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DEPARTMENT OF VIROLOGY, PARASITOLOGY AND IMMUNOLOGY
LABORATORY OF PARASITOLOGY

Acaricidal activity of plant-derived essential oil components against *Psoroptes ovis* *in vitro* and *in vivo*

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26th August, 2019

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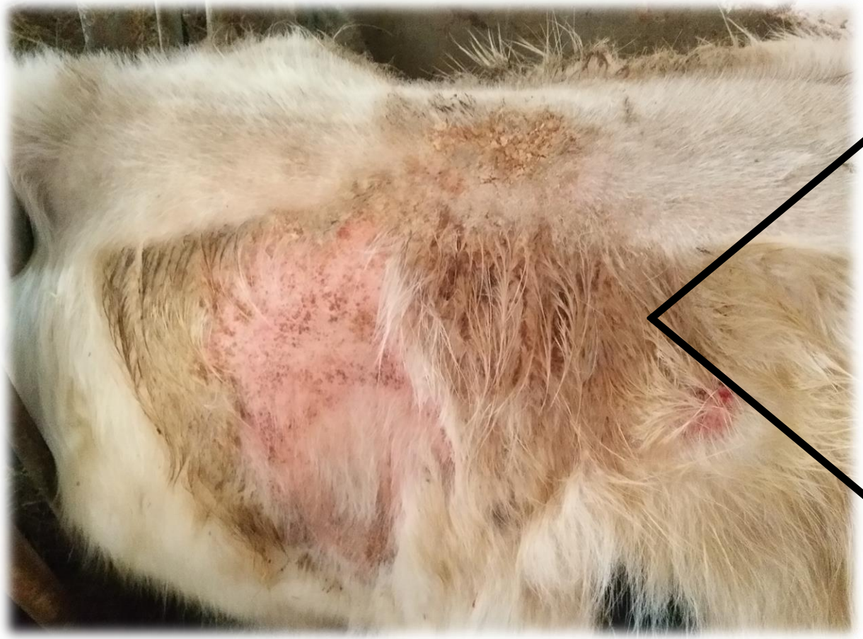
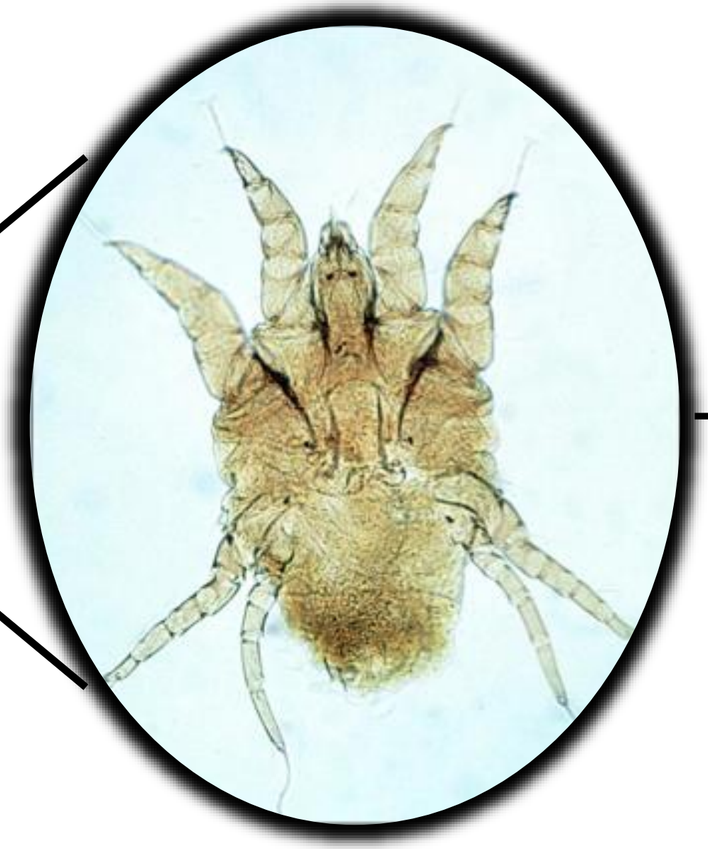
PSOROPTES OVIS CAUSES SIGNIFICANT PROBLEMS IN BELGIAN BLUE CATTLE





↘ Animal welfare
↘ Growth
↘ Leather quality

↗ Financial losses[1,2,3,4]

