



Technical University of Denmark
DTU Vet
National Veterinary Institute



UNIVERSITY OF COPENHAGEN

Department of
Veterinary Disease Biology

In vivo efficacy of chicory silage against parasitic nematodes in cattle

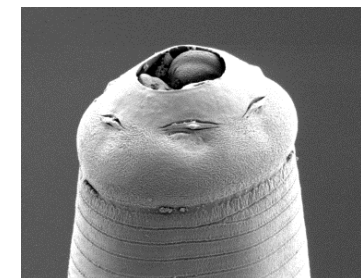
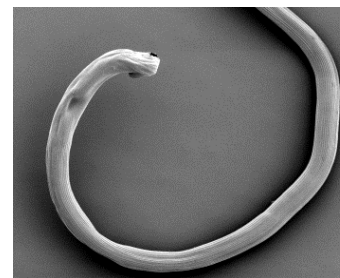
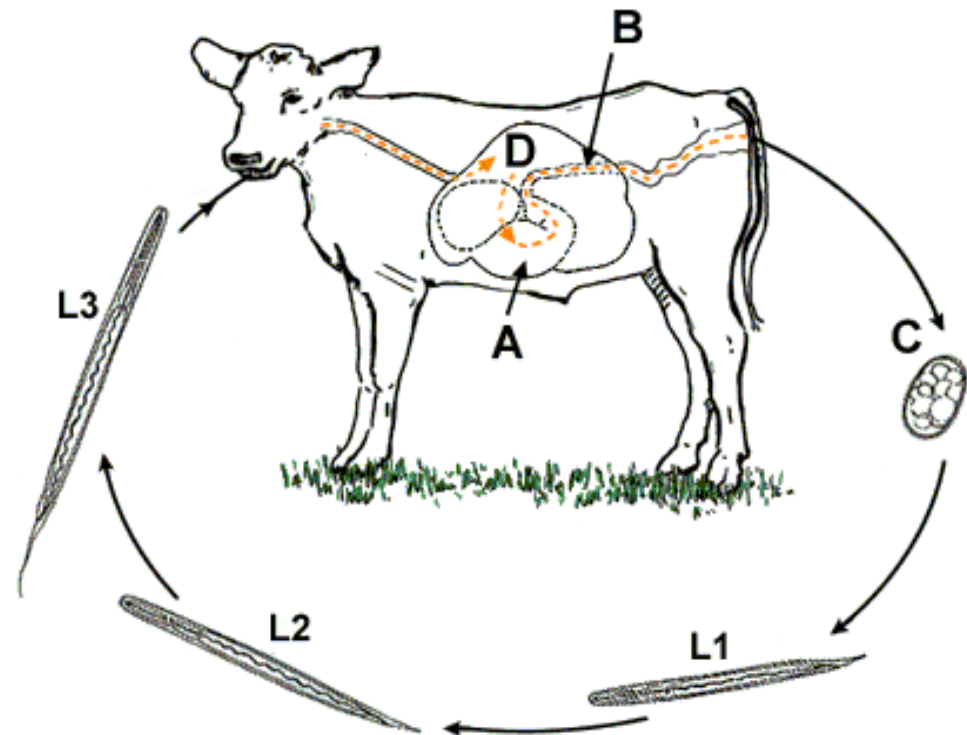
Miguel Peña-Espinoza¹, Olivier Desrues², Andrew Williams²,
Stig M. Thamsborg², Heidi L. Enemark¹

¹ Technical University of Denmark, National Veterinary Institute

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Gastrointestinal nematodes (GIN) of cattle

- Several species:
Ostertagia ostertagi
Cooperia oncophora
- Pasture-borne infections
- No multiplication in the host =
infection level depends on number of
ingested infective larvae (L3)
- Significant impact on animal health,
welfare and productivity



Extensive use of anthelmintics to control GIN

Anthelmintic resistance in
GIN of cattle

Wish to reduce reliance
on anthelmintics e.g.
Organic farming, low-
input systems

Need for integrated parasite control methods:

- Grazing management
- Vaccines
- Breeding programs (selection of resistant animals)
- **Bioactive forages**

Chicory (*Cichorium intybus*)



