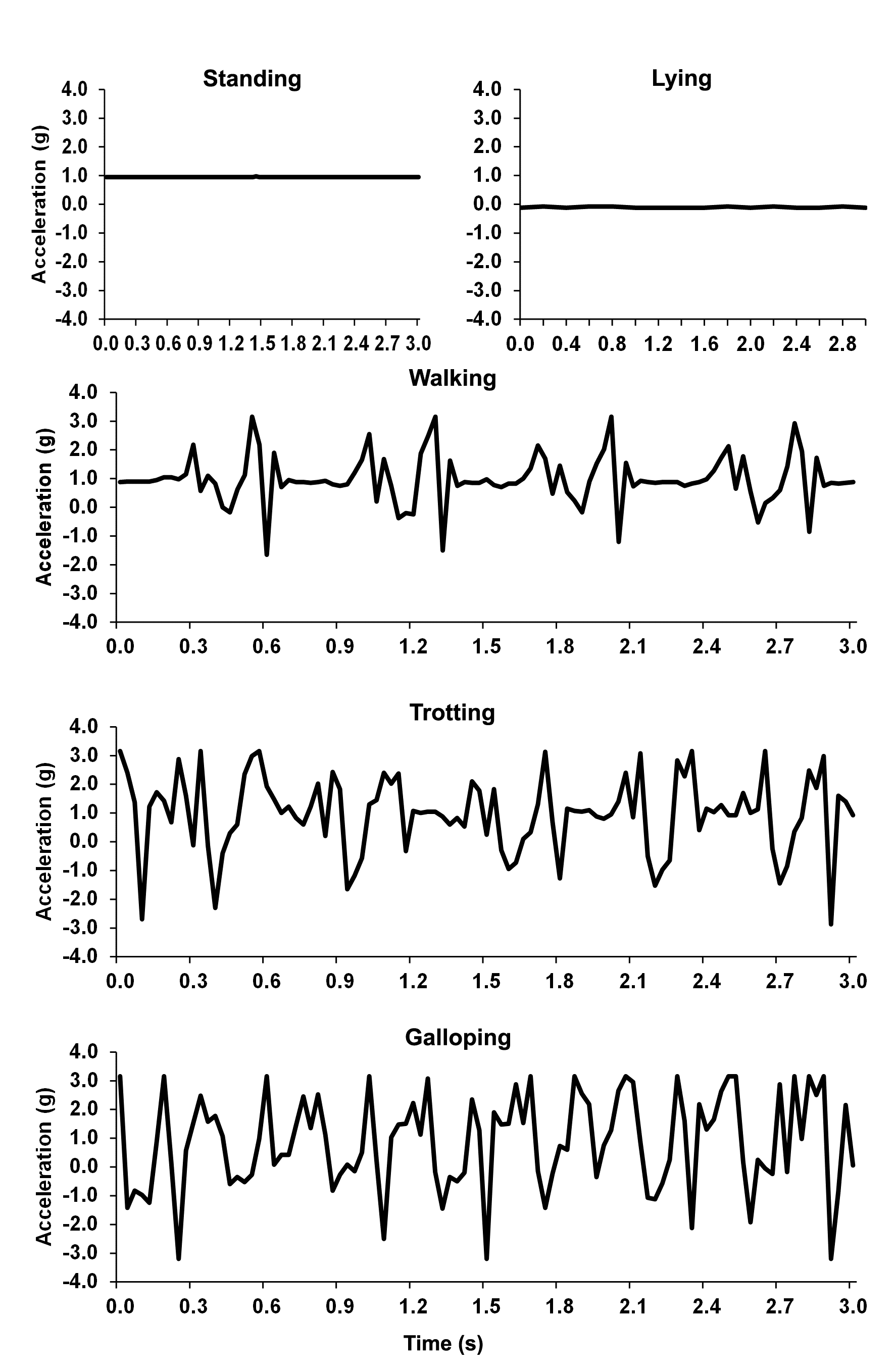
1 The misclassified cases (epochs) are presented with their distances (SMD) from the centroid of the False gait classification, followed by the SMD of the correct (True) gait classification.

a Gait misclassifications where the true gait is the third (last) choice in the *post hoc* predictions.

b Misclassification due to *a priori* probability set up (p)



**Supplementary Figure S1.** Location and positioning of the accelerometer on sheep. The accelerometer is mounted on the left hind leg in lateral metatarsal region (picture left). The accelerometer is positioned with x as vertical axis and y as horizontal axis and z axis is directed from lateral to medial side (picture right).



**Supplementary Figure S2.** Graphs showing the acceleration values on the vertical (x) axis of tri-axial accelerometer while sheep is standing, lying, walking, trotting and galloping in a period of 3 s (one epoch).