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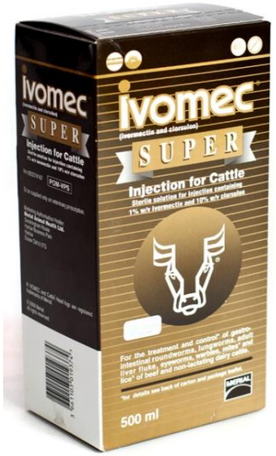
[1]Kirkwood, 1986; [2]Lonneux et al.,1998; [3]Sarre et al., 2012; [4]Lekimme et al., 2010

TREATMENT OF PSOROPTIC MANGE

- Macrocyclic lactones (SC injection)
- Topical acaricides
  - Amitraz
  - Phoxim



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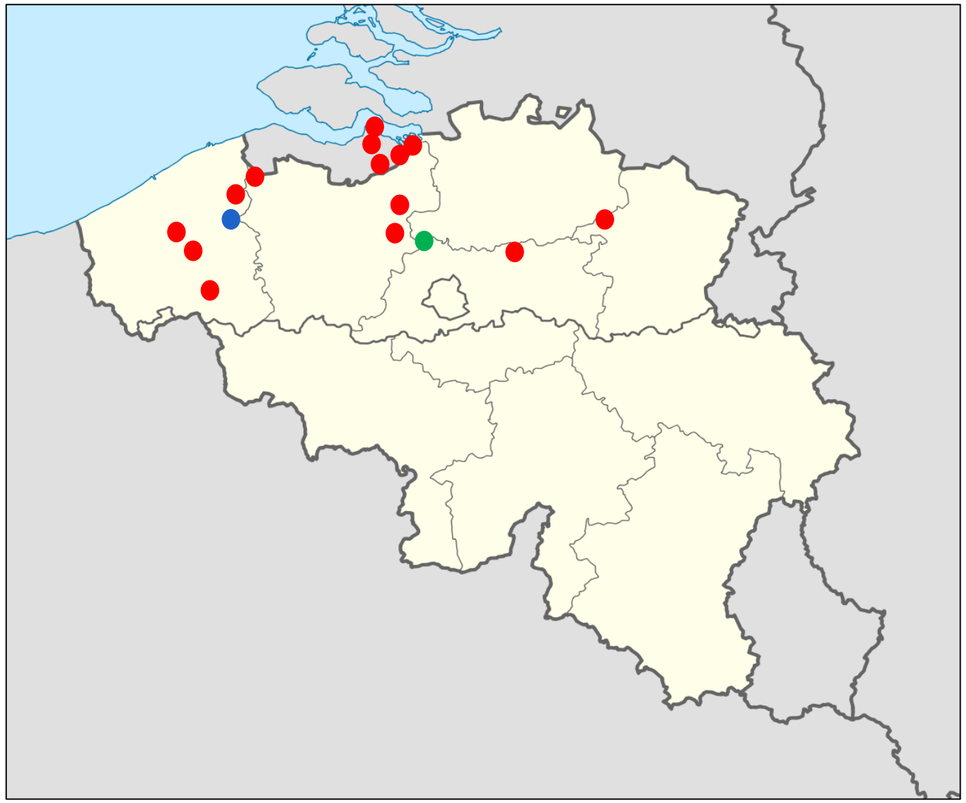
MACROCYCLIC LACTONE RESISTANCE IN *PSOROPTES OVIS*

P. ovis

- Sheep (Doherty et al., 2018)[1]
- Cattle (Lifschitz et al., 2018)[2]



Van Mol et al., 2019[3]

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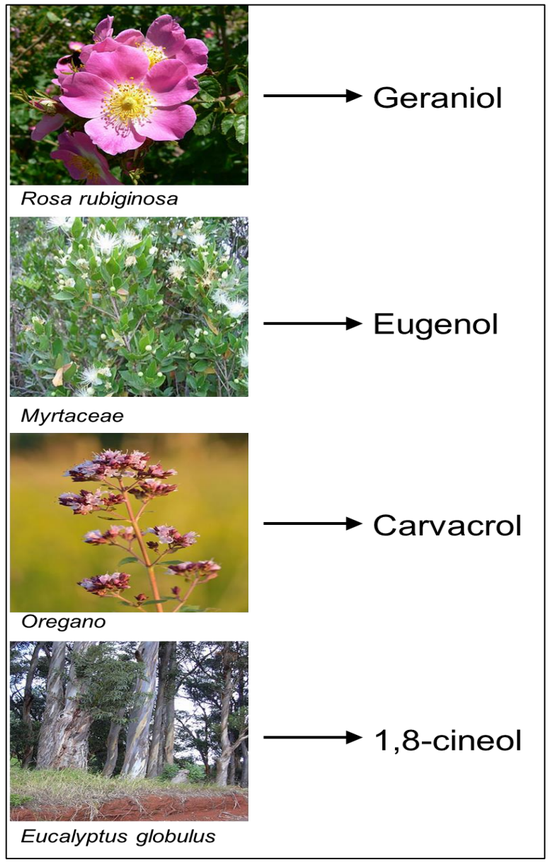
[1]Doherty et al., 2018; [2]Lifschitz et al., 2018; [3]Van Mol et al., WAAVP conference, Madison WI, 2019

