Dimethyl anthranilate based repellents affect cage pecking and feather condition of laying hens

Animal Science Days
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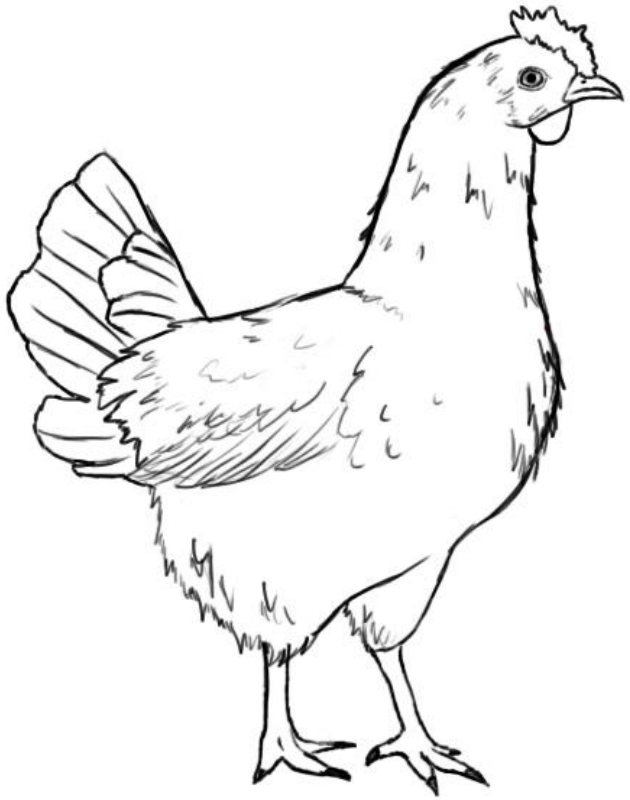


Uroš Šraj[2], Dušan Terčič[1], Dušanka Jordan[1], Mojca Pestotnik[1], Manja Zupan[1]

[1]University of Ljubljana, Biotechnical Faculty
[2]University of Maribor, Faculty of Agriculture and Life Sciences

University of Maribor
Faculty of Agriculture and Life Sciences

University of Ljubljana
Biotechnical Faculty

Background

- Feather pecking and cannibalism are two multifactorial problems.
- Beak trimming remains the most effective preventive method; it causes pain in animals.
- A promising method is the use of repellents, lack of studies in commercial flocks.
- Harlander-Matauschek and Rodenburg (2011) found that 2% and 4% quinine solutions were the most repulsive.
- In order to gain a wider acceptance of this approach, other non-toxic substances that could replace quinine have to be tested.

