

# Long term consumption of thiamethoxam coated seeds causes multilevel effects to the passerine *Agelaioides badius*

Poliserpi, M. B.<sup>1</sup>; Fernandez-Vizcaíno<sup>2</sup>, E.; Ruiz de Arcaute, C.<sup>3,4</sup>; Soloneski, S.<sup>3,4</sup>; Brodeur, J.C<sup>1,4</sup>.

<sup>1</sup>Instituto de Recursos Biológicos, Centro de Investigaciones de Recursos Naturales (CIRN). Instituto Nacional de Tecnología Agropecuaria (INTA); <sup>2</sup>Instituto de Investigación en Recursos Cinegéticos (IREC) CSIC-UCLM; <sup>3</sup>Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), <sup>4</sup>Universidad Nacional de la Plata

[poliserpi.maria@inta.gob.ar](mailto:poliserpi.maria@inta.gob.ar)



UNIVERSIDAD  
NACIONAL  
DE LA PLATA



# Birds and pesticide treated seeds

- Pesticides and fertilizer use, is the one of the main pressure for most farmland bird population declines.
- **Pesticide treated seeds:** common practice in agriculture (maize, soybean, sunflower, wheat, etc.)
- Birds directly exposed to treated seeds during sowing.



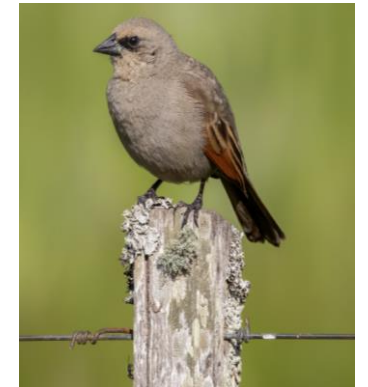
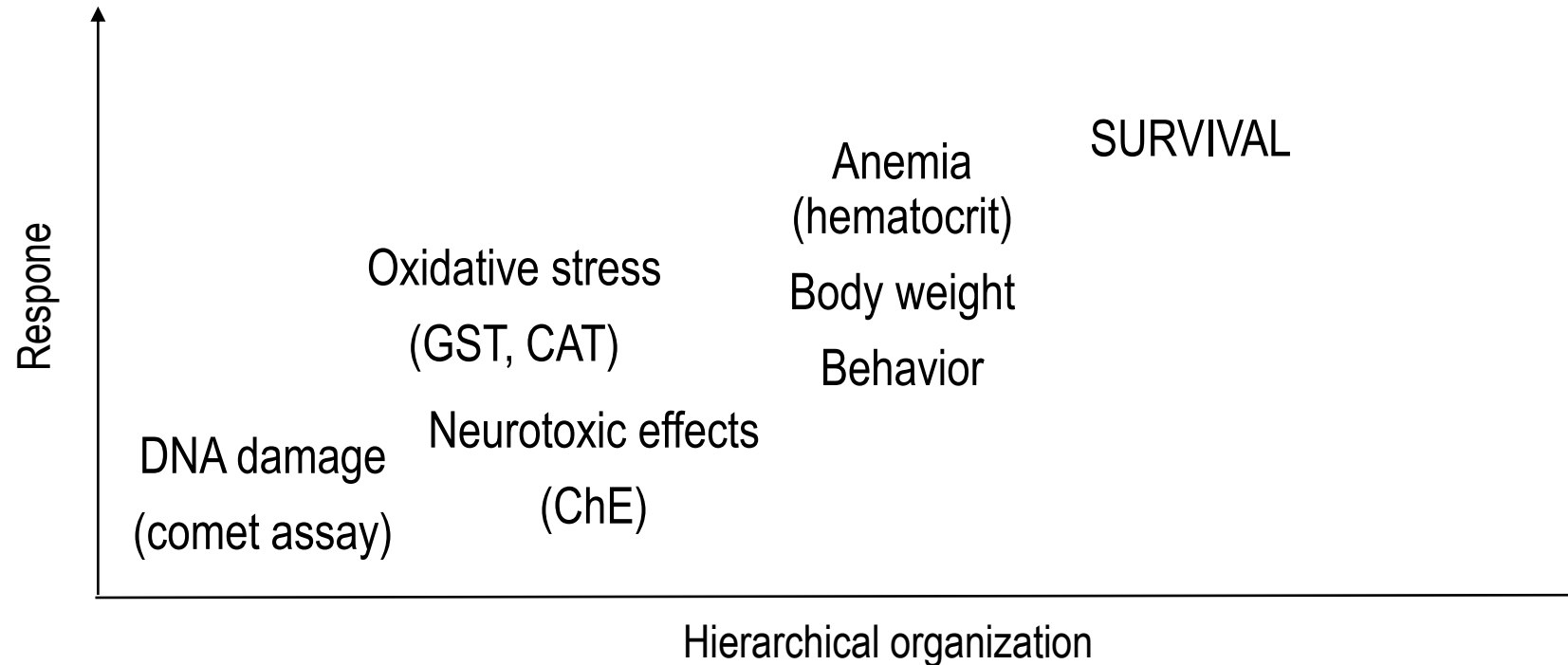
# Neonicotinoid treated seeds