ALTERNATIVE NATURAL COMPOUNDS WITH ACARICIDAL ACTIVITY

METHODS



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[1]Fichi et al. 2007; [2]Fang et al., 2016; [3]Guillot, 1981; [4]Draize et al., 1994

CONTACT ASSAY
MATERIALS AND METHODS

0.16% - 5%

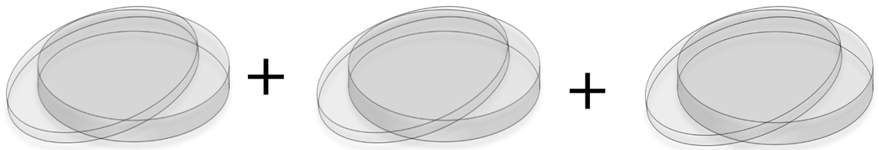
Paraffin oil
(mineral oil)

Essential oils
(Geraniol, Eugenol,
Carvacrol, 1,8-cineol)

10 adult mites/
Petri dish

+

20 µL/ Petri dish



1 2 3

1, 2, 4, 6, 8,10, 12, and 24 h

30 ± 1℃, 55 ± 5% RH

* Dead = lack of reaction to stimulus or persistent immobility in one minute

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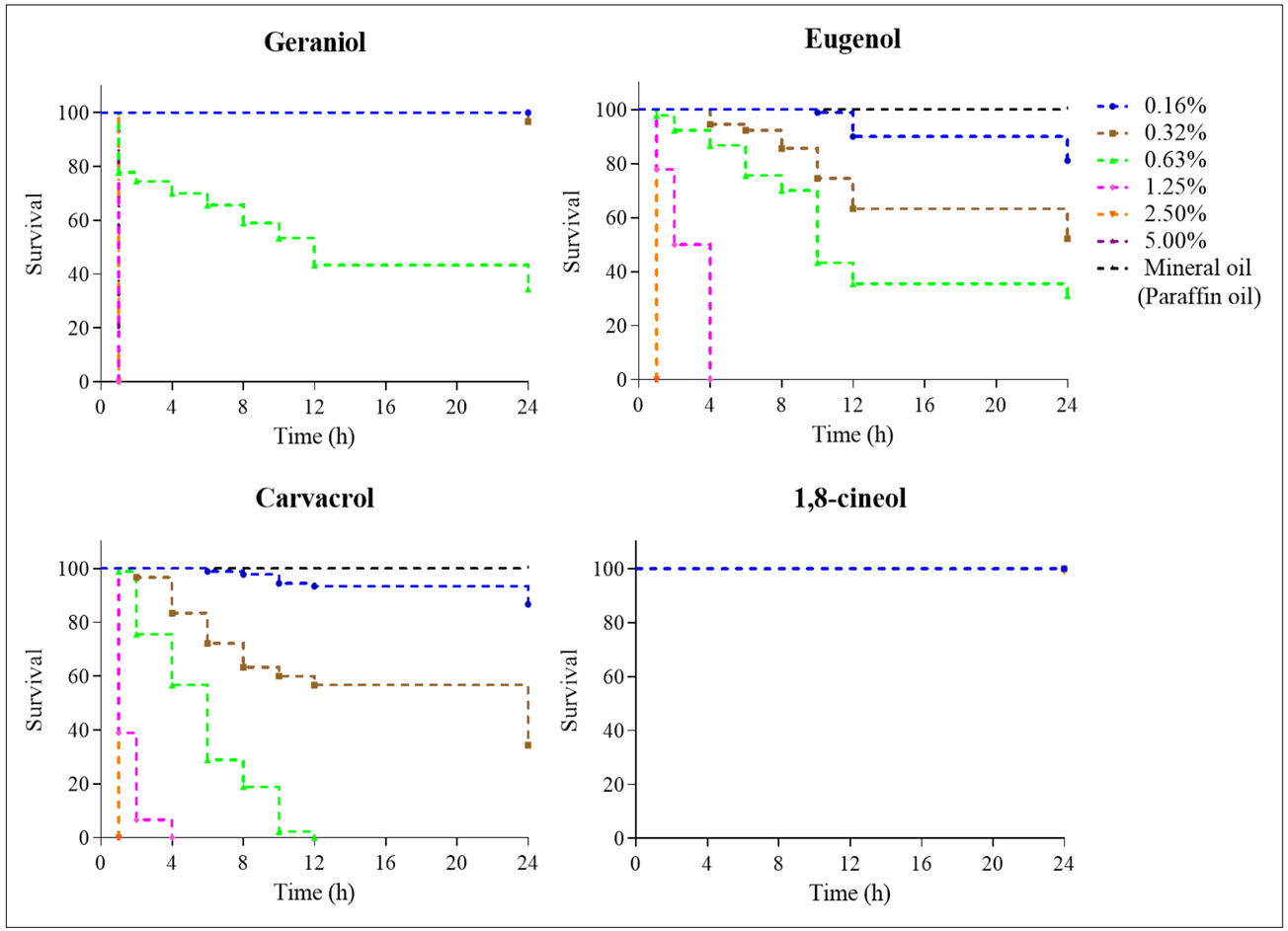
CONTACT ASSAY RESULTS