cv. Spadona



cv. Puna II

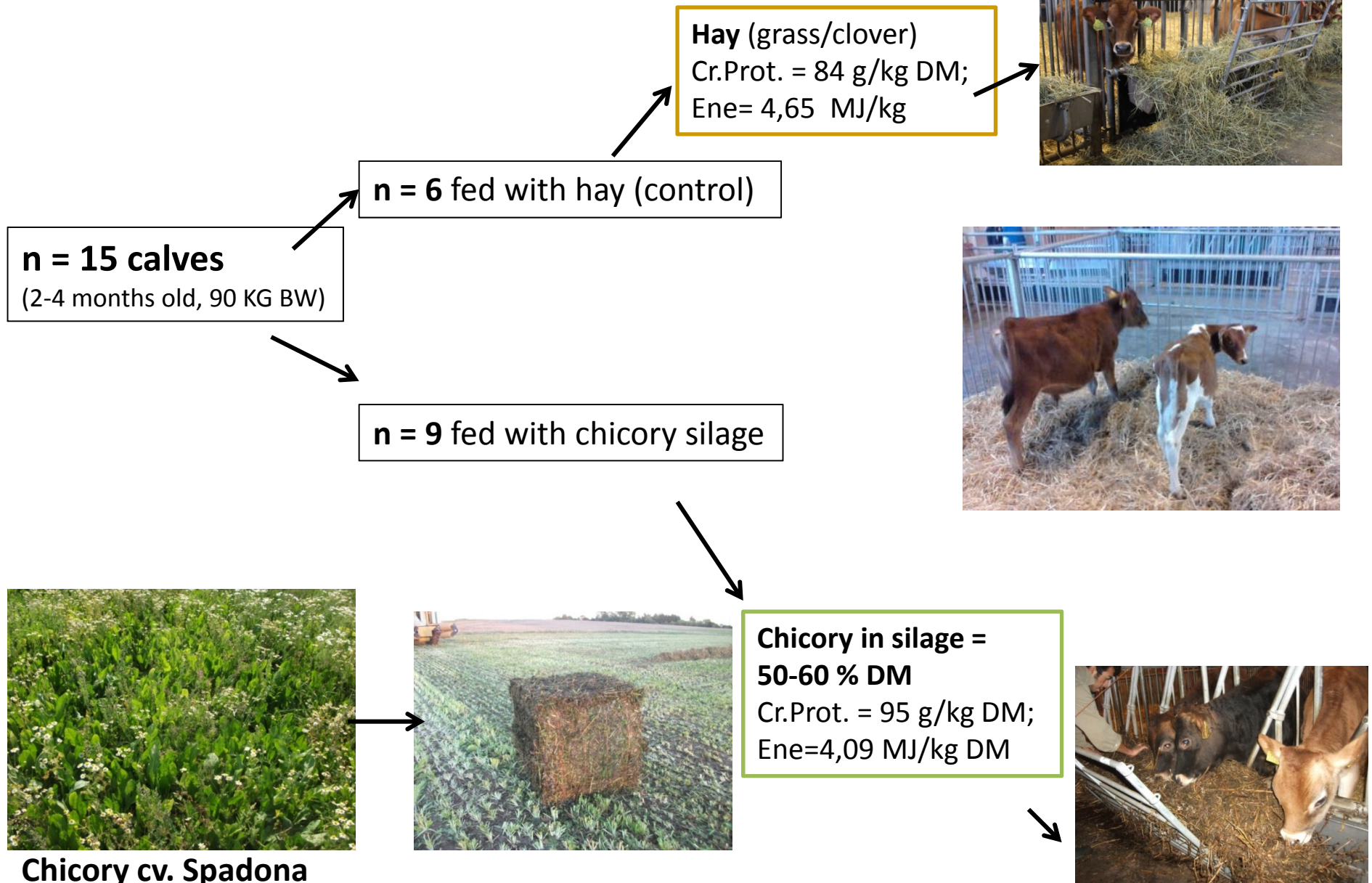


- Perennial herb (Family *Asteraceae*)
- Used for feeding of livestock in some areas
- Different cultivars
- Some indications of antiparasitic effects in deer and sheep (abomasal nematodes)
- *In vitro* antiparasitic effect on cattle nematodes (Poster EAAP 65th – 2014)

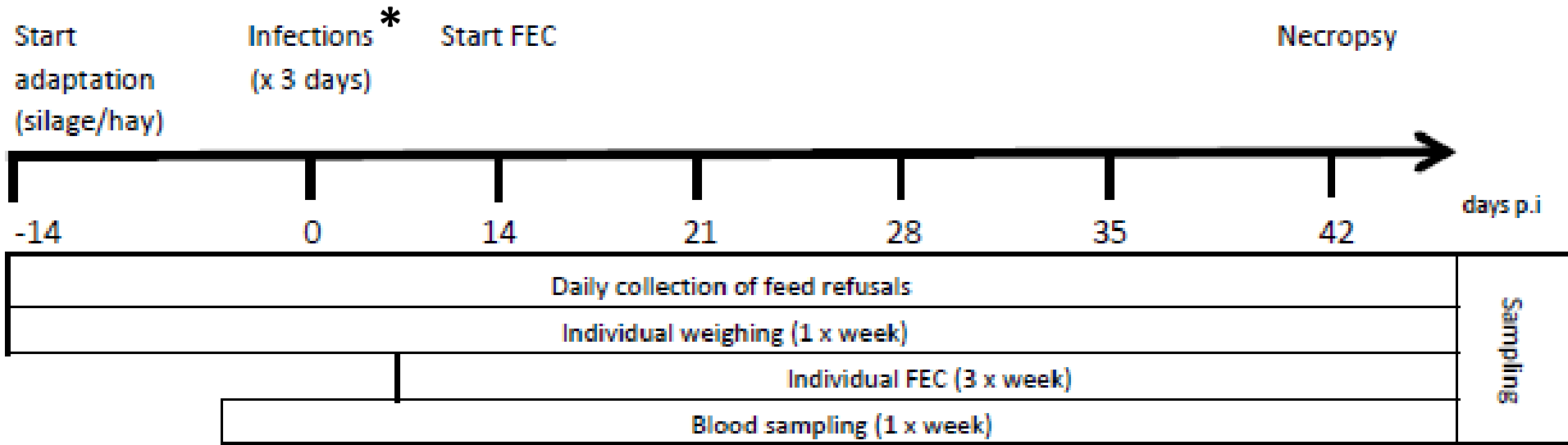
Objective of our study:

To assess the anti-parasitic effect of chicory silage on calves experimentally infected with *Ostertagia ostertagi* and *Cooperia oncophora*

Material and methods:



Study design:



*Total infection dose = 10,000 *O. ostertagi* + 66,000 *C. oncophora* third-stage larvae

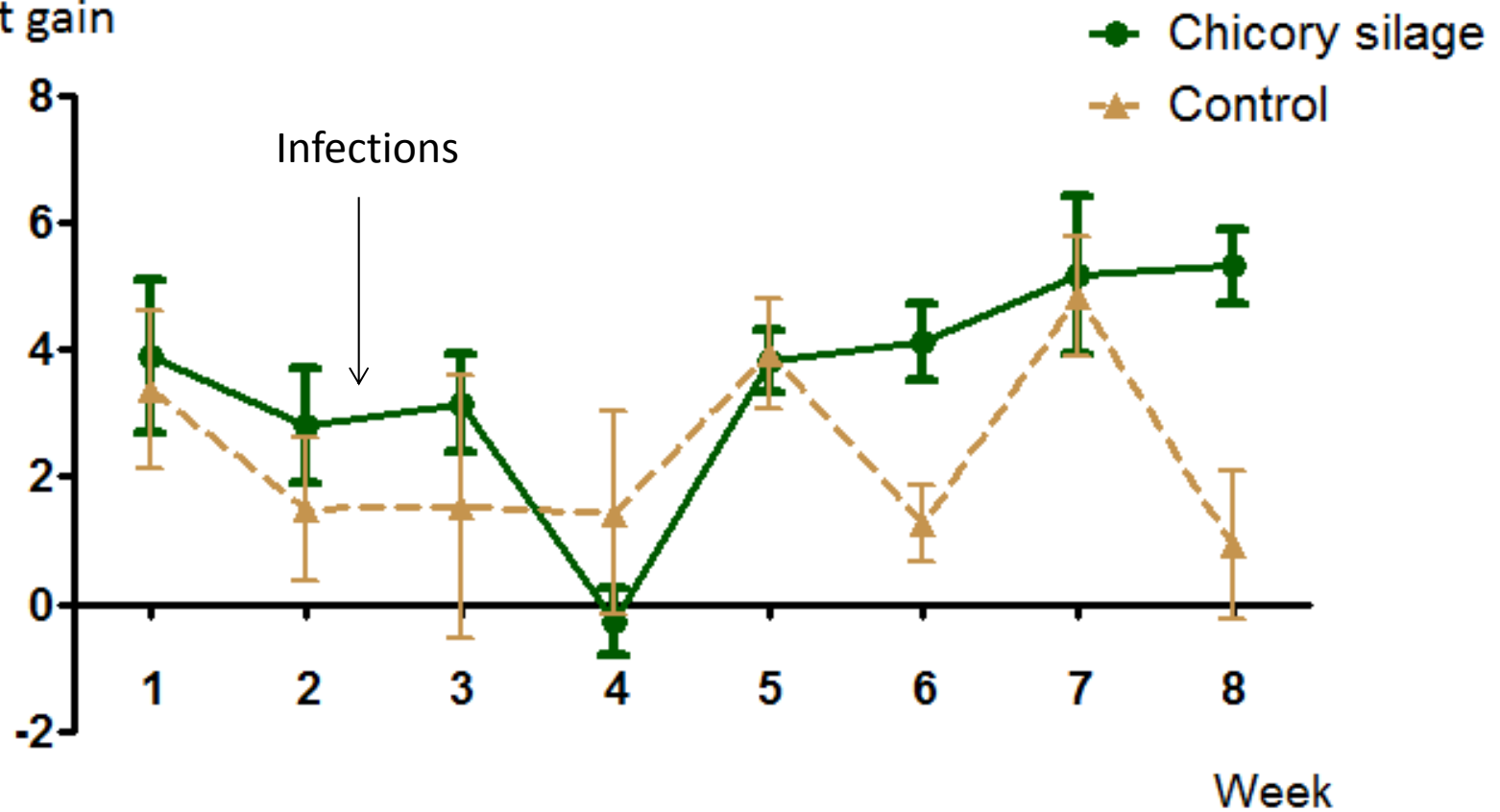
Results:

- Weight gains
- Faecal egg counts (FEC) adjusted to faecal DM
- Adult worm counts