- **Neonicotinoids insecticides** used in seed treatment: thiametoxam (TMX), clothianidin and imidacloprid.
- **Neurotoxic effects.**
- Effects on non- target species: pollinators and birds (imidacloprid).
- **TMX: low acute toxicity to birds** (LD50 : 576-4366 mg TMX/ kg bw)
- TMX is the precursor of the clothianidin



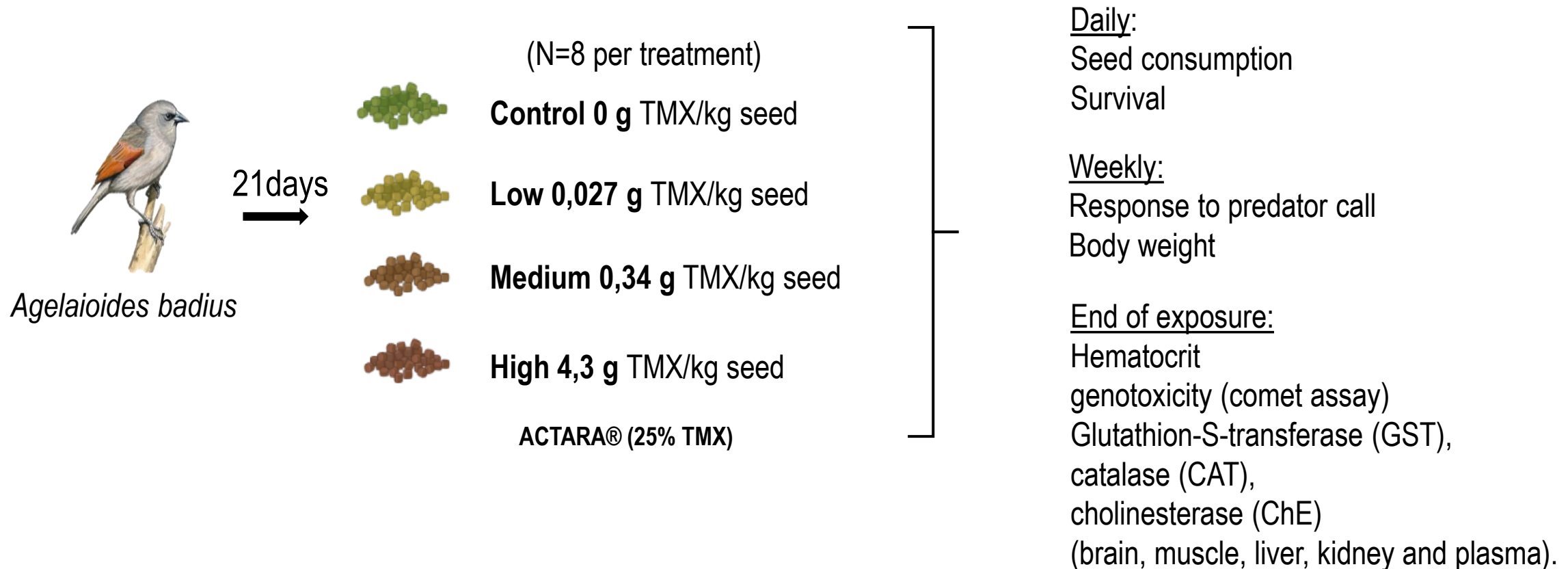
# Objective

Characterize the sublethal effects of TMX in the passerine grayish baywing (*Agelaioides badius*) after long-term exposure to TMX-treated seeds, by evaluating the effect on multilevel parameters.