- Geraniol, eugenol and carvacrol showed concentration-dependent acaricidal activity.
- 1,8-cineol had no effect on mites in a contact assay.
- Paraffin oil or mineral oil had no effect on mites in a contact assay (negative controls).

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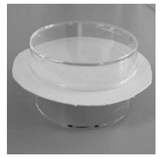
FUMIGATION ASSAY
MATERIALS AND METHODS

10 adult mites/
Petri dish

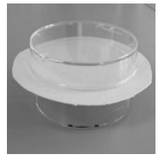


1

+

2

+



3

15 µL/ Petri dish
Pure compound

Essential oils
(Geraniol, Eugenol,
Carvacrol, 1,8-cineol)

Every 10 min until 150 min

30 ± 1°C, 55 ± 5% RH

* Dead = lack of reaction to stimulus or persistent immobility in one minute

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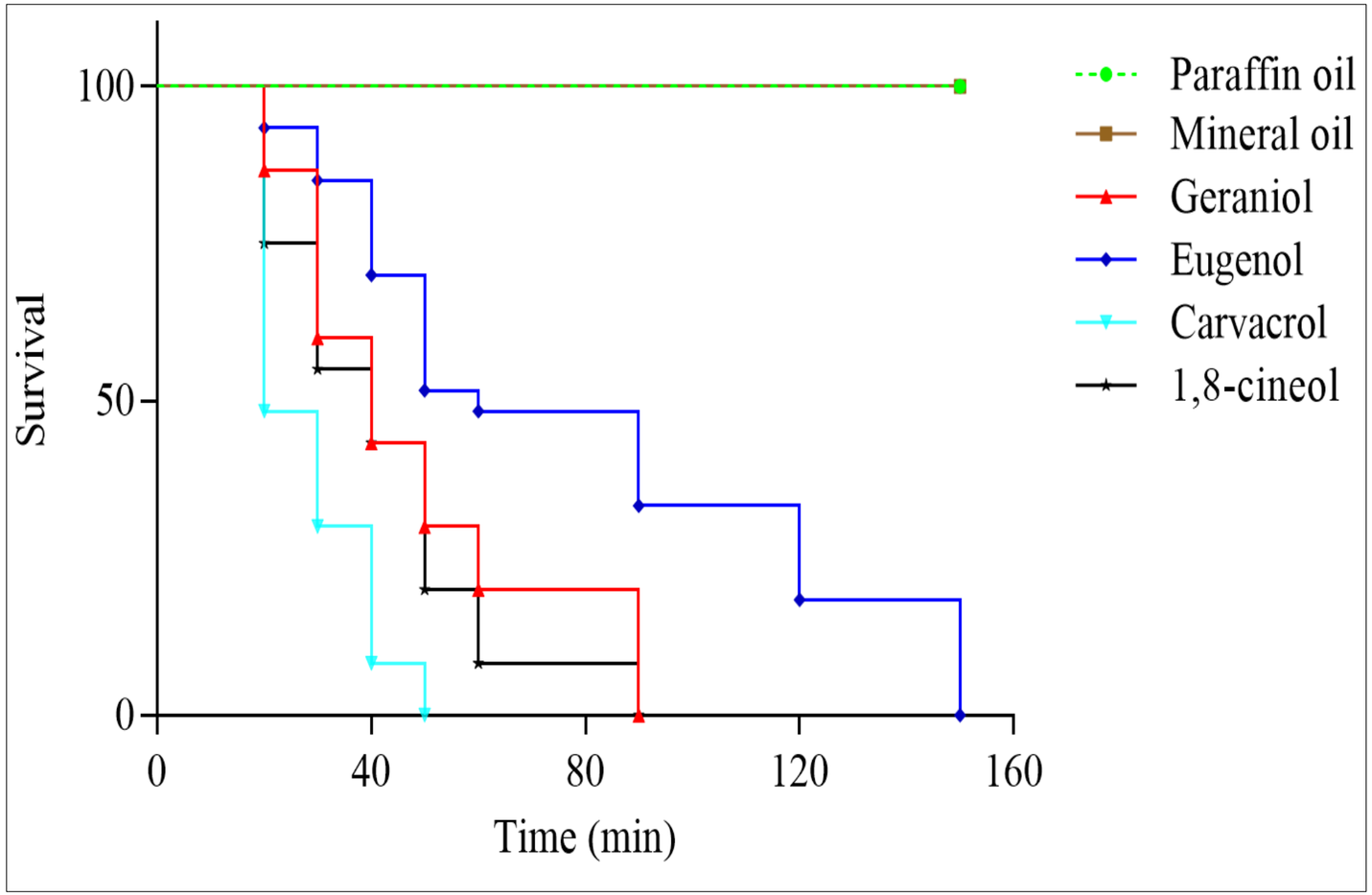
FUMIGATION ASSAY RESULTS



