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Suisse. Naturellement.

Using sensor technology to quantify gait quality

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29.03.2023

www.agroscope.ch | gutes Essen, gesunde Umwelt

Universität Bern | Universität Zürich
vetsuisse-fakultät

Universität Zürich
Vetsuisse-Fakultät, Departement für Pferde




What should we measure and how?

- First determine which kinematic parameters are relevant
- This will set the framework of which system you will use

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Determining Objective Parameters to Assess Gait Quality in Franches-Montagnes Horses for Ground Coverage and Over-Tracking - Part 1: At Walk


Annik Imogen Gmel^{a,b,c}, Eyryn Halla Haraldsdóttir^b, Filipe M. Serra Bragança^c, Antonio M. Cruz^d, Markus Neuditschko^e, Michael A. Weishaupt^b

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Original Research

Determining Objective Parameters to Assess Gait Quality in Franches-Montagnes Horses for Ground Coverage and Over-Tracking - Part 2: At Trot

Annik Imogen Gmel^{a,b,c}, Eyryn Halla Haraldsdóttir^b, Filipe Manuel Serra Bragança^c, Antonio M. Cruz^d, Markus Neuditschko^e, Michael Andreas Weishaupt^b

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Measurements we are considering

- Speed
- Stride frequency and stride length
- Maximal protraction and retraction
- Maximal Abduction – Adduction
- Suspension duration (trot)
- Vertical displacement of withers



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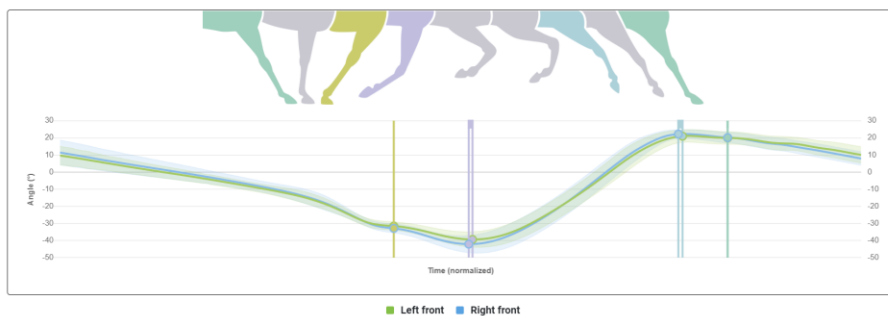
Forelimb protraction - retraction