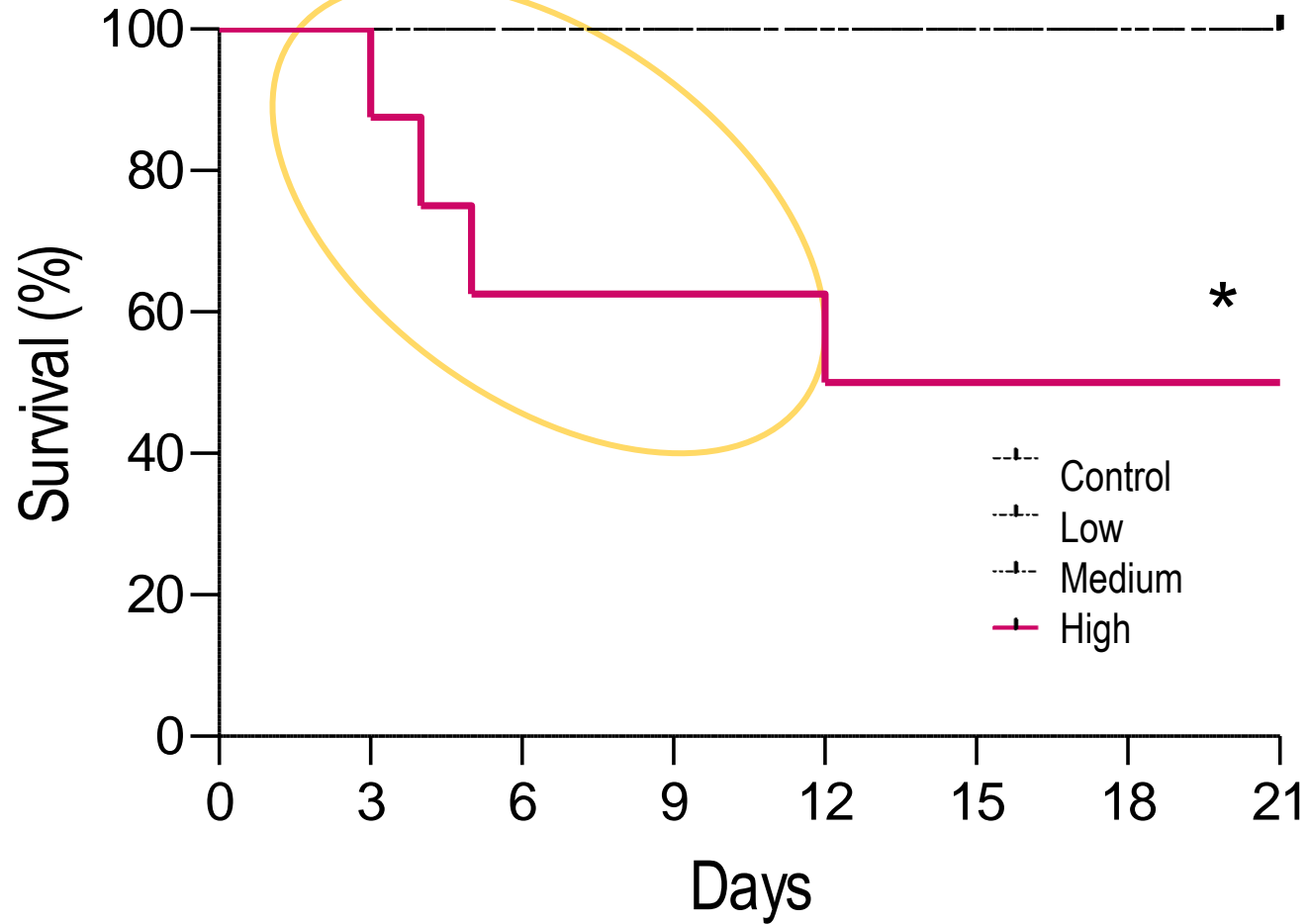


# Methodology

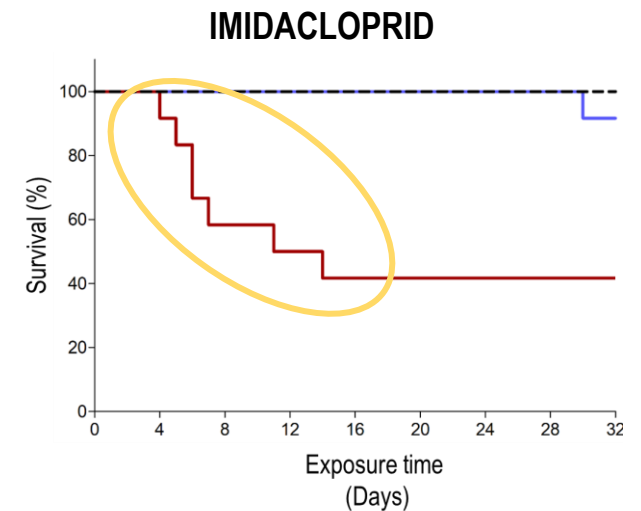
- Common application rates: **0,35 to 3 g TMX/ kg seed**
- Exposure time → sowing season of 1 to 2 months
- Grayish baywing (*Agelaioides badius*) as an avian model for environmental toxicity testing.