- Carvacrol killed all mites within 50 min.
- Geraniol, 1,8-cineol and eugenol needed 90 min, 90 min and 150 min, respectively.
- Paraffin oil or mineral oil had no effect on mites in a fumigation assay.

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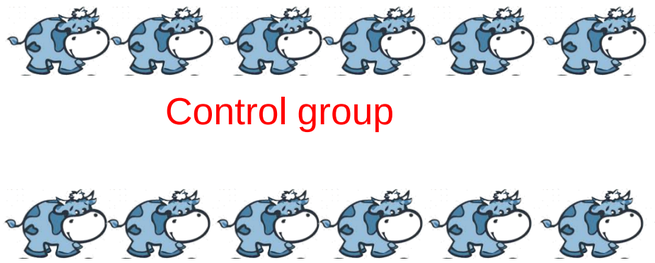
IN VIVO ACARICIDAL EFFICACY OF NATURAL COMPOUND



Control group

Treatment group

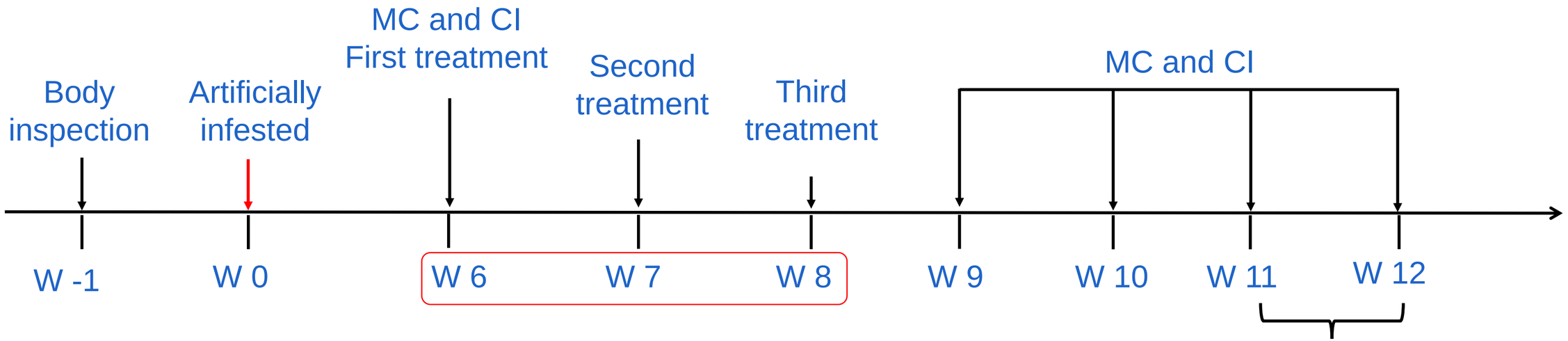
Belgian Blue calves
(4-12 months old)

+

400 *P. ovis* mites
(nymphs and adults)