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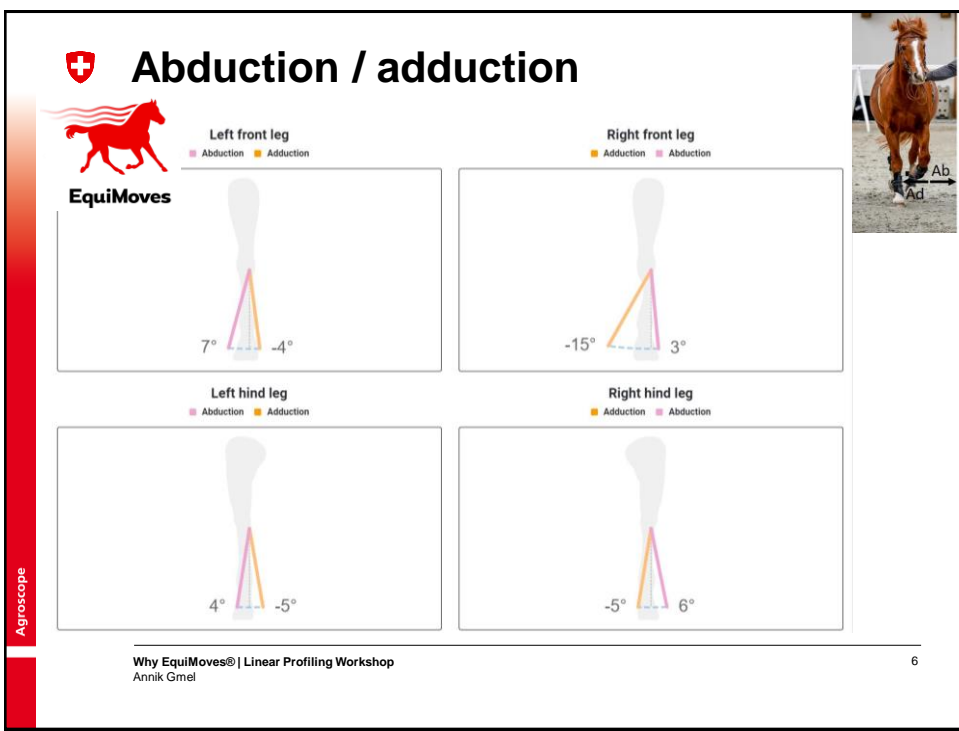
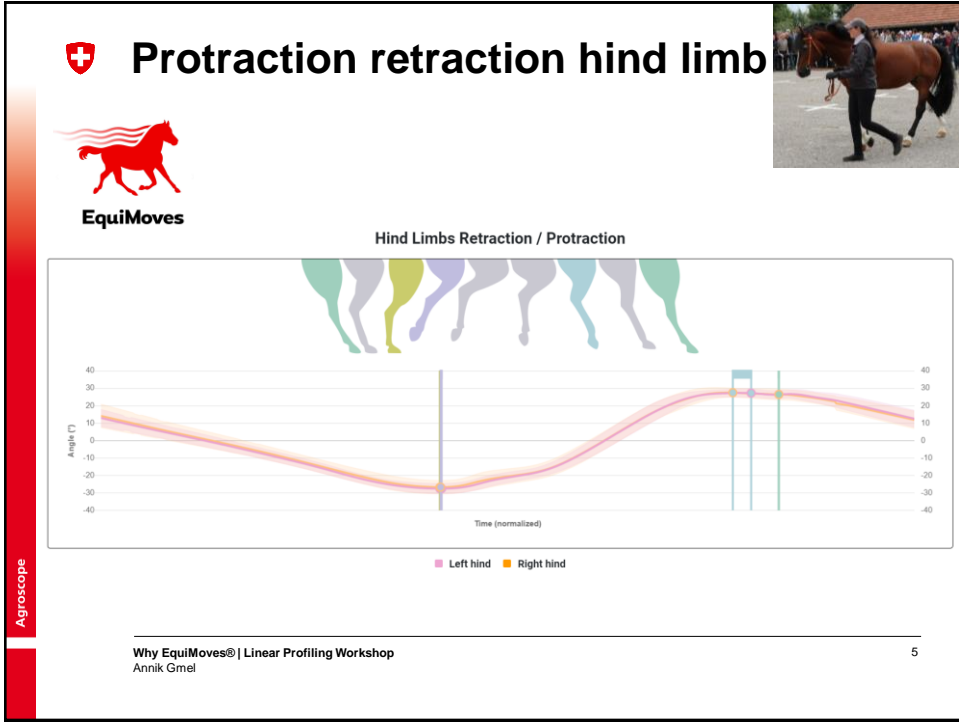
Front Limbs Retraction / Protraction