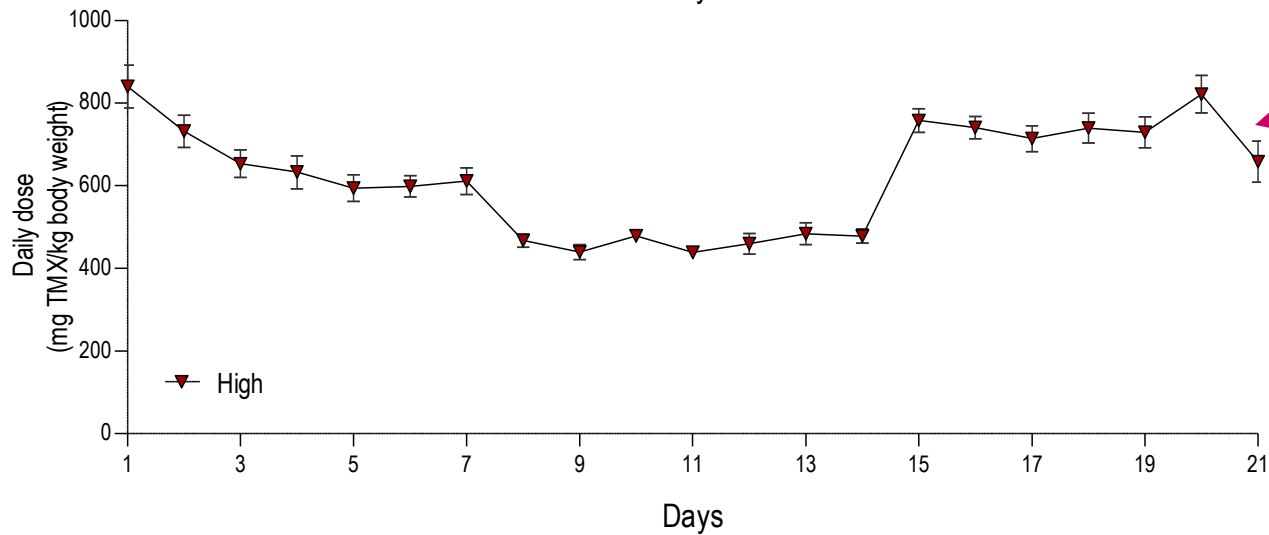
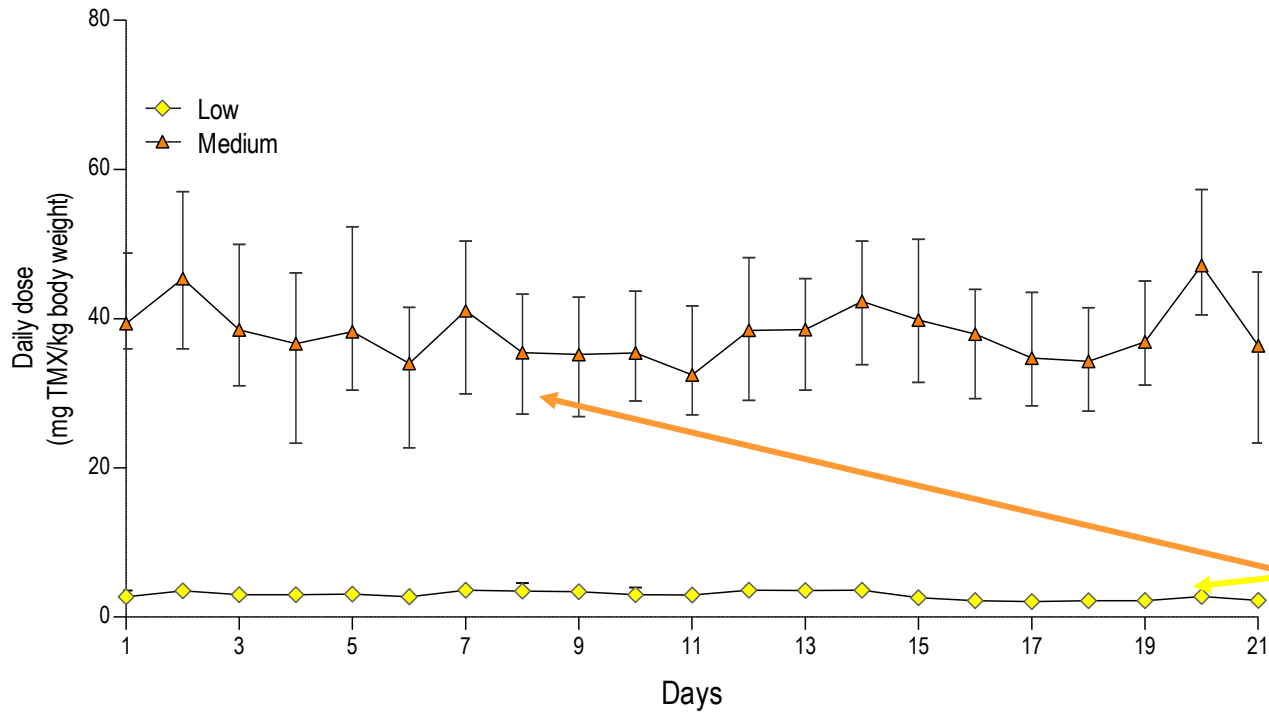
# Survival



- 50% mortality in High treatment.
- Average daily dose: 748 mg TMX/kg bw
- Mortality between 3 to 12 days, similar to imidacloprid