2% Tween-80
(spray 0.4ml/cm^2 of lesion)

2% carvacrol in 2% Tween-80
(spray 0.4ml/cm^2 of lesion)



MC: Mite Counts
CI : Clinical Index

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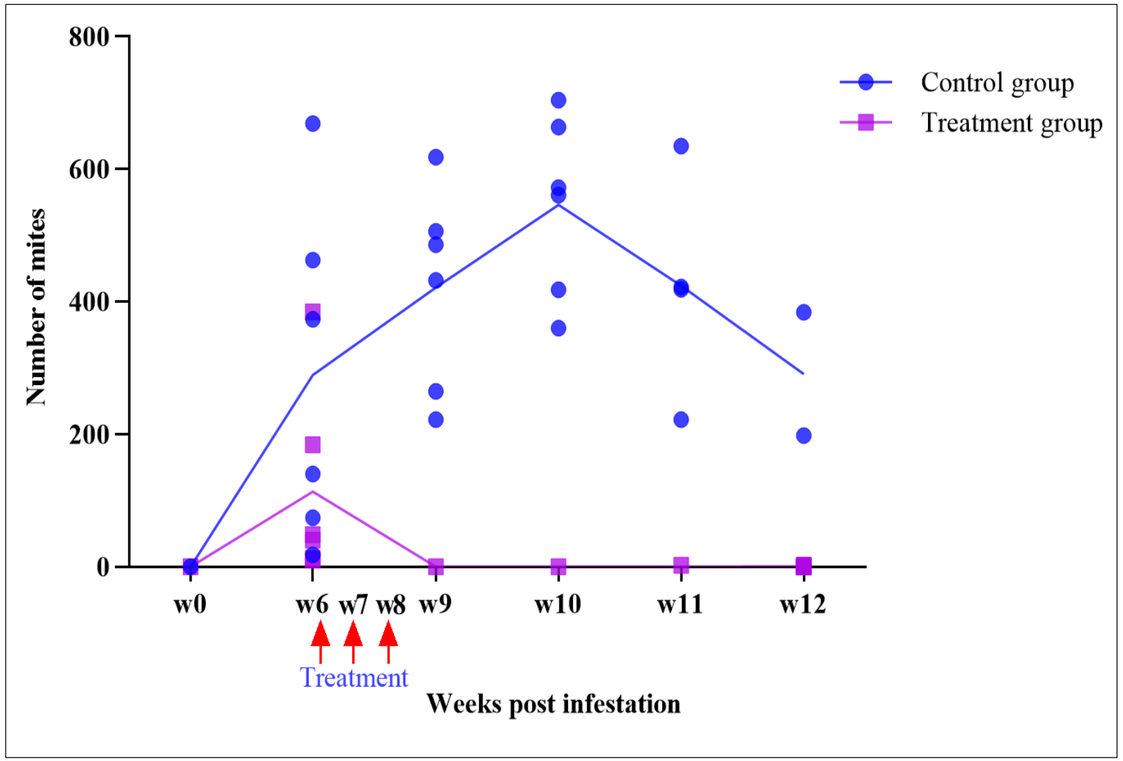
IN VIVO ACARICIDAL EFFICACY OF NATURAL COMPOUND

MITE COUNTS



- Control group: mite population increased with similar kinetics as typical experimental infestation.
- Treatment group: mite counts were reduced 98.5 % at 6 weeks post treatment.

* According to WAAVP guidelines[1], on week 11, some of control group animals were treated topically with amitraz.