Results: Weight gains

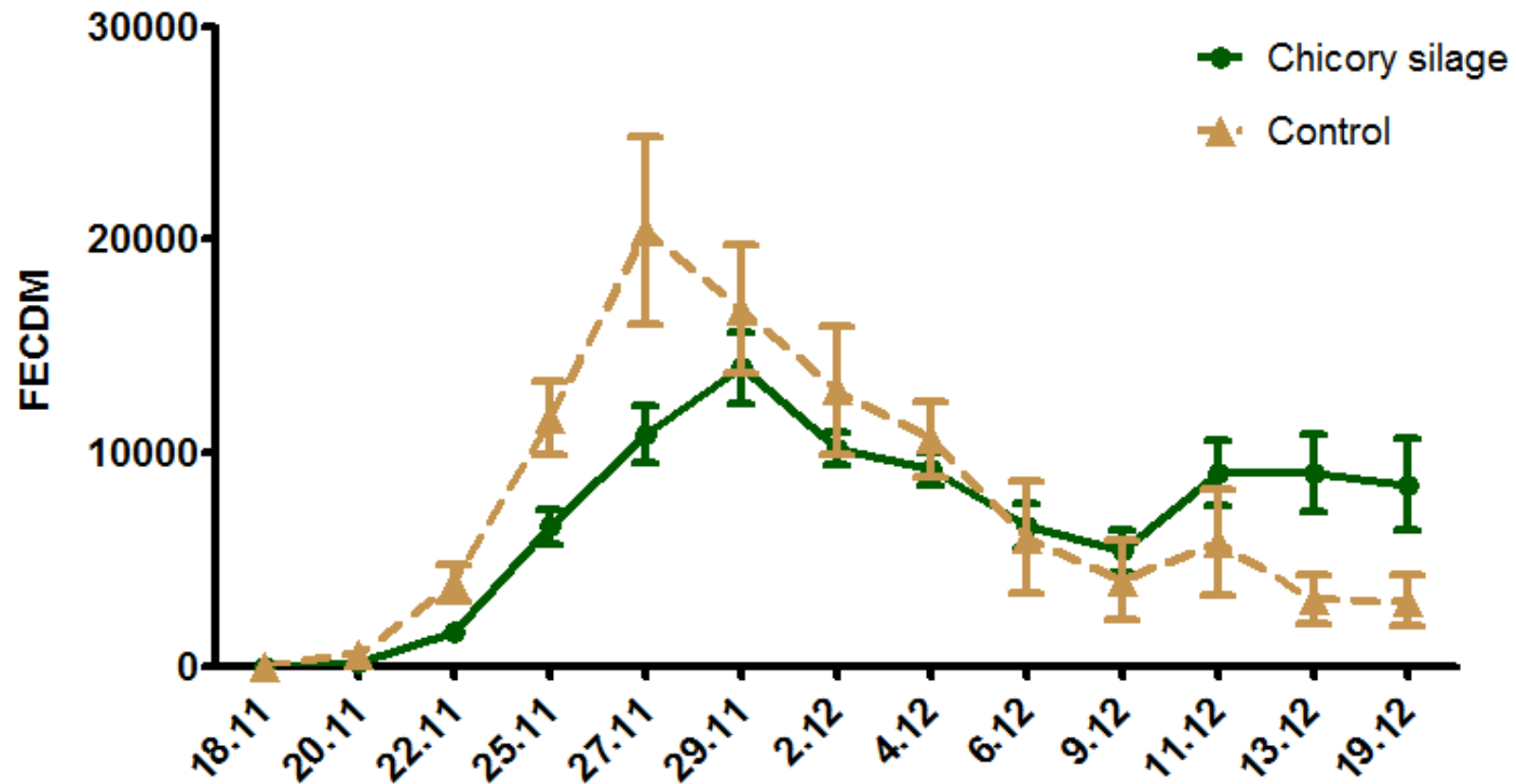
Weight gains were significantly higher in chicory-fed calves (+35%; $p = 0.02$) compared with hay-fed controls