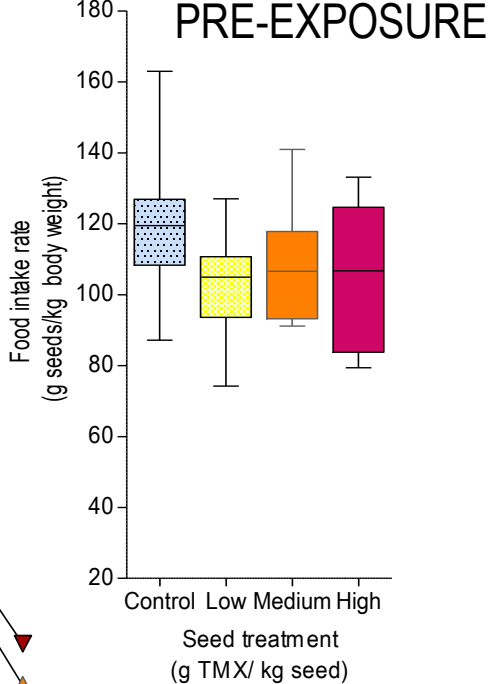
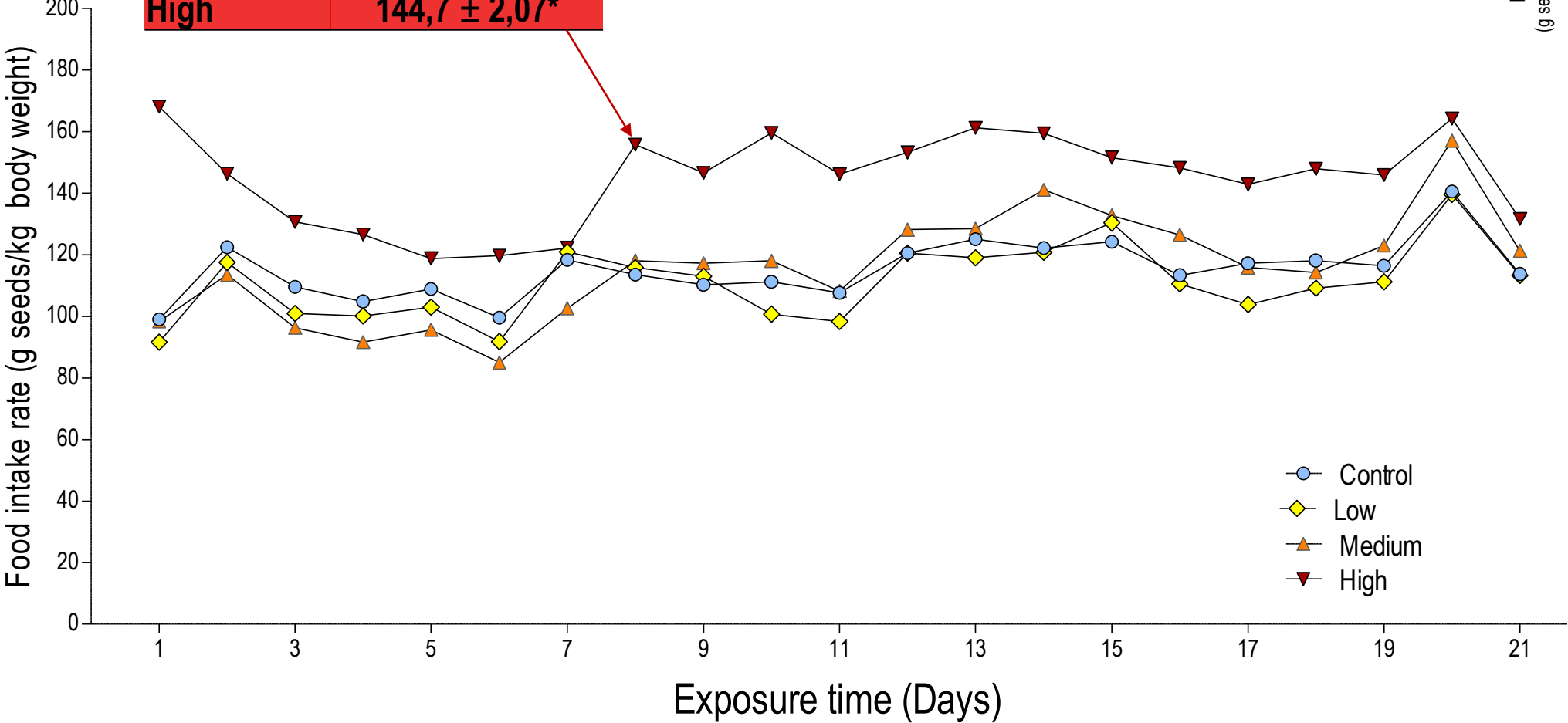
# Daily dose (mg TMX/kg body weight)



Treatment	Mean (mg TMX/ kg bw)
Low	2,94 ± 0,05 <sup>a</sup>
Medium	38,01 ± 0,54 <sup>b</sup>
High	619,7 ± 15,3 <sup>c</sup>

