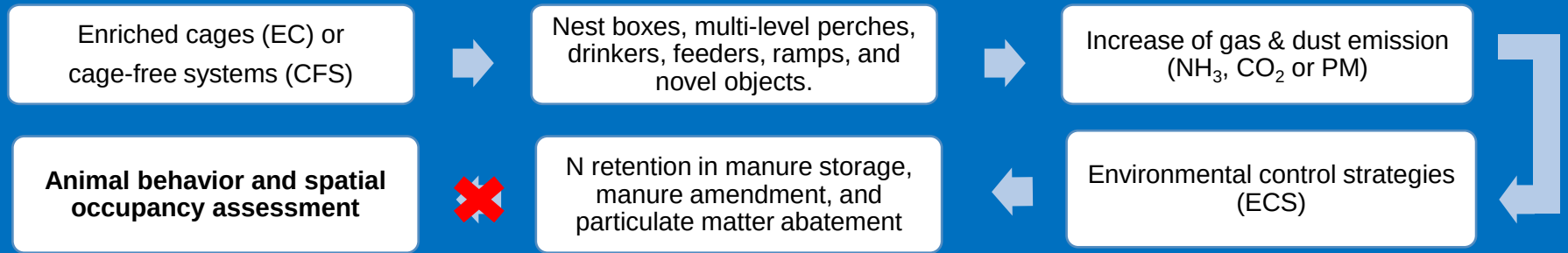
# Assessing Environmental Control Strategies in Cage-Free Egg Production Systems: Effect on Spatial Occupancy and Natural Behaviors

Authors: **Andrés F. Gonzalez Mora**, Araceli D. Larios, Alain N. Rousseau, Stéphane Godbout, Cédric Morin, Joahnn H. Palacios, Michèle Grenier and Sébastien Fournel

Animals 2021, 11(1), 17; https://doi.org/10.3390/ani11010017

## Motivation of the work

The poultry industry have experimented a continuously modifications focusing on housing design, within alternative methods to rearing hen in friendly environments ensuring animal welfare and international market demands.




## Aim of the study

The study aims to evaluate the effect of four selected Environmental Control Strategies (ECS), *i.e.*, decrease of litter surface area (T17); use of heated floor (HFOS), and litter amendment with biochar material (AOS) both combined with established oil sprinkling periods; as well as one single oil sprinkling treatment (OS), on spatial occupancy (SO) and laying hen behavior (LHB), using video recordings and statistical analysis.

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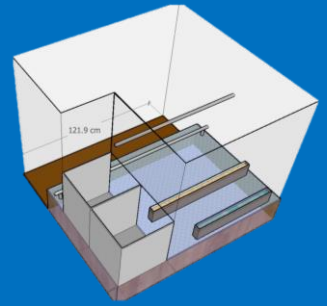
## Methodology

Twelve bench-scale rooms (BSR) were used to shelter 144 laying hens for 19 weeks. SO and LHB were analyzed by two trained observers following a protocol. Six (6) areas inside the BSR and ten (10) hen behaviors were selected for SO and LHB observations. SO was assessed by relative frequency, and LHB were calculate by summarizing the number of hens doing a specific behavior divided by the number of BSRs undergoing the same treatment.



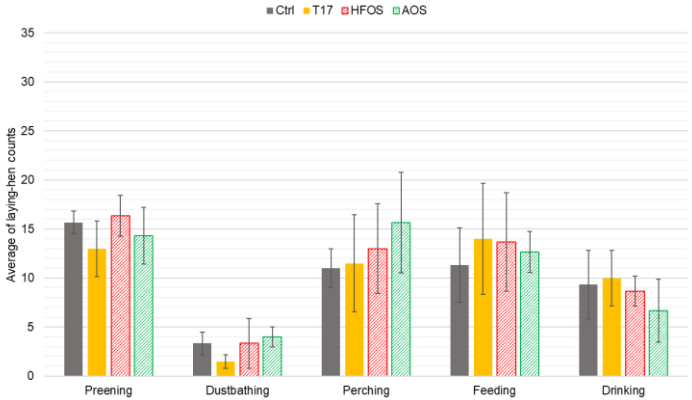

$$SO|j\ (\%) = (NHi/TNH)\ x\ 100$$

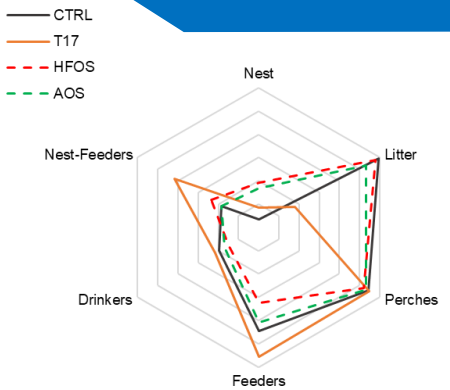
Nhi = number of hens observed in the *i*-th section per day
TNH = Total number of hens observed on the same day

## Results & discussion

The litter, perch and feeder areas were the areas with high relative frequencies. However, the hens spent less time on litter in the T17 treatment.

Natural and species-specific animal behaviors were observed for all treatments.



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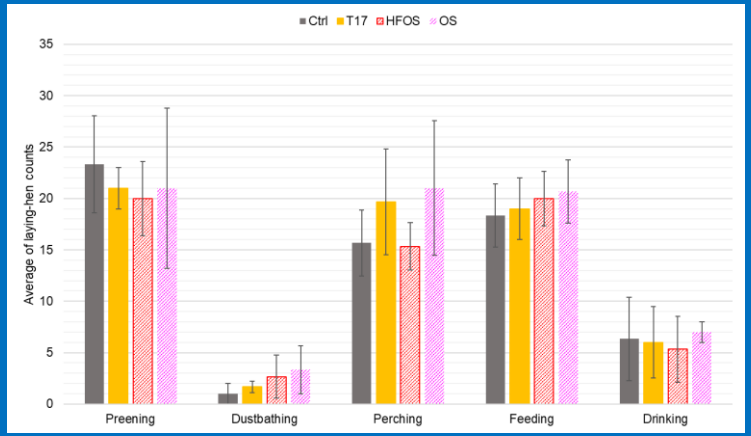
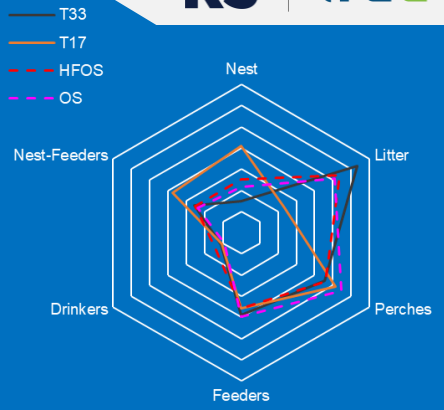
## Results & discussion

There was high flock activity and higher odds of feeder and nest-feeder preference, observed in the T17 treatment, result of motivational conflicts in the flock.

There was not any significant effect linked to the four ECSs in any of the nine laying hen behaviors.




## Conclusions

The natural behavior of laying hens observed in a cage-free experimental system, using the selected ECSs, was not affected. However, the reduction of litter surface (T17) produced significant differences in the spatial flock distribution. Moreover, reducing litter allowance could be a limiting factor to trigger some behaviors performed in the litter area.

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