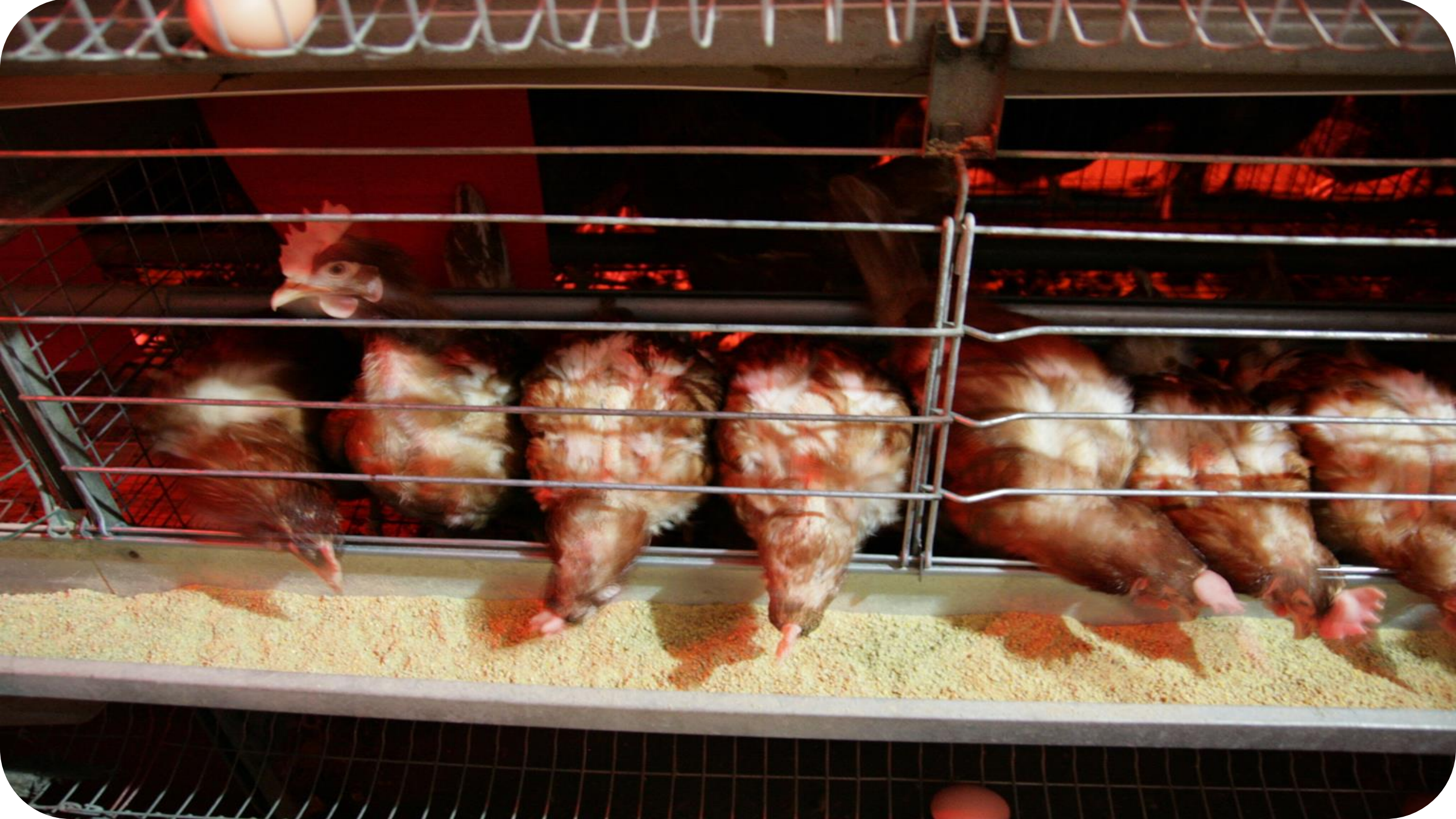
Aim and hypothesis

- We used dimethyl anthranilate (DA) based repellents in this study.
- DA is used as a flavoring agent in the human food industry, but has been demonstrated to be aversive to numerous species of birds, e.g. starlings, quail, pigeons, jungle fowl etc. (Kare, 1971).
- The aim of this study was to evaluate possible benefits of the repellents on hens' welfare.
- **Our hypothesis was that the repellents' aversive properties are going to reduce feather pecking and consequently feather damage.**

Materials and methods

- Total of 180 non beak trimmed laying hens of Slovenian layer hybrid Prelux-R (brown).
- Reared in deep litter system, transferred to Facco‘s enriched cages at 18 weeks of age.
- 15 hours of light, 9 hours of dark. Feed and water available *ad libitum*.

empty	10 hens	10 hens	empty	10 hens	10 hens	empty	10 hens	10 hens	empty
empty	10 hens	10 hens	empty	10 hens	10 hens	empty	10 hens	10 hens	empty
empty	10 hens	10 hens	empty	10 hens	10 hens	empty	10 hens	10 hens	empty



Application of repellents

- Every 14 days from 20th week onward

Total volume	Repellent P	Control group	Repellent T
300 ml	**dimethyl anthranilate = 2.34 ml** methyl phenylacetate = 37.5 ml propylene glycol= 260.1 ml (Kare, 1961)	Distilled water = 300 ml	**dimethyl anthranilate = 13.5 ml** geraniol = 1.5 ml polysorbate 80 (a.k.a. Tween 80) = 15.0 ml distilled water = 270 ml (Kare, 1961)

Cage structure layout

Repellent P **Control group** **Repellent T**



empty	10 hens	10 hens	empty	10 hens	10 hens	empty	10 hens	10 hens	empty
empty	10 hens	10 hens	empty	10 hens	10 hens	empty	10 hens	10 hens	empty
empty	10 hens	10 hens	empty	10 hens	10 hens	empty	10 hens	10 hens	empty

Application of the repellents

Weighing of the hens

Data collection

Feather scoring and weighing

- Six body parts (back, wings, tail, vent/cloaca, neck and breast)
- Scores from 1 to 4 (Tauson et al., 2005)