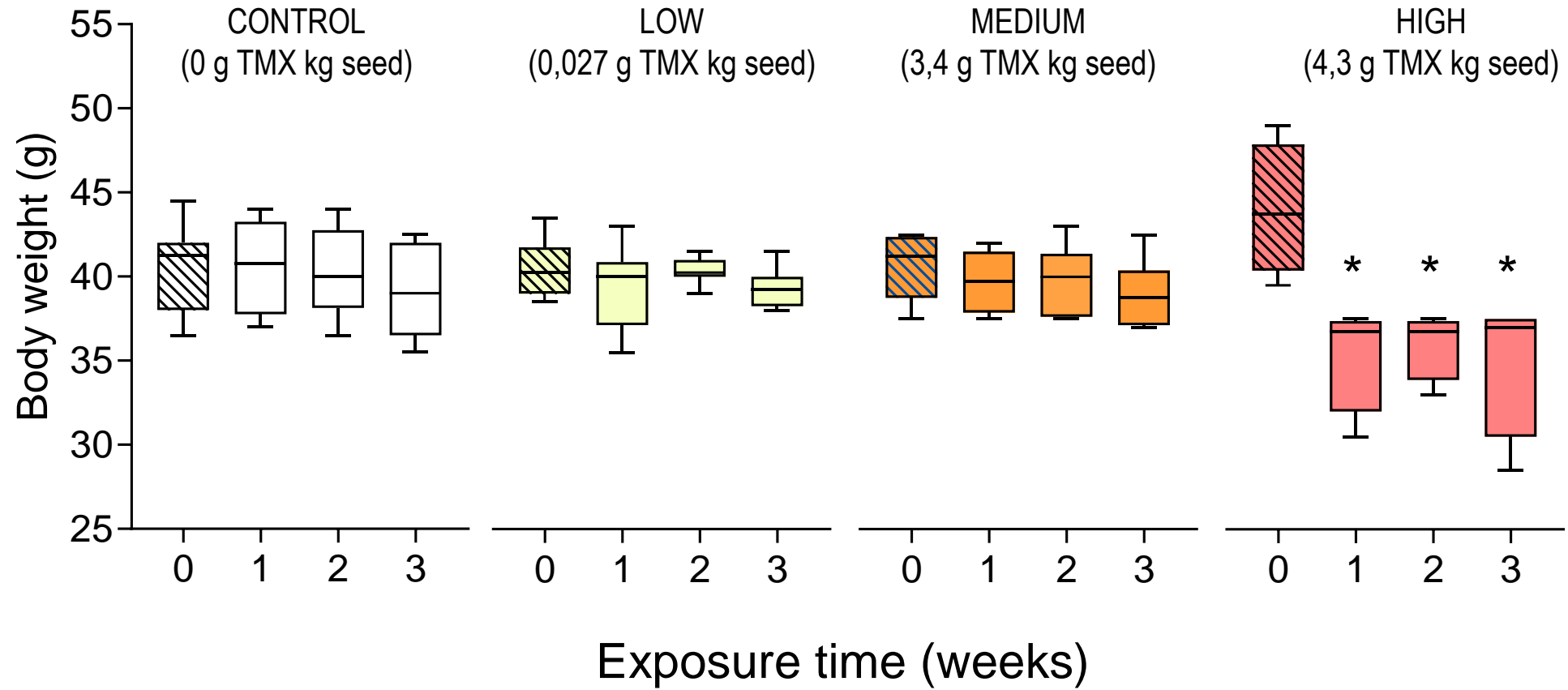
# Food intake rate (g seeds/kg body weight)

Treatment	Mean $\pm$ S.E
Control	115,0 $\pm$ 1,65
Low	111,0 $\pm$ 1,30
Medium	115,8 $\pm$ 1,90
High	144,7 $\pm$ 2,07*

