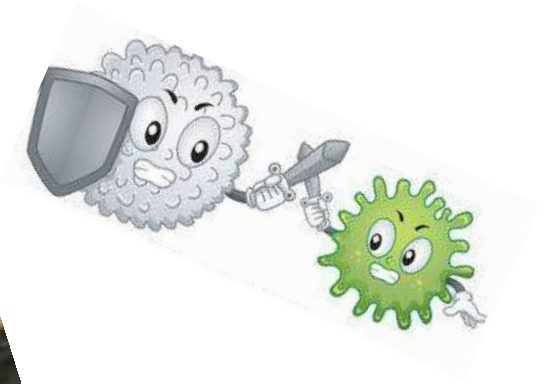
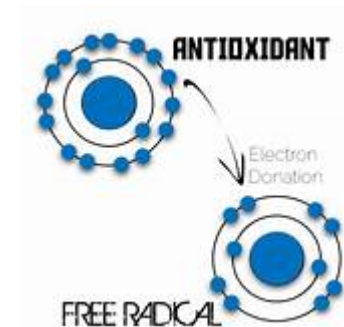


# Use of a commercial feed supplement based on diatom earth and yeast products on oxidative status and in vitro immune response in buffaloes during peripartum

A. Maggiolino, E. Casalino, T. Latronico, G. M. Liuzzi, M. F. Sgarro, P. De Palo



UNIVERSITÀ  
DEGLI STUDI DI BARI  
ALDO MORO



# Why Water buffalo (*Bubalus bubalis*)?



- ❑ 450.000 heads
  - ❑ Mediterranean Italian Buffalo breed
- (Italian livestock registry office, 2024)



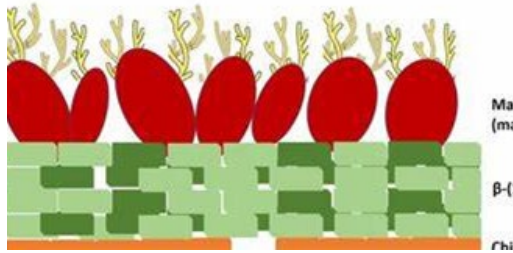
- ❑ +30% exportation 2019/2023
  - ❑ The second/third Italian PDO food for economic value in the last 5 years
- (Italian Institute of Agricultural Economy, 2024)

# Rationale

Current Mediterranean Italian Water buffalo is not yet a «highly specialized» milk producing animal

# Question

Could the use of a immune response modulator/antioxidant dietary supplement be useful?



**microorganisms**  
ISSN 2076-2607  
www.mdpi.com/journal/microorganisms

**Review**  
**Live Yeast and Yeast Cell Wall Supplements Enhance Immune Function and Performance in Food-Producing Livestock: A Review**<sup>†‡</sup>  
Paul R. Broadway, Jeffery A. Carroll \* and Nicole C. Burdick Sanchez



Journal of  
**Animal Physiology and Animal Nutrition**  
DOI: 10.1111/j.1439-0396.2012.01328.x

REVIEW ARTICLE  
***Spirulina* as a livestock supplement and animal feed**  
B. W. B. Holman and A. E. O. Malau-Aduli



J. Dairy Sci. 94:4046–4056  
doi:10.3168/jds.2011-4277  
© American Dairy Science Association®, 2011. Open access under [CC BY-NC-ND license](#).

**Effects of supplementation with yeast culture and enzymatically hydrolyzed yeast on performance of early lactation dairy cattle**  
J. E. Nocek,<sup>\*†</sup> M. G. Holt,<sup>†</sup> and J. Oppy<sup>†</sup>

# What did we test?



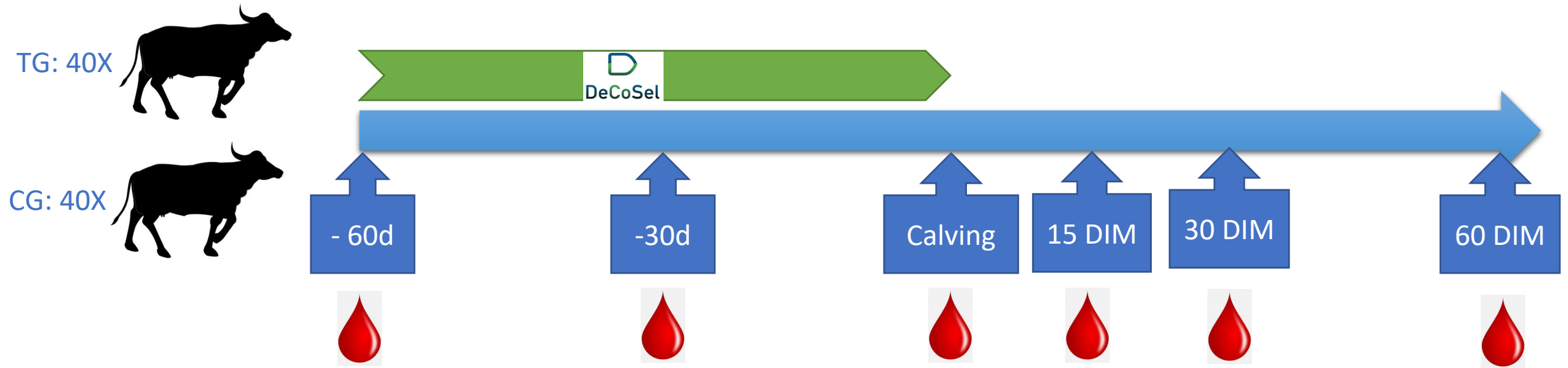
**Microalgae**  
Cultivation, Recovery of Compounds and Applications  
2021, Pages 239-312

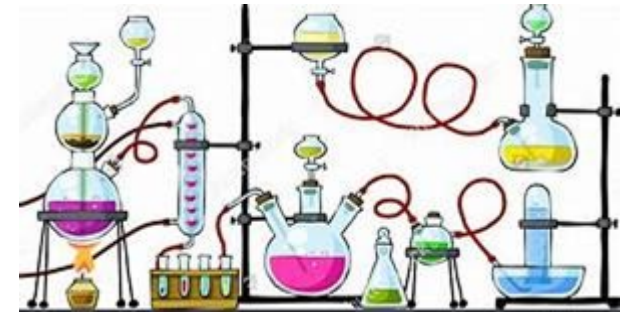
Chapter 9 - Microalgae as feed ingredients for livestock production and aquaculture

# Which patterns did we planned to investigated?

- ✓ Biochemical profile
- ✓ Antioxidant profile 
- ✓ Cytokines profile 
- ✓ Production traits
- ✓ PBMC viability 
- ✓ PBMC antioxidant patterns 

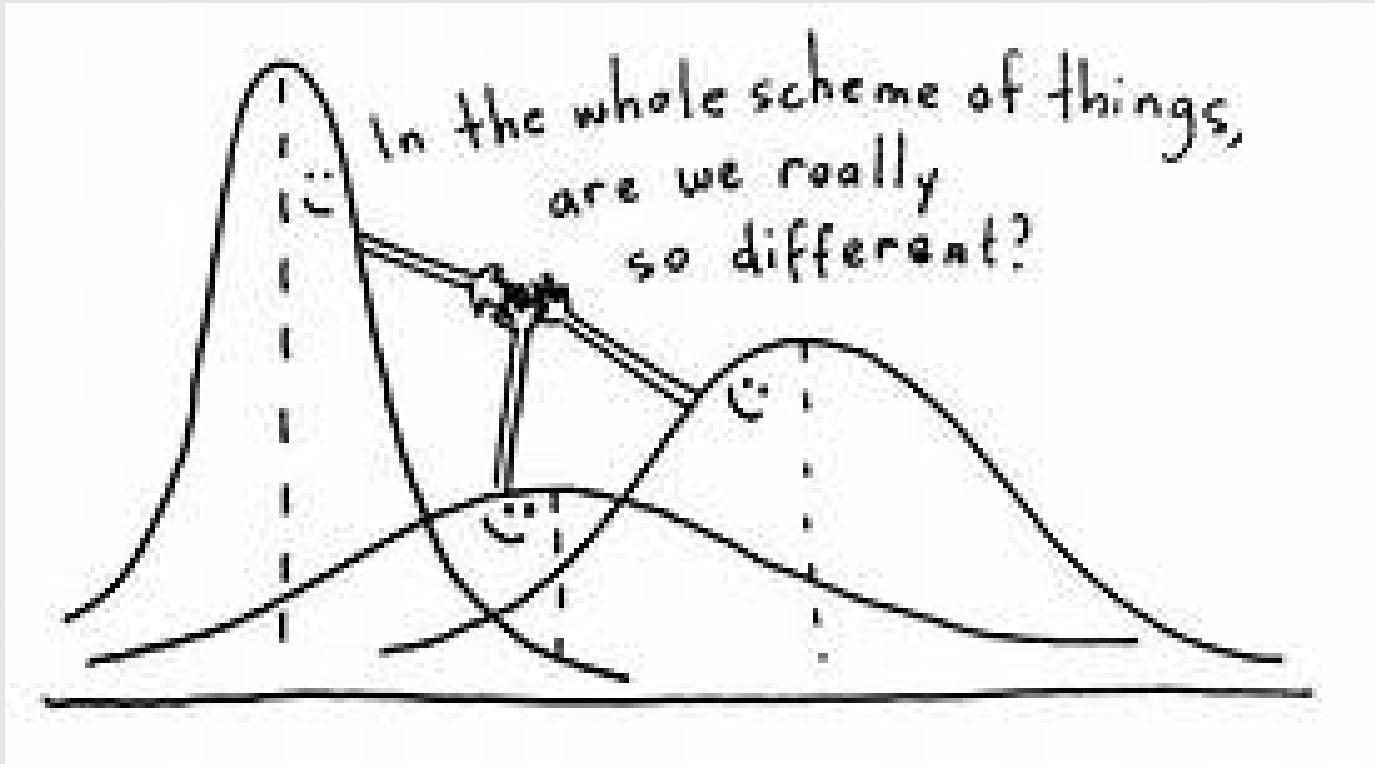
# Experimental design





- Cytokines panel (ELISA method, DBA-Italy)
- Antioxidant enzymes activity (spectrophotometric methods)
- Oxidation products (spectrophotometric methods)
- Total Antioxidant indexes (FRAP and ABTS; Spectrophotometric method)
- PBMC cell viability and challenge with ConA and  $H_2O_2$  (Dinardo et al., 2022; Latronico et al., 2007)
- PBMC supernatant and intracellular ROS/RNS before and after  $H_2O_2$  challenge (Dinardo et al., 2022; Latronico et al., 2007)

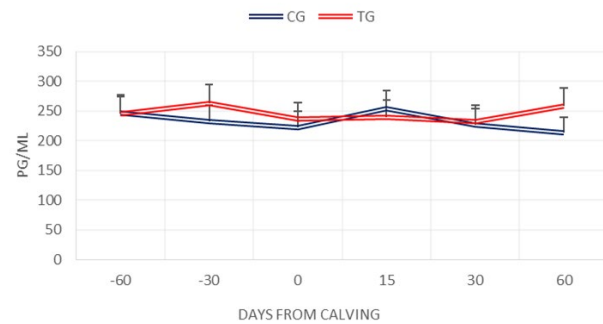
# Statistical analysis



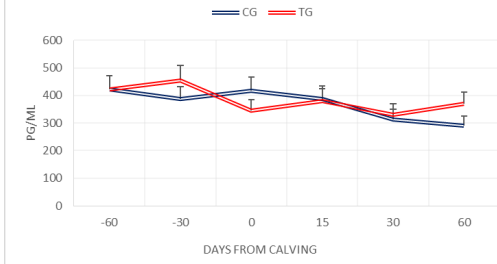
- Normality test
- Analysis of variance
- Tukey test for repeated measures

Cytokines that  
are not affected  
by treatment nor  
by time

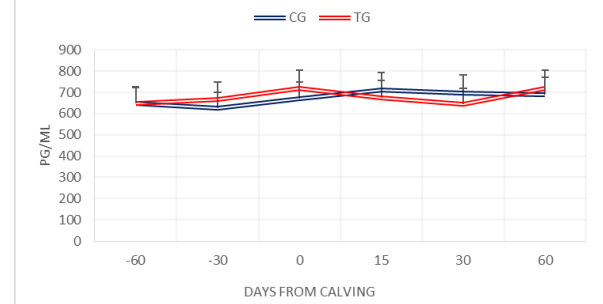
IL-10



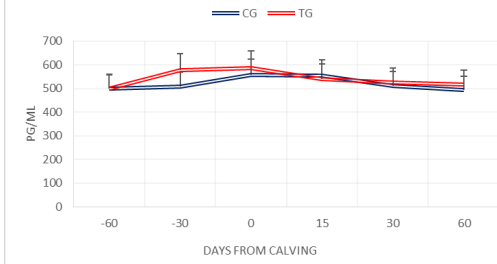
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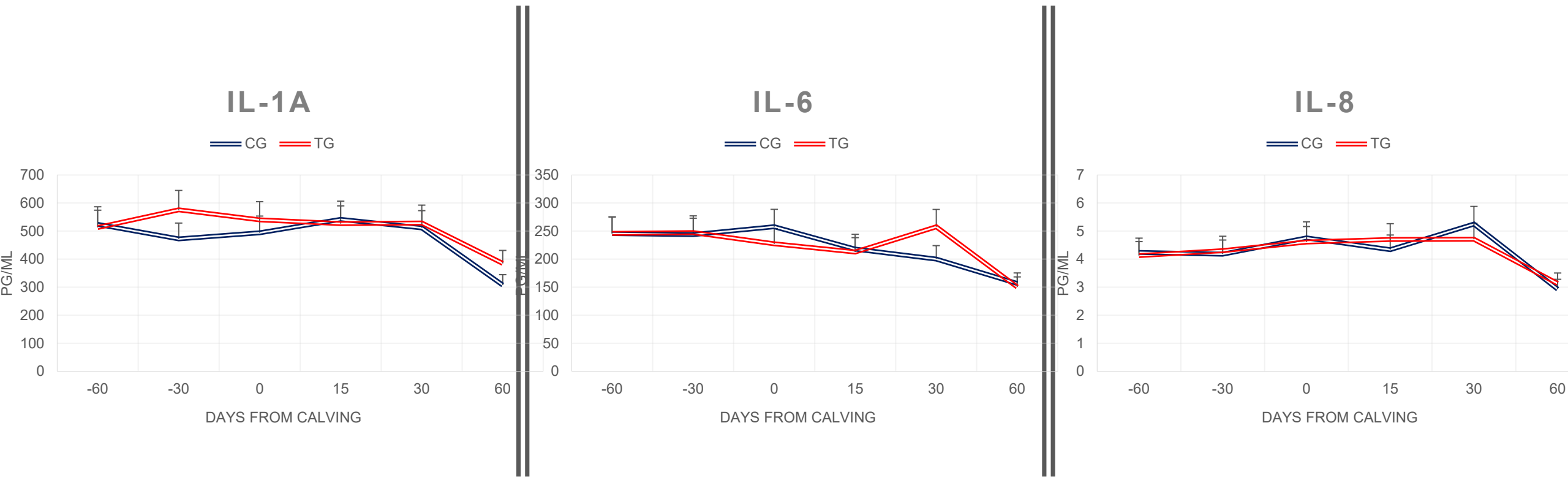


IL-2



IL-1B

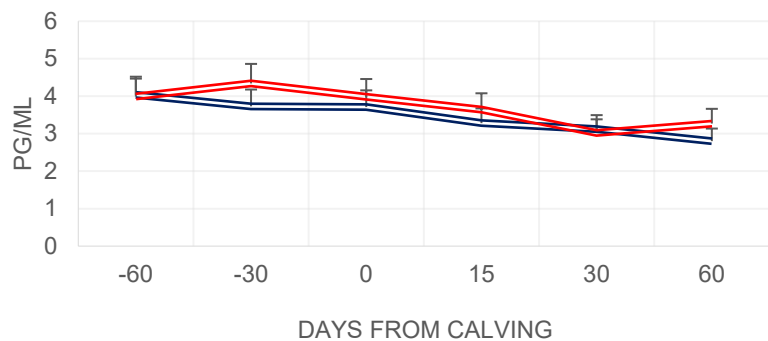




Cytokines affected by time

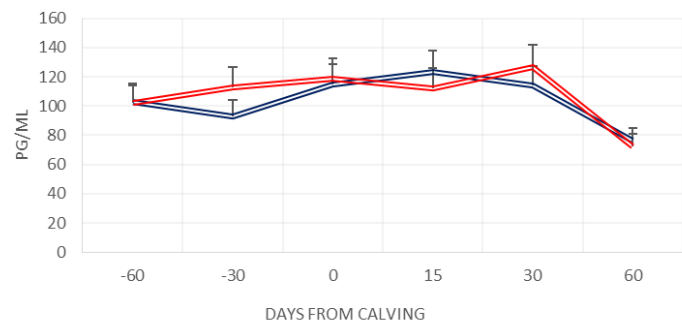
## HP

CG TG



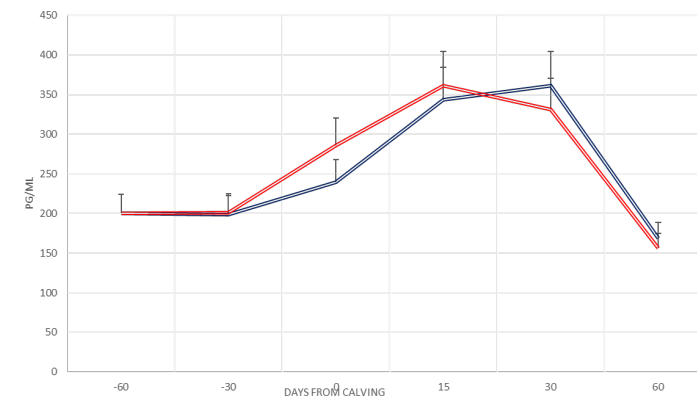
## TNF-ALPHA

CG TG

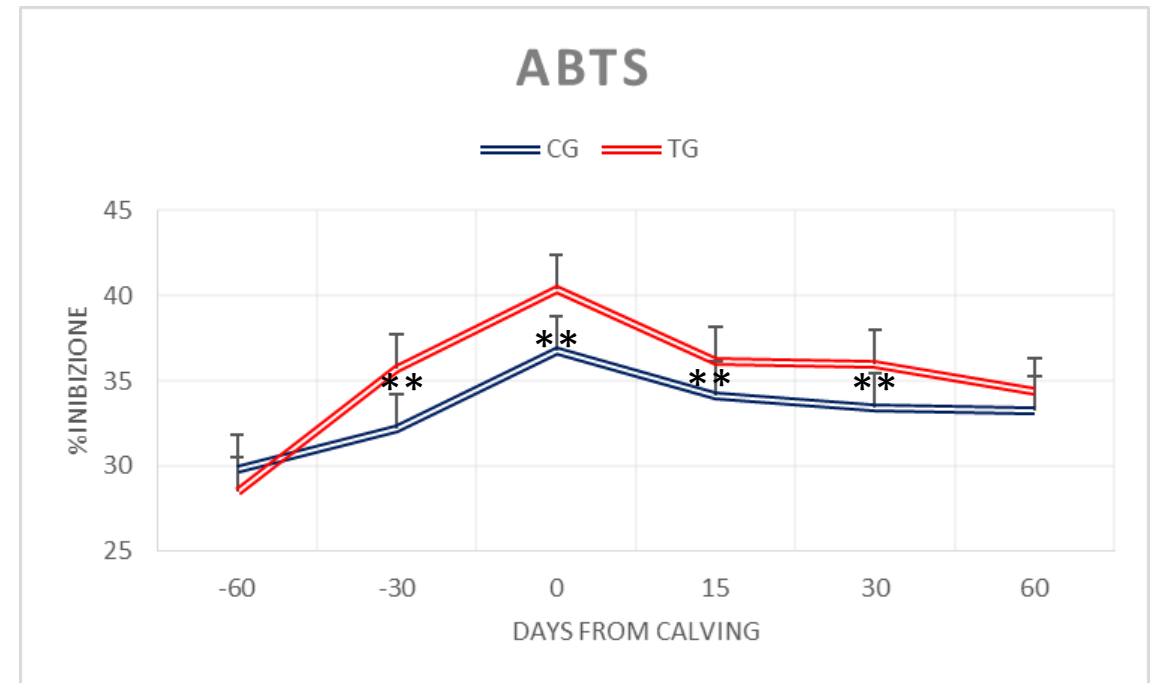
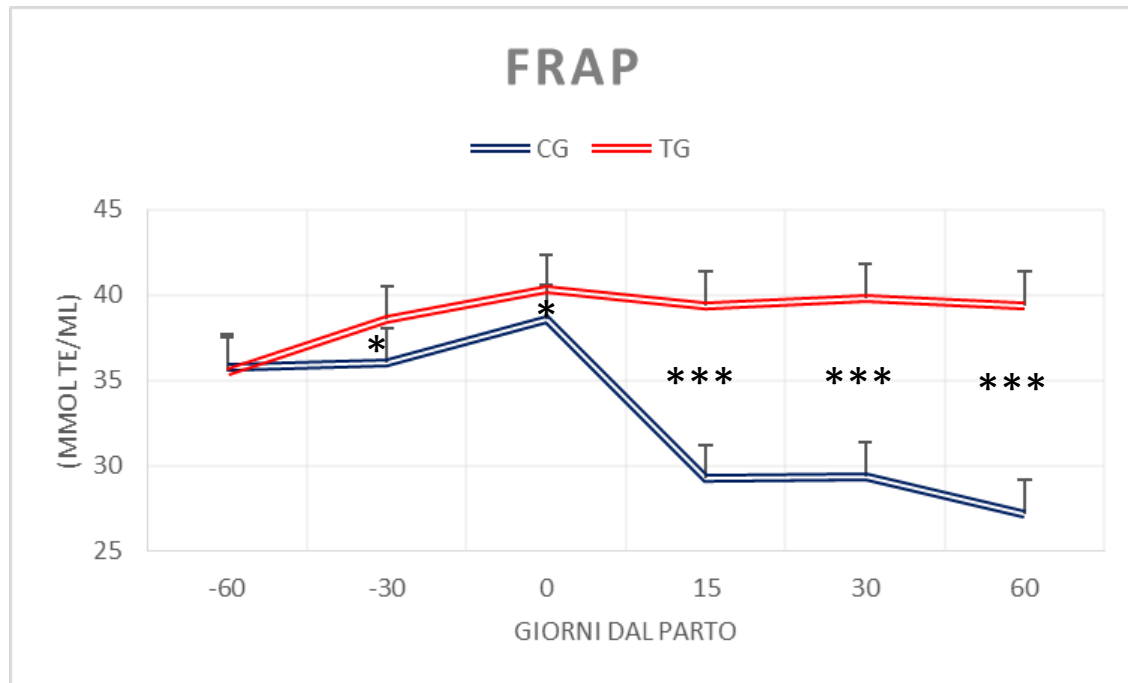


## CRP

CG TG



Cytokines affected by time



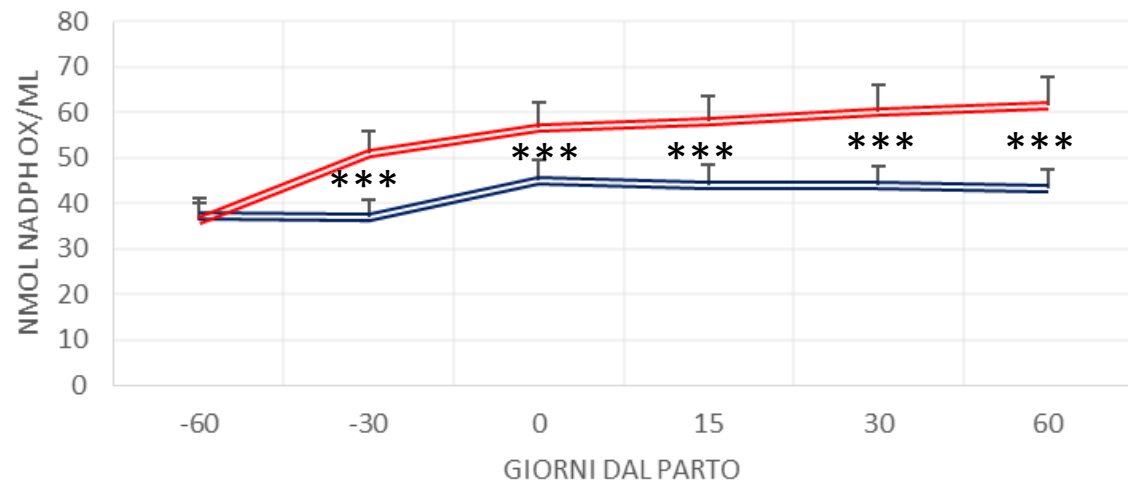
## Plasma Total Antioxidant Activity

\*P < 0,05; \*\* P < 0,01;\*\*\* P < 0,001

## Antioxidant Enzymes Activity

### GSPX

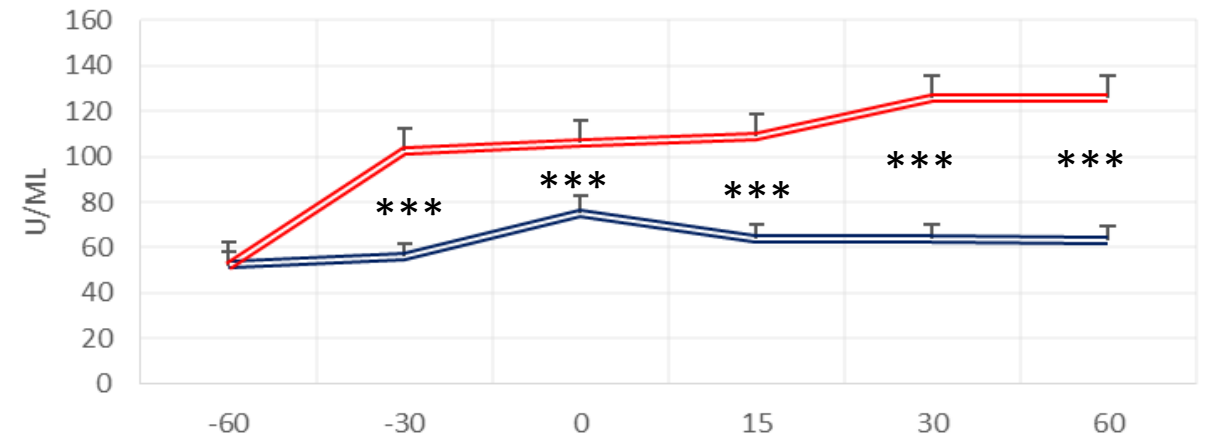
CG TG



\*\*\* P < 0,001

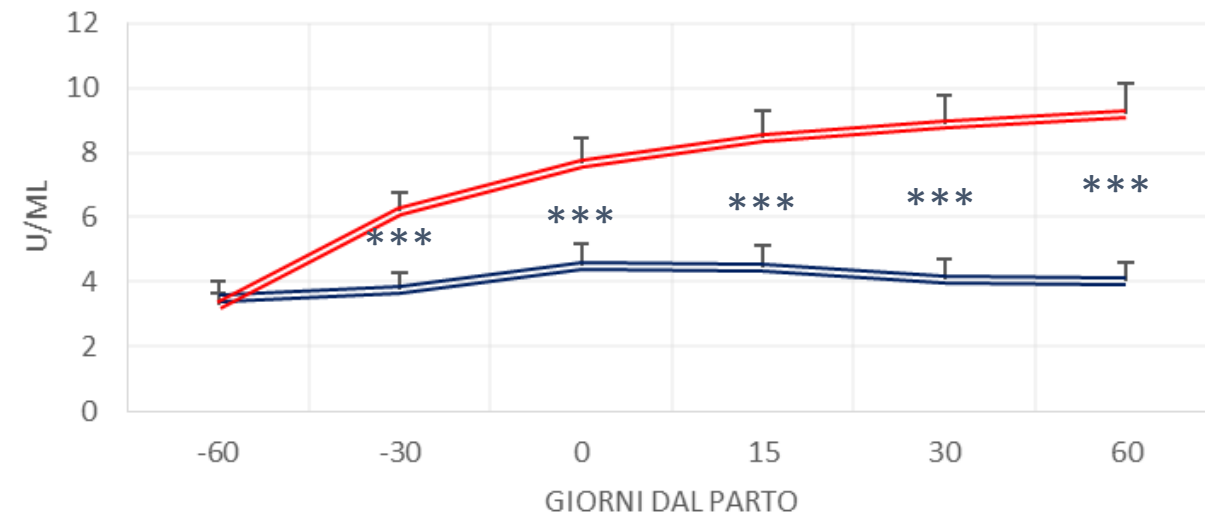
### SOD

CG TG



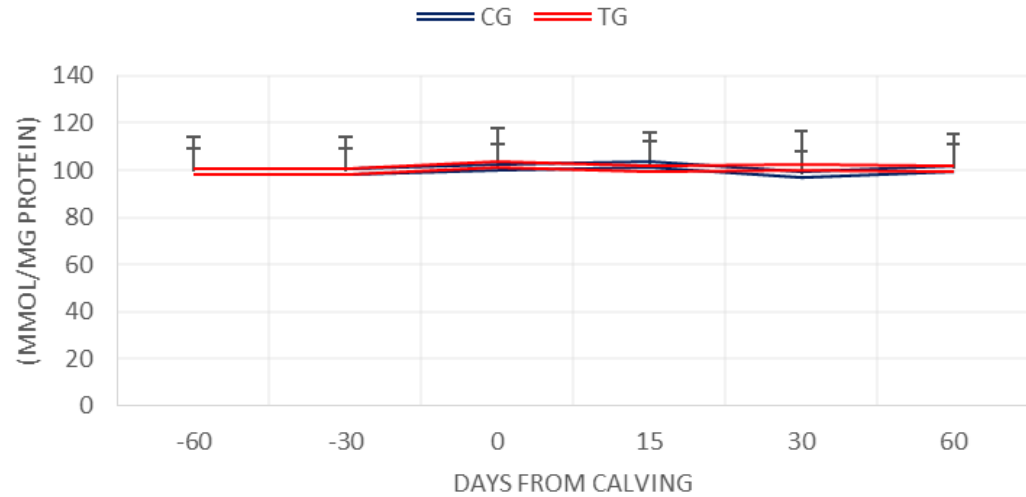
### CATALASE

CG TG

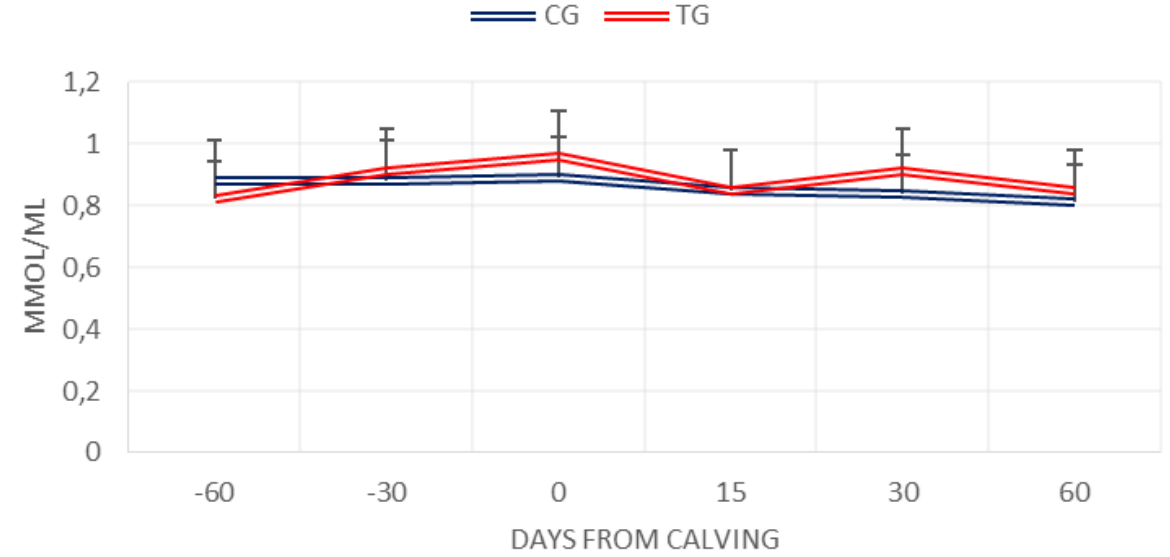


# Oxidation Products

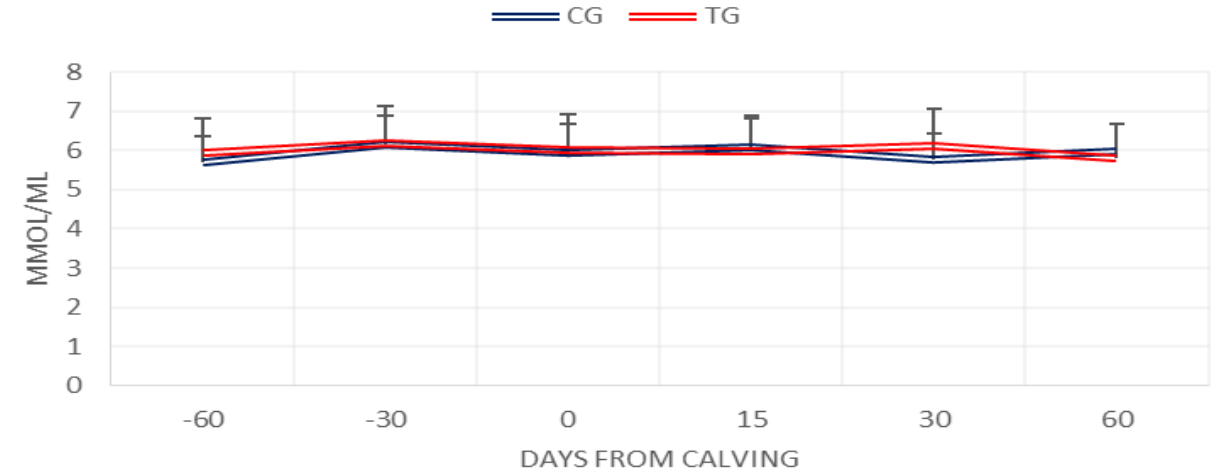
## PROTEIN CARBONYLS



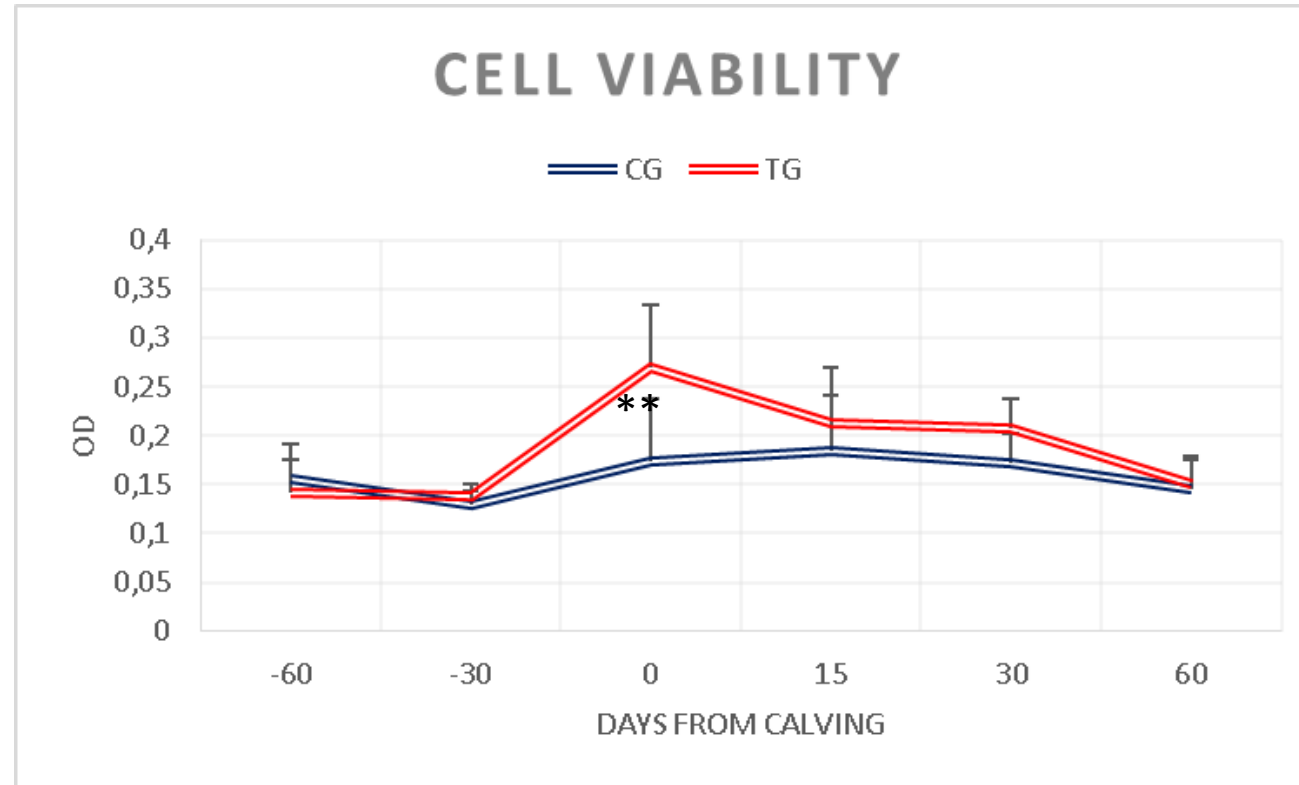
## TBARS



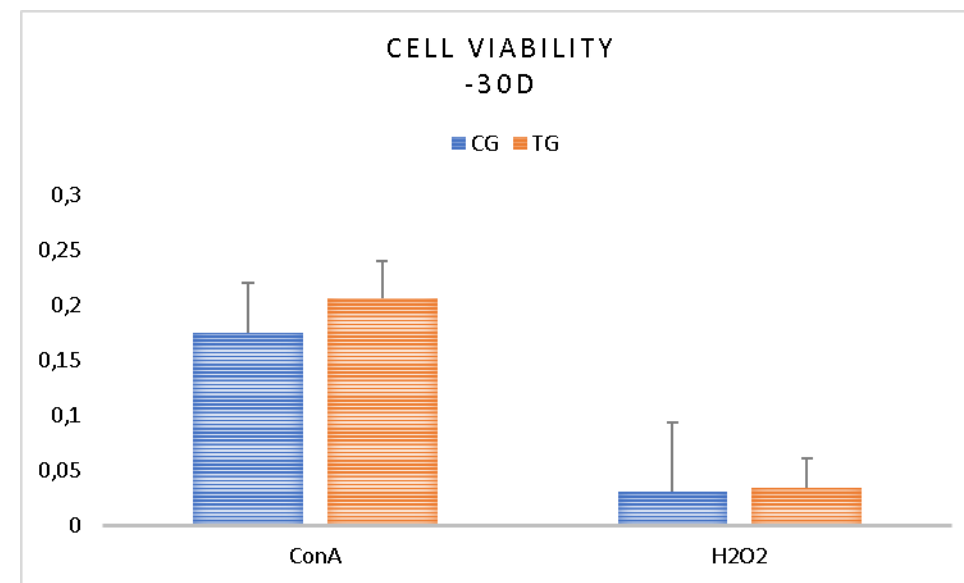
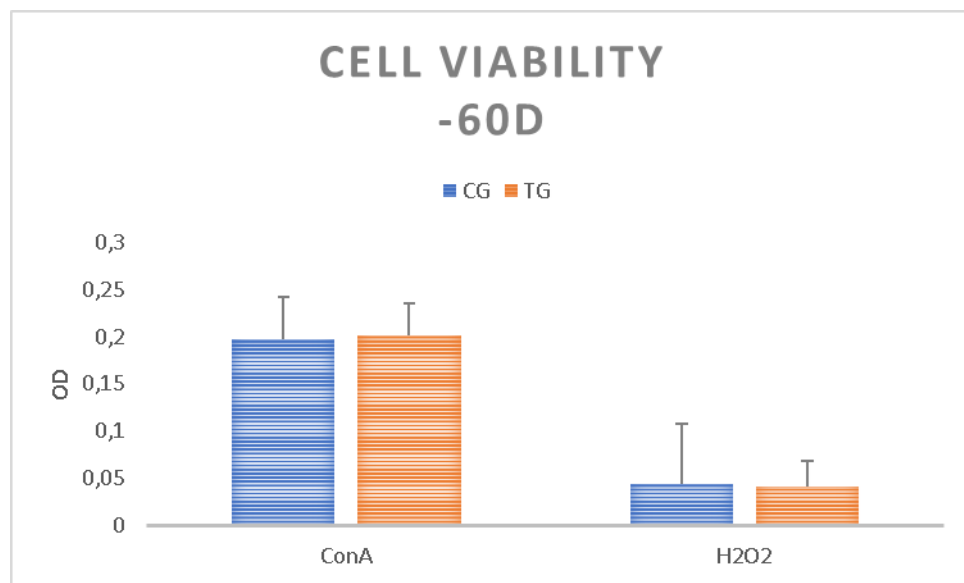
## HYDROPEROXIDES



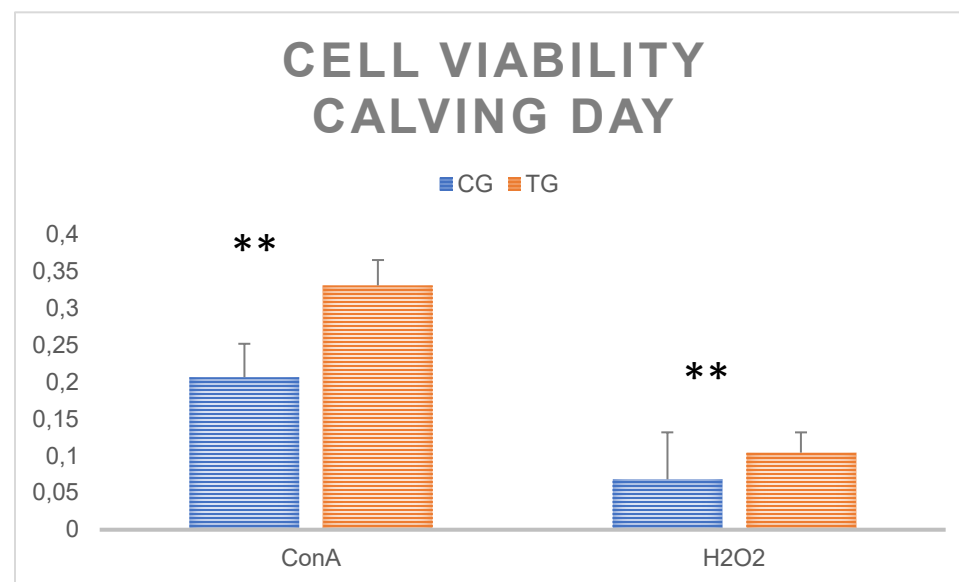
# PBMC

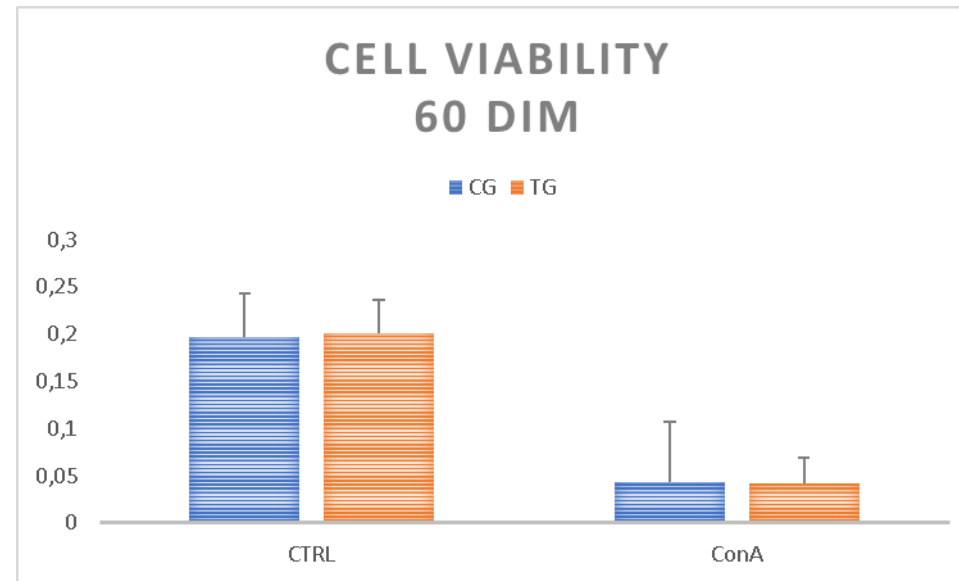
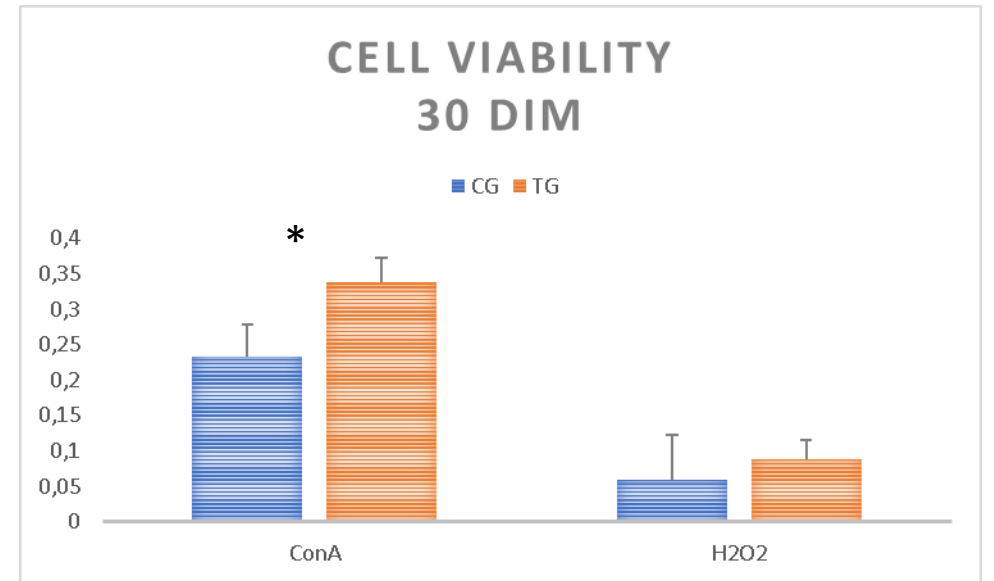
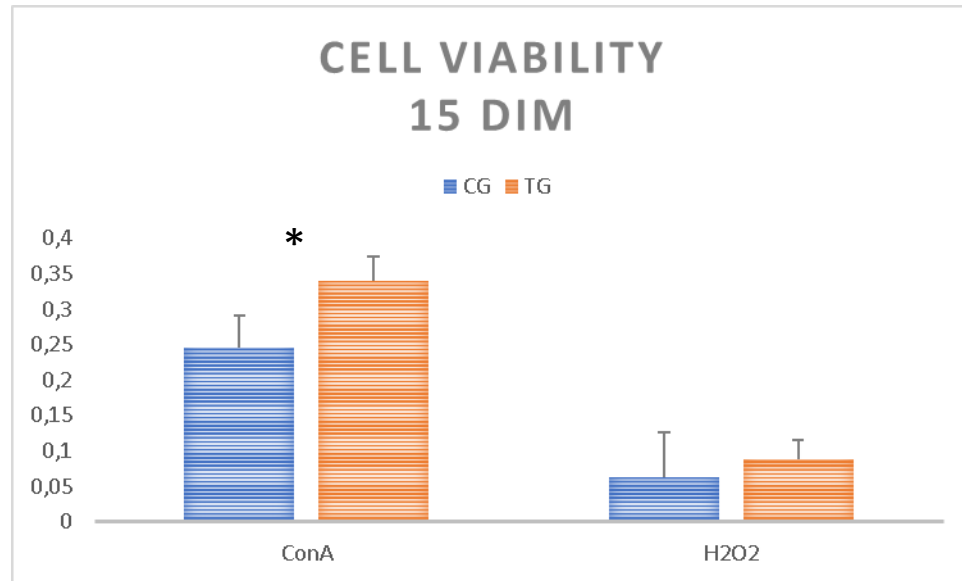


\*\*  $P < 0,01$



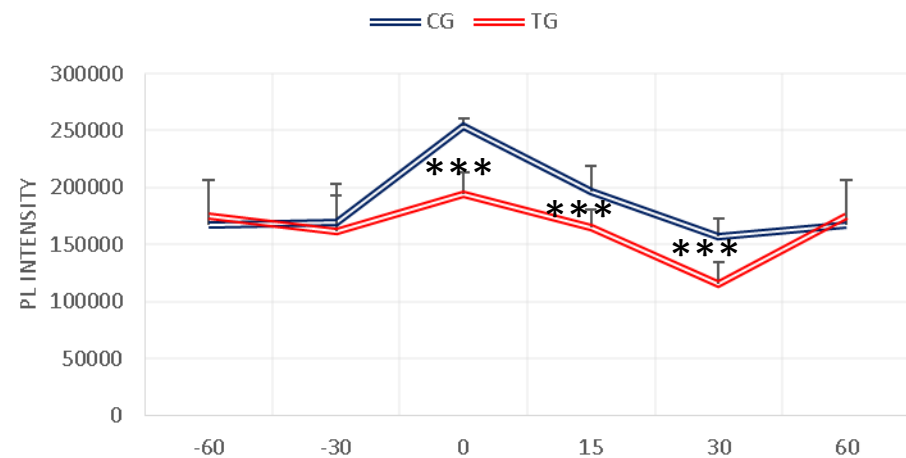
**\*\* P < 0,01**





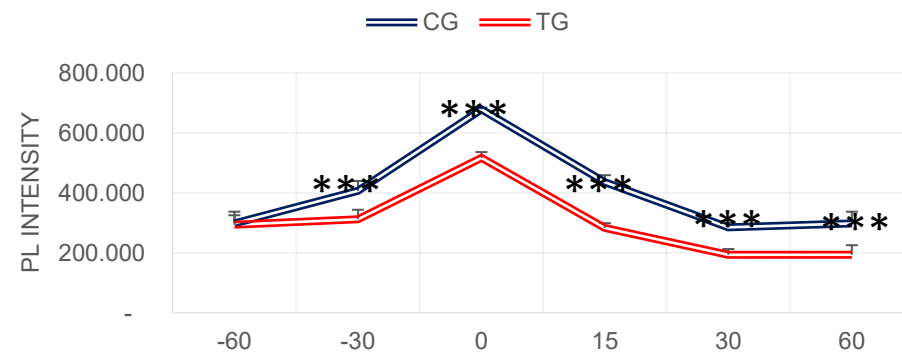
\*  $P < 0,05$

## INTRACELLULAR PBMC ROS



\*\*\*  $P < 0,001$

## INTRACELLULAR PBMC ROS AFTER H2O2 CHALLENGE



# Conclusions

Oral administration of the feed supplement affects *ex vivo* both immune and oxidative response in transition healthy medium productive water buffalo cows

Water buffalo has a lower metabolic and catabolic effort in transition period, so the peripartum as a challenging moment is not suitable

Lab tests aiming to evaluate the maximum potentials of systems (enzymes, antioxidant capacity, challenges on PBMC) show some effects, but in healthy water buffalo cows we did not reveal any evidence (same concentration of oxidation products)

There is a carry over effect of the oral administration of the product until 60 DIM

JOURNAL ARTICLE ACCEPTED MANUSCRIPT

# Use of a commercial feed supplement based on diatom earth and yeast products on oxidative status and in vitro immune response in buffaloes during peripartum

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Aristide Maggiolino ✉, Maria Federica Sgarro, Elisabetta Casalino, Tiziana Latronico, Grazia Maria Liuzzi, Pasquale De Palo

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**THANK YOU  
FOR YOUR ATTENTION**

