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In pregnant cows vaccinated against neonatal calf