KG weight gain



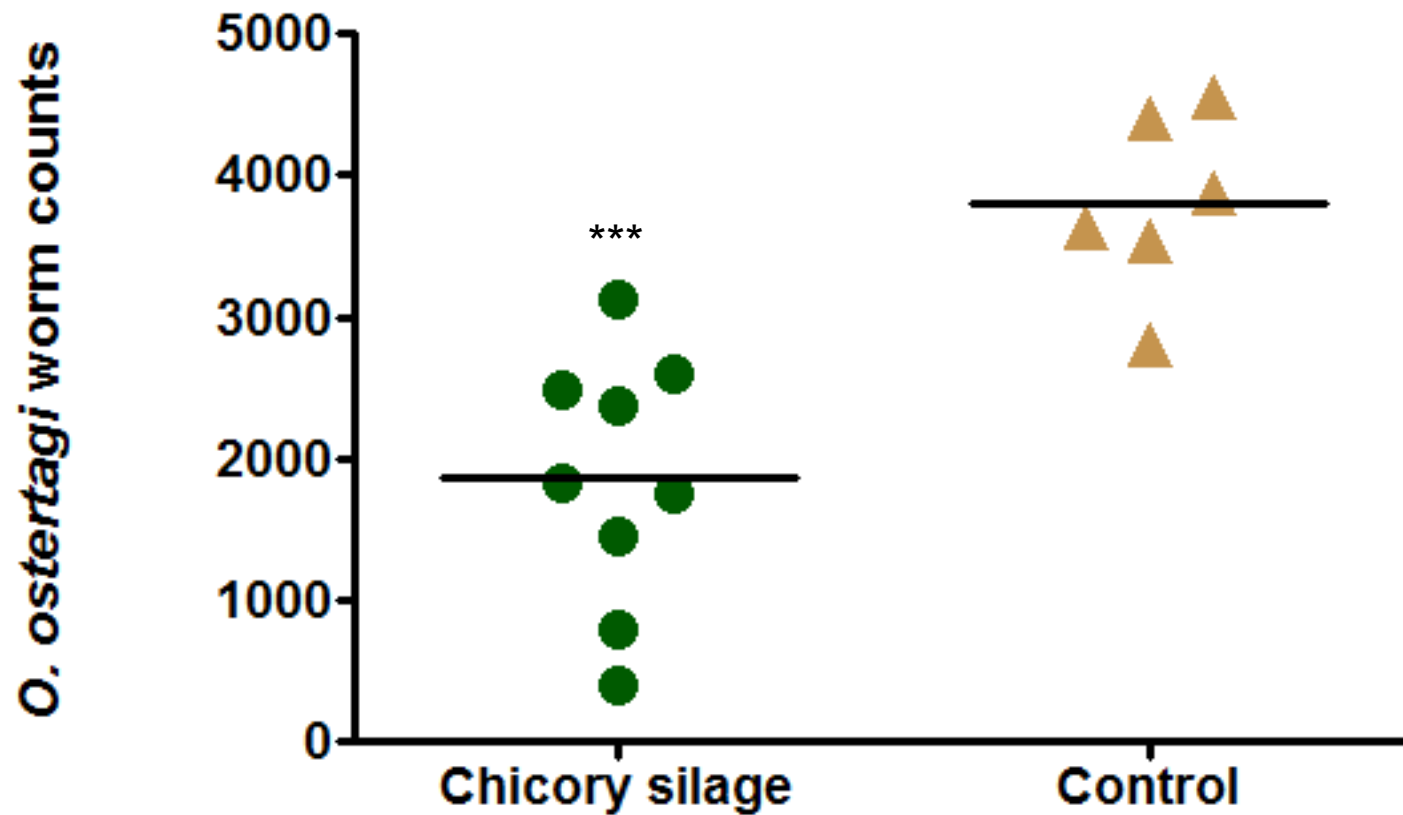
Results: Faecal egg counts (FECDM)

No significant differences in FEC adjusted for faecal DM between groups ($p=0.14$)



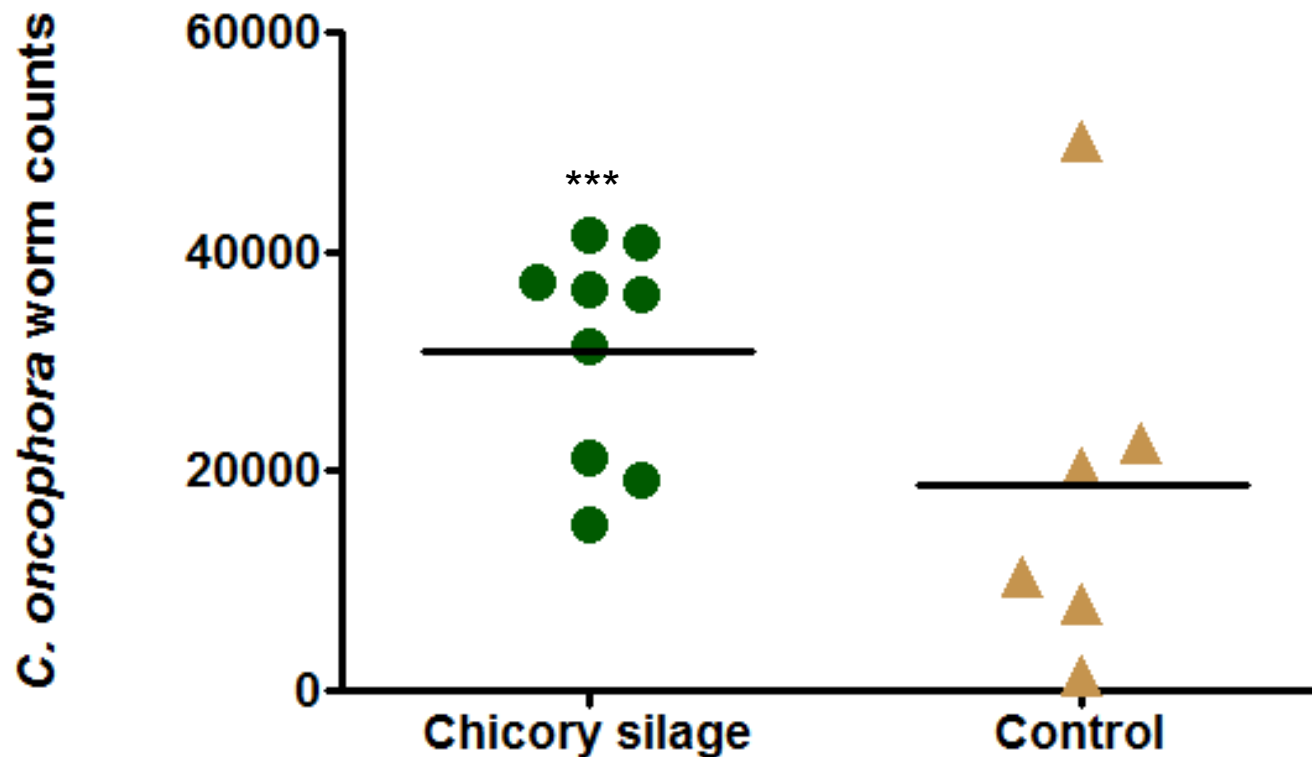
Results: *Ostertagia ostertagi* worm burdens