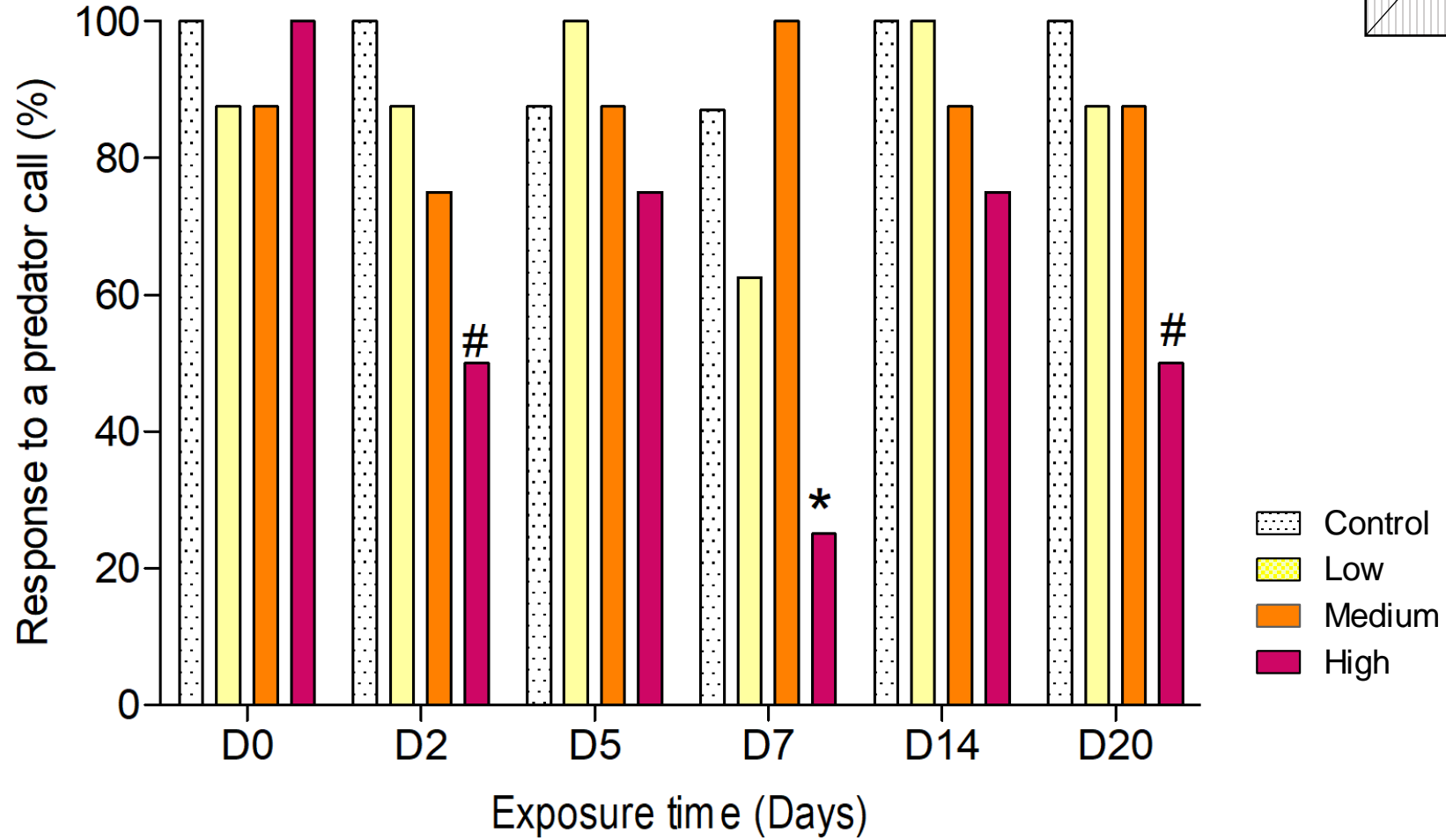
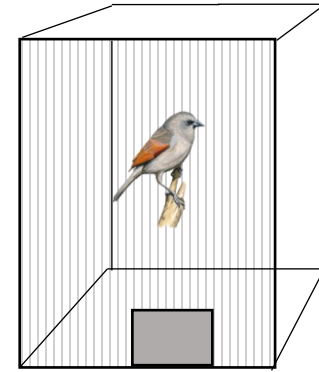