Study timeline

- Feather score
- Weighing of the hens

- Feather score
- Weighing of the hens
- Behavioural observations

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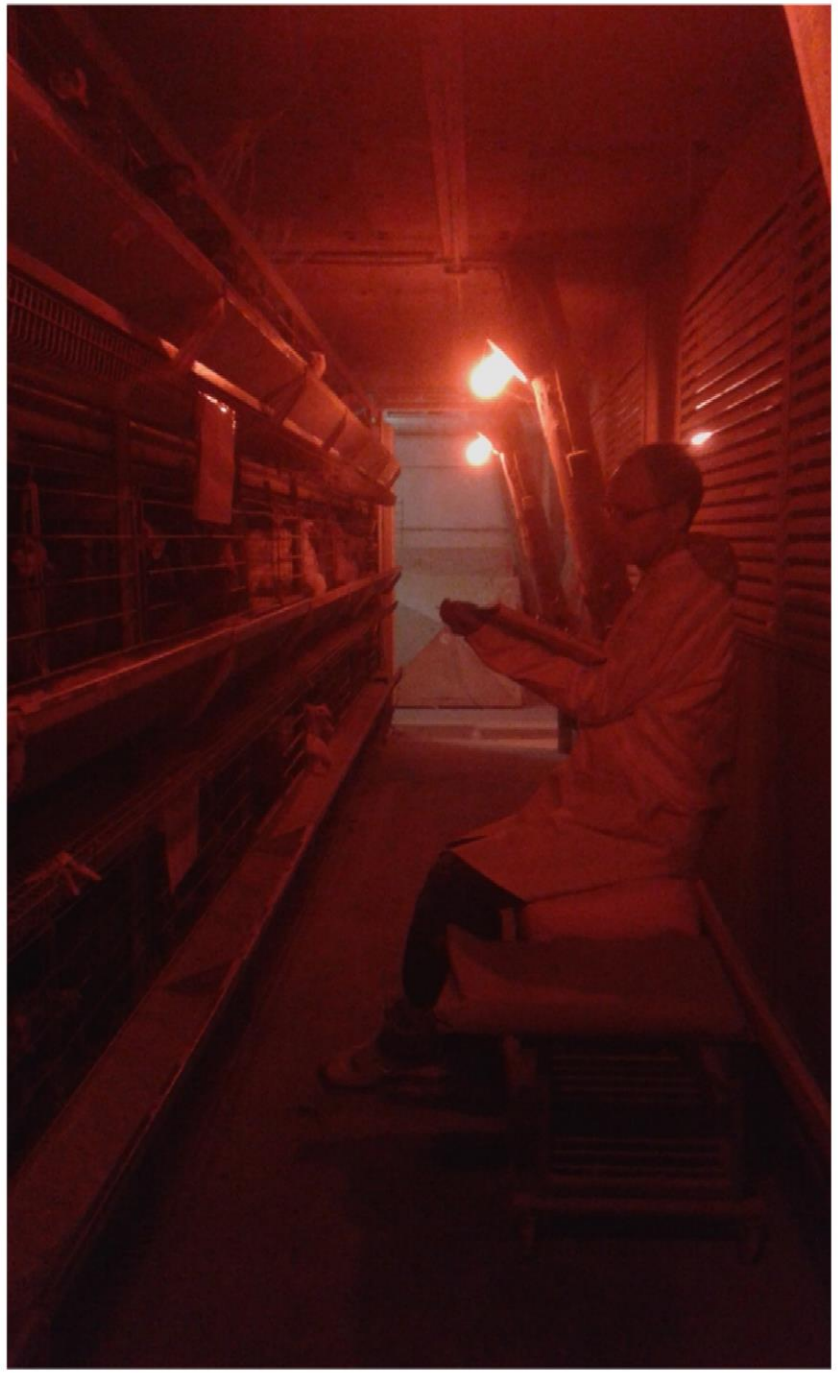
Each observation period lasted 14 days:

- Day 0: feather score, weighing of the hens
- Day 1: application of the repellents
- Day 2: behavioural observations
- Day 8: behavioural observations
- Day 14: behavioural observations

Behavioural observations

- A total of 27 hours of live behavioural observations so far
- Randomized order of cages
- Scan sampling (feeding) and focal sampling (drinking, pecking to the head, feather pecking, feather peck, preening, comfort behaviour, cage pecking and air pecking)
- One-zero recording for each 15s interval