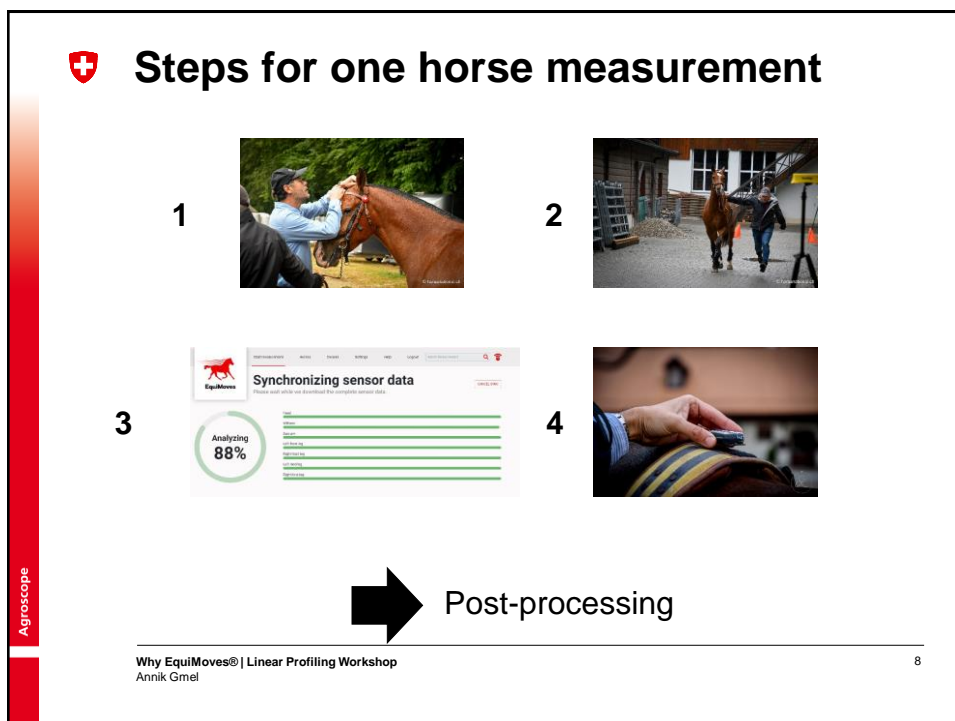
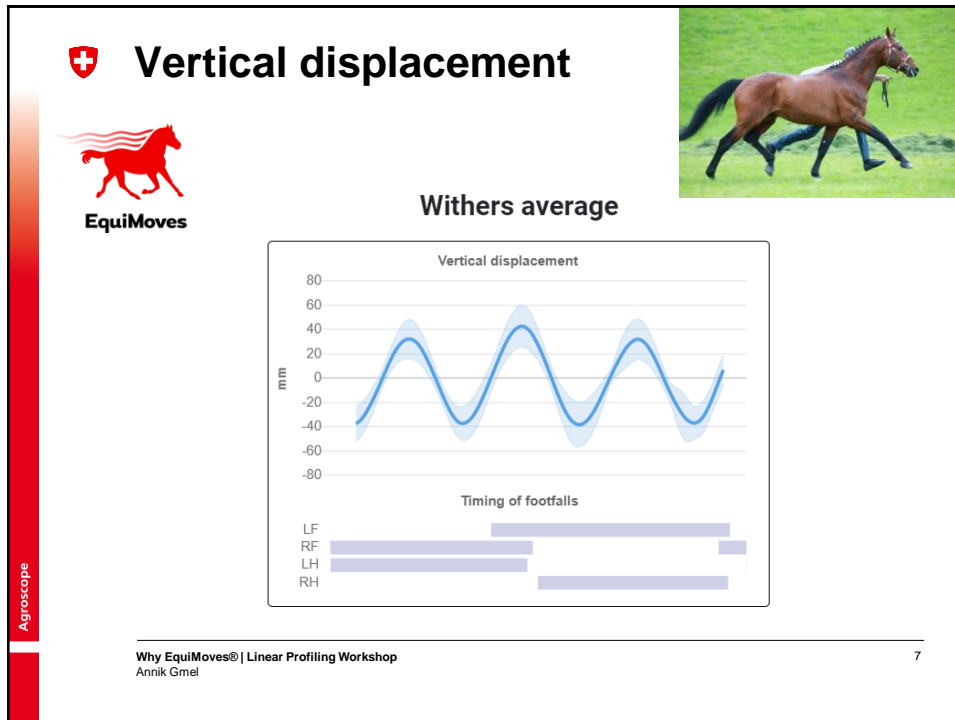


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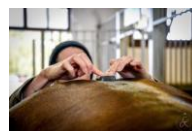
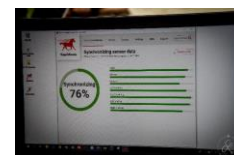
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What matters

- Quality of the presentation (if possible, keep the same team)
- Keep calm, it takes time! Putting on the sensors, synchronising data, having good trials for each horse,...
- Quite extensive post-processing



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How we work

- Visit breeders with 10 horses or more
- 30-35 meters on a flat, hard surface
- Estimate 15 minutes per horse on average
- 30 minutes set up
- 2 persons for the horse, 1 for the computer



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Partner up with companies willing to listen to your needs

- We explained we needed the system to record speed
- Research and development made it happen

Using Different Combinations of Body-Mounted IMU Sensors to Estimate Speed of Horses—A Machine Learning Approach

by [Harald Denkers](#)¹, [Filipe Serra Bragança](#)¹, [Berend-Jan van der Zwaag](#)^{1,2,3,4,5}, [Julia Vorkamp](#)⁴, [Annik Gmel](#)^{1,6} and [Paul Haringa](#)^{1,7}

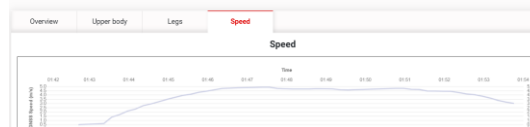
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Analysis for selected period: **trot, 01:42 - 01:53 (17 strides)**



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Any questions?



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