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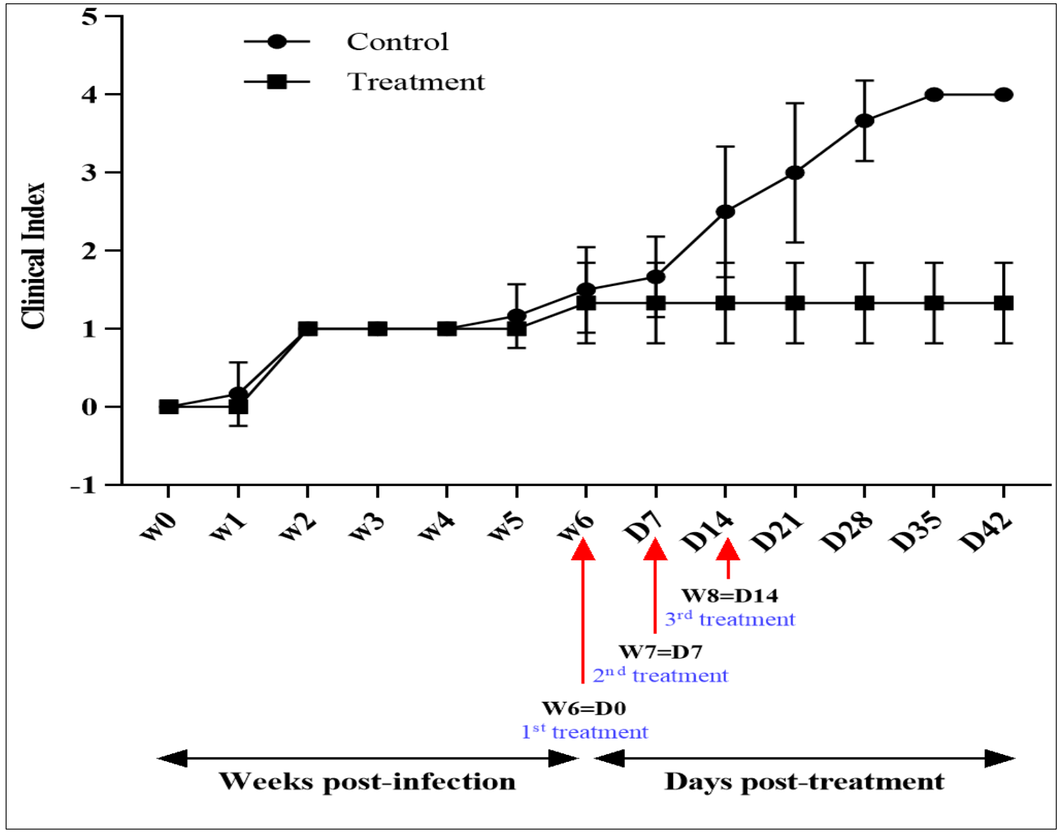
[1] Vercruysse, J., et al., 2006

IN VIVO ACARICIDAL EFFICACY OF NATURAL COMPOUND CLINICAL INDEX



- Control group: the active lesions increased during the whole trial.
- Treatment group: although the lesions did not decrease, the lesion appearance changed from active to healing lesions or healed skin.

* According to WAAVP guidelines[1], on week 11, some of the control group animals were treated topically with amitraz.

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[1] Vercruysse, J., et al., 2006

IN VIVO ACARICIDAL EFFICACY OF NATURAL COMPOUND

CLINICAL INDEX

6 weeks post infestation

6 weeks post treatment

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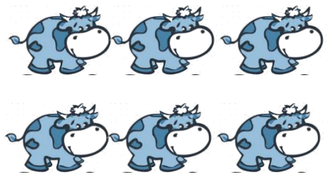
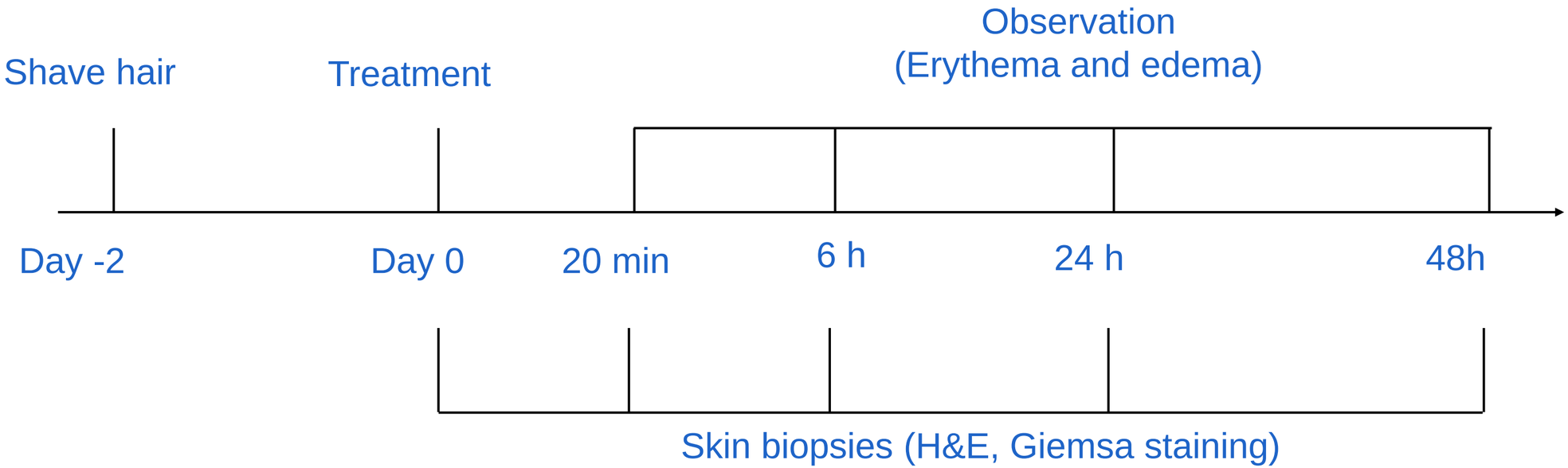
IN VIVO SKIN IRRITATION OF NATURAL COMPOUND



Belgian Blue calves
(4-12 months old)

Control (left side thigh) + 2% Tween-80
(spray 0.4ml/cm^2 of lesion)

Treatment (right side thigh) + 2% carvacrol in 2% Tween-80
(spray 0.4ml/cm^2 of lesion)



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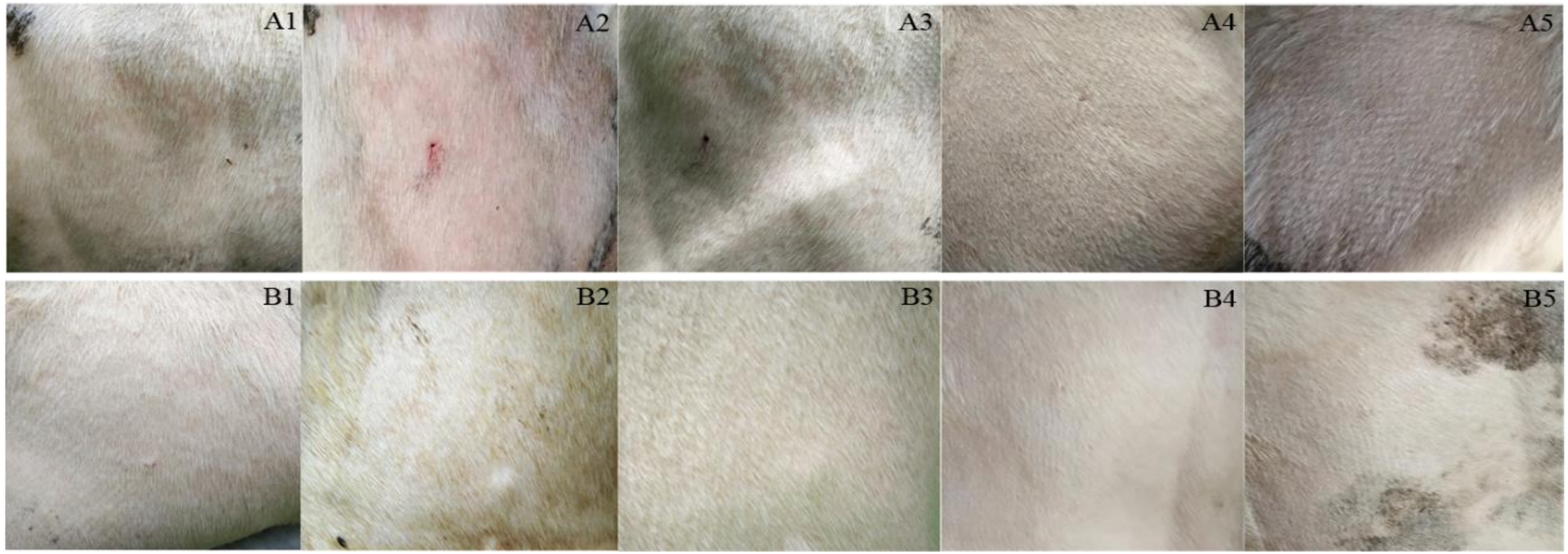
IN VIVO SKIN IRRITATION OF NATURAL COMPOUND

Treatment side

Control side



- Topical application of carvacrol on shaved skin caused mild and transient erythema 20 min after treatment. No other side effects were observed.

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Conclusion

- There is a significant acaricidal activity against *P. ovis* mites of geraniol, eugenol, and carvacrol using contact and fumigation assays *in vitro*, and of 1,8-cineol using a fumigation assay.
- *In vivo*, carvacrol in cattle result in 98.5 % elimination of *P. ovis*, which demonstrates a potential use of carvacrol as acaricidal agent against *P. ovis*.
- Topical treatment of calves with carvacrol only cause mild and transient local side effects, which shows low toxicity activities of carvacrol against *P. ovis*.

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Thank you -Questions?

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