Ethogram

Behaviour	Definition
Feeding	Feed pecking
Drinking	Pecking of the drinking nipples or the trough under the nipples
Pecking to the head	Pecking to the head of another bird except of pecking another’s beak
Feather pecking	Peking of another bird's feathers. At least 2 pecks in the same bout
Feather peck	Peck of another bird's feathers that happens exactly once in the same bout
Preening	Preening its own feathers
Comfort behaviour	Shaking of the whole body with feathers on the whole body getting bristled
Cage pecking	Pecking of any object in the cage except of the feed trough
Air pecking	Pecking that is not directed at any object or pecking of the dust in the air

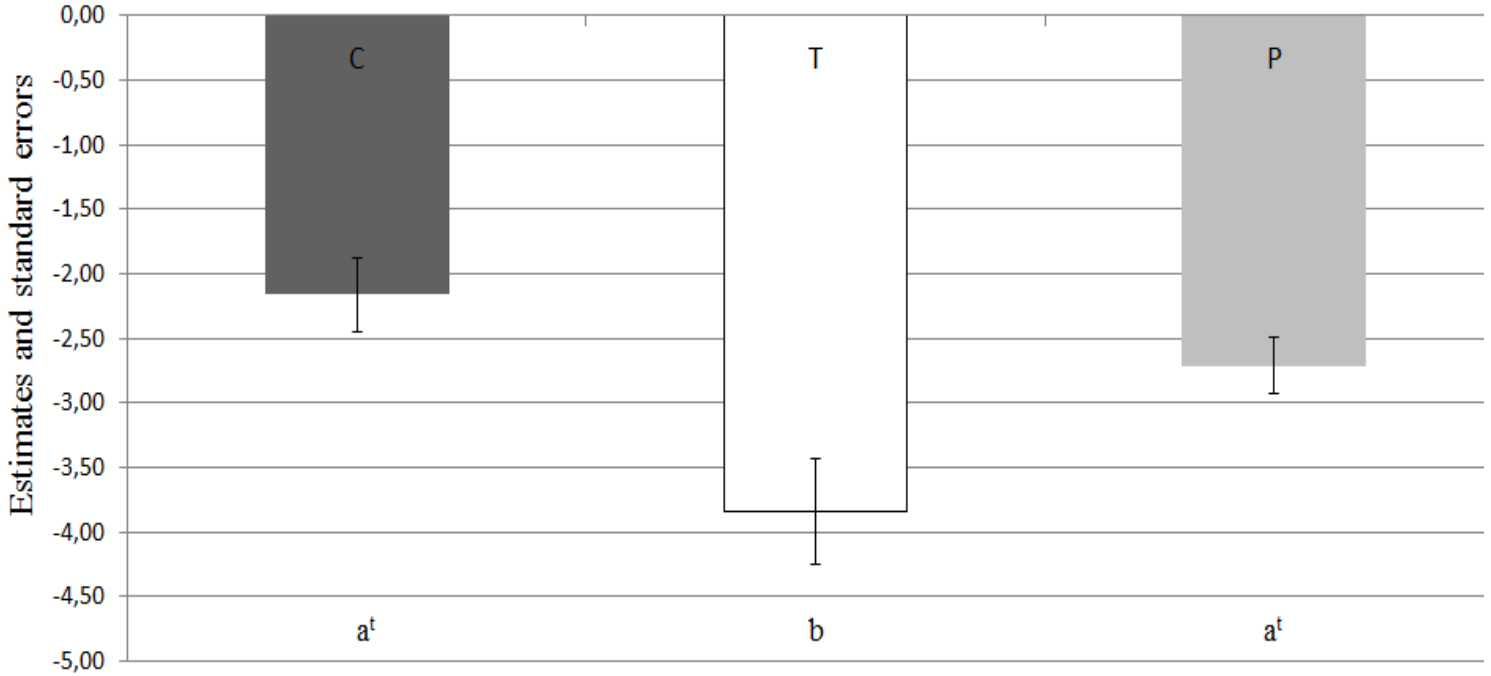
Results and discussion

- Repellents **had a significant effect** on:
  - Cage pecking
  - Feather condition
- **No effect** on:
  - Feather pecking

Cage pecking

- C - control
- P - repellent P
- T - repellent T

- [a,b] a significant difference of $p<0.05$. [t] a tendency towards significance of $p<0.10$.