57% reduction in *O. ostertagi* adult worms in chicory silage group compared with control group ($p < 0.01$)



Results: *Cooperia oncophora* worm burdens

60% less *C. oncophora* adult worms in control group compared to chicory-fed calves ($p < 0.01$)



- Immune-mediated expulsion of *C. oncophora* in high responder animals at 35-42 days after infection (Kanobana et al., 2001,2002)
- **Why some hay-fed control calves expelled *C. oncophora* and not chicory-fed calves?**

Conclusions and future research:



- Feeding with chicory silage →
Lower worm burden of *Ostertagia ostertagi*
Higher worm burden of *Cooperia oncophora*
- Expulsion commonly observed in *Cooperia* infections was delayed in chicory-fed calves – Why?
- *In vivo* anti-parasitic effects of chicory against cattle nematodes were confirmed, but seems to be:
 - 1) Species-specific or influenced by parasite location in the gut, or/and
 - 2) Concentration of active compounds

Acknowledgements

- Coping with Anthelmintic **RES**istance (**CARES**) - EMIDA-ERA NET
- Becas Chile – CONICYT
- Colleagues and technicians at KU-SUND and DTU-VET





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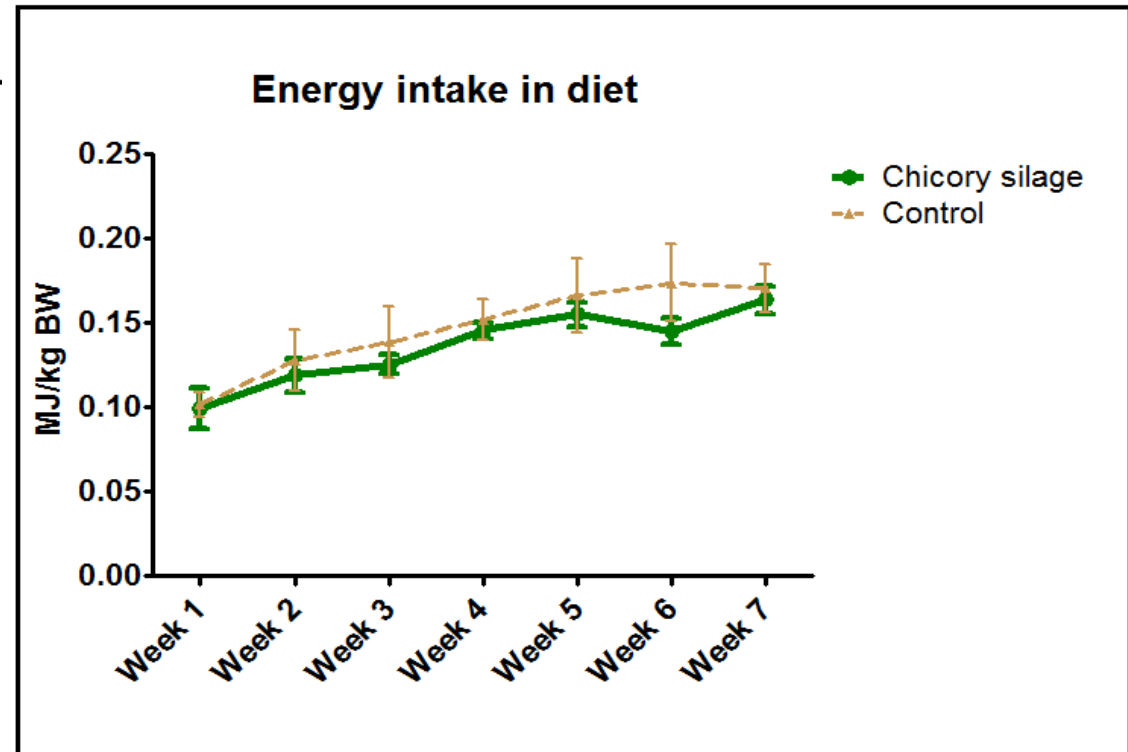
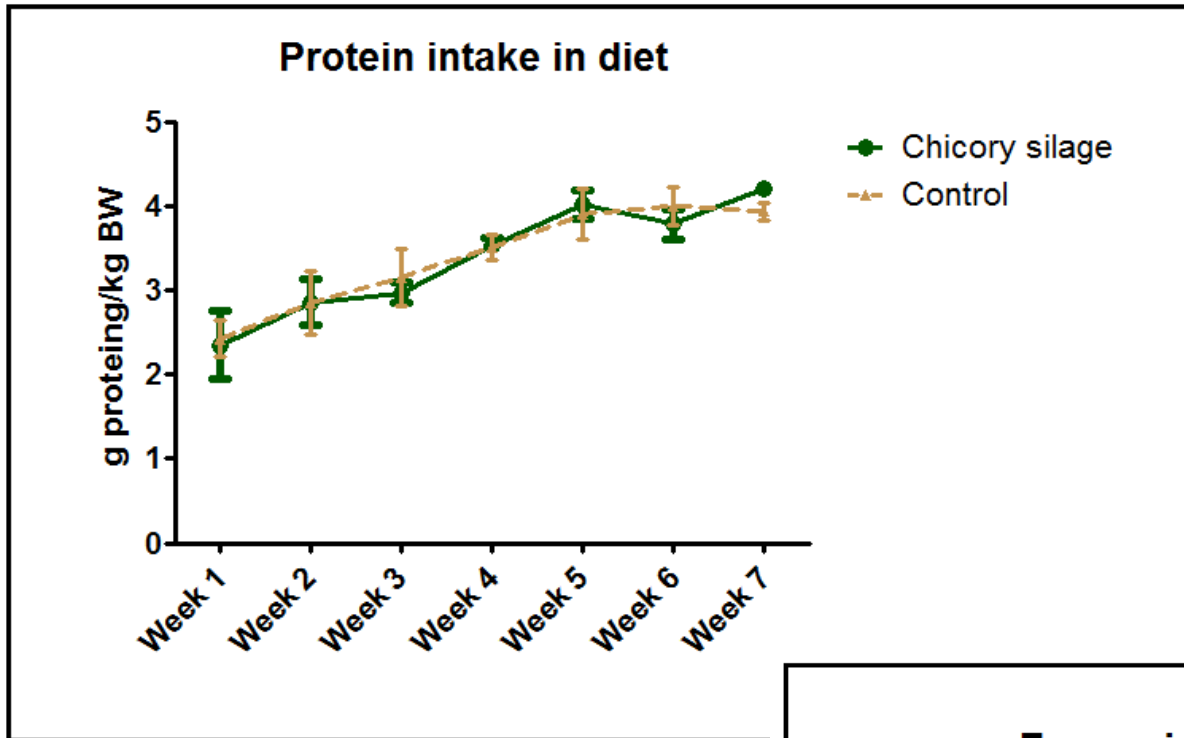
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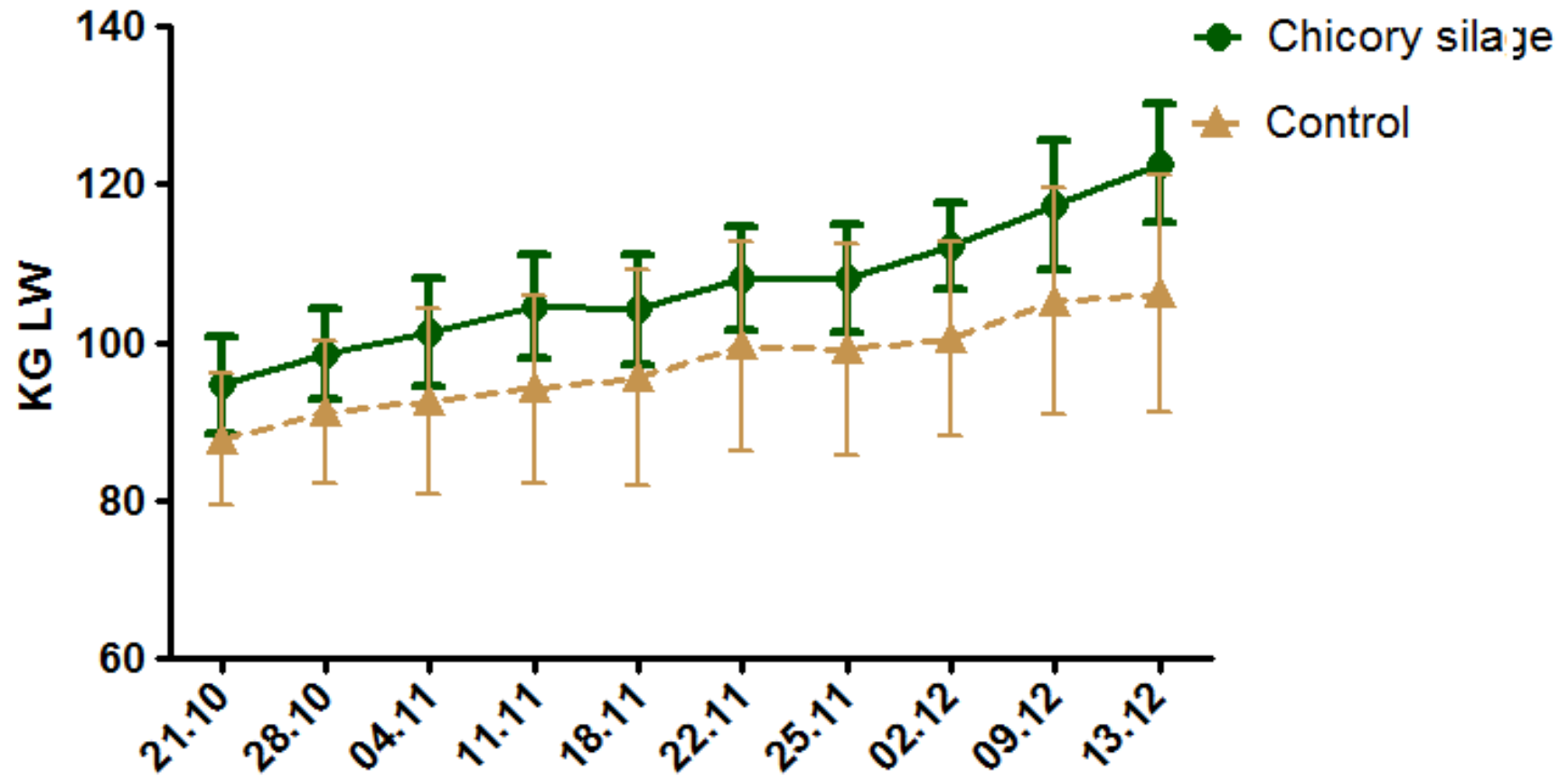
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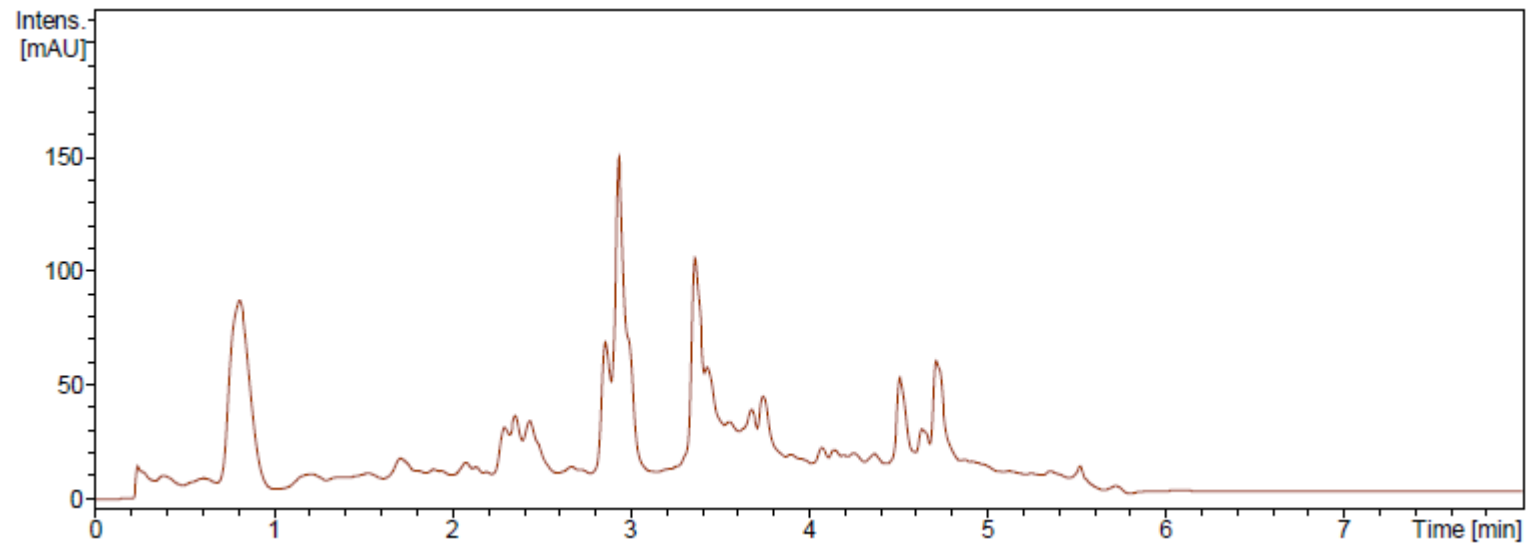
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HPLC-MS: Sesquiterpene lactones-fraction detected in chicory silage used in the *in vivo* study (50-60 % DM chicory *Spadona* in silage)



HPLC-MS: Sesquiterpene lactones-fraction in original chicory *Spadona* leaves