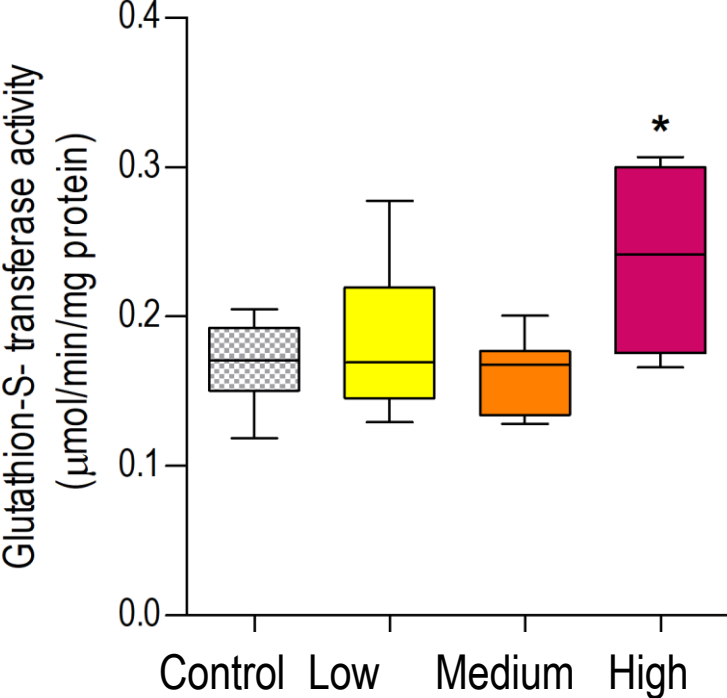
# Body weight



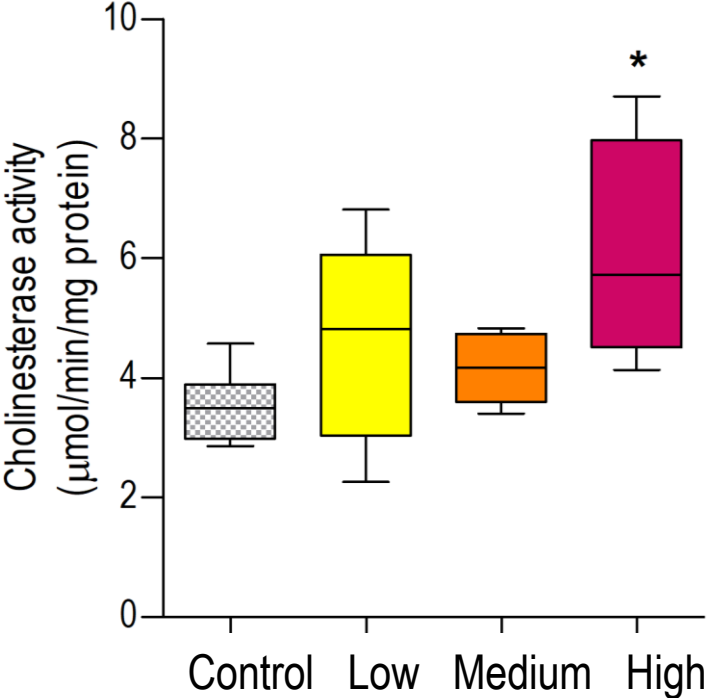
# Response to a predator call



# Enzymatic activity: MUSCLE

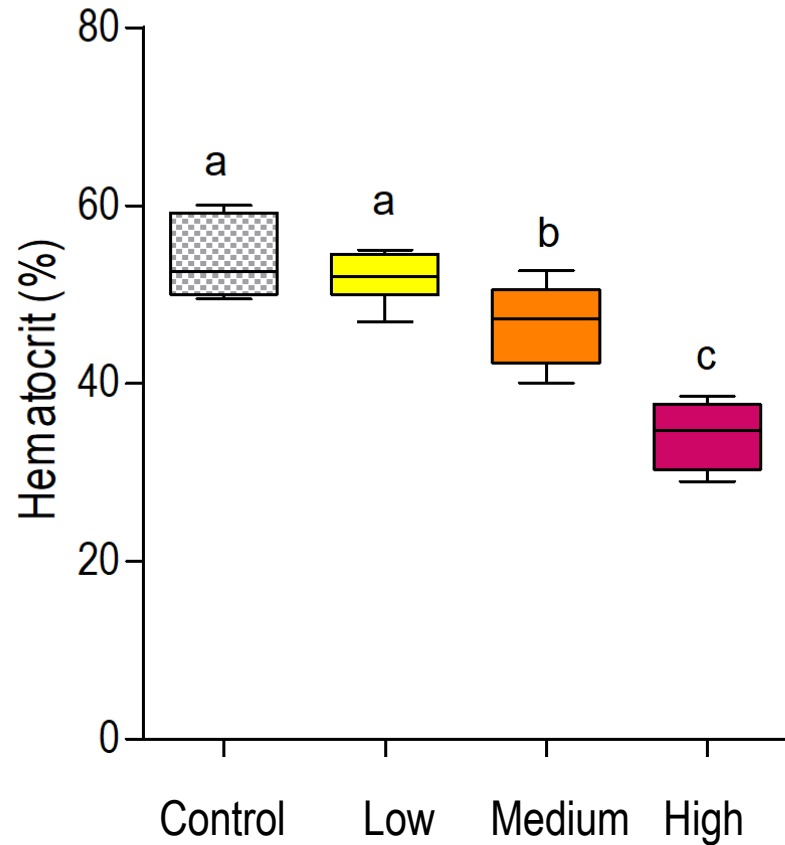


Oxidative stress and biotransformation



Neurotoxic effects

# Hematology and genotoxicity



- Genetic damage in birds exposed to TMX ( $p < 0,05$ ).
- Significant enhancement of the genetic damage in Medium and High treatment birds.

## 8.P-Tu-092

Thiamethoxam Induces Oxidative Damage in DNA Pyrimidine Bases in *Agelaioides badius* (Passeriformes, Icteridae) Evaluated by the Comet Assay

Ruiz de Arcaute, Poliserpi, Fernandez-Vizcaino, Laborde, Brodeur, Soloneski



# Final Remarks

- TMX higher application rates for seed treatment are lethal for the grayish baywing.
- Metabolic effect of TMX.
- LOAEL 38 mg TMX/kg bw (genetic damage, anemia).
- Multilevel effects of TMX can translate into effects on bird survival and bird populations in the wild.



Thank you!  
Gracias!  
Obrigada!

---

[poliserpi.maria@inta.gob.ar](mailto:poliserpi.maria@inta.gob.ar)