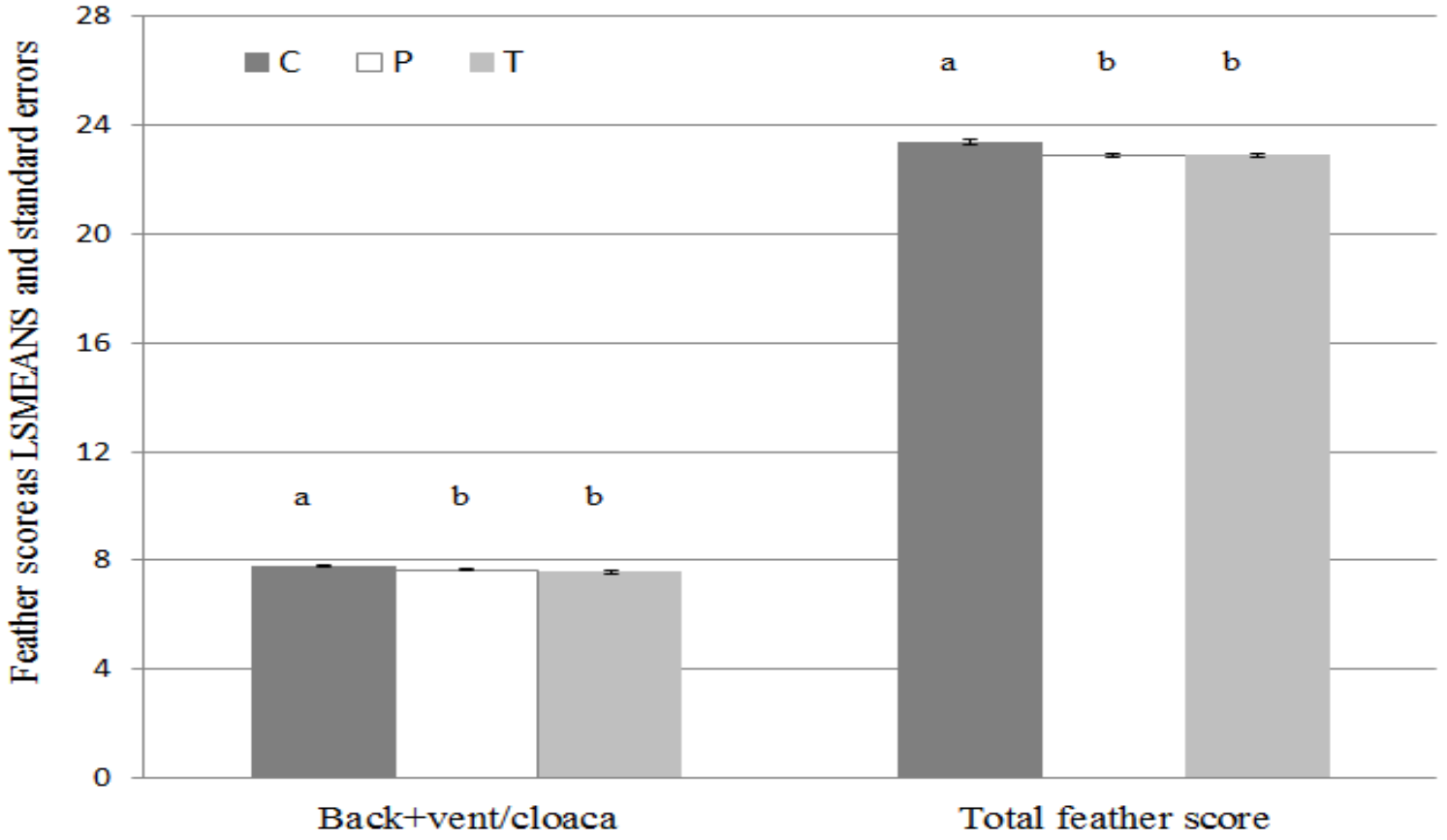
The data residuals for behaviour variables did not follow a normal distribution (UNIVARIATE procedure) so a non-parametric Generalized Linear Model procedure (proc GENMOD) was utilized taking into account the Binomial distribution.

- **Significantly more cage pecking in the control group than in group T**

aversive taste of repellents repellents stick to the cages

Feather condition

- C – control
- P - repellent P
- T - repellent T
- [a,b] a significant difference of $p<0.05$.



Proc GLM using Gaussian distribution

- **Feather score significantly better in the control group**

pecking behaviour directed mostly toward the environment and not to the cage mates

Conclusions

In the five months of the study dimethyl anthranilate based repellents did:

1) **NOT have a positive impact on feather pecking**,

2) **have a negative effect on feather score**,

3) **decreased incidence of cage pecking**.

Acknowledgement

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DoPiP

Thank you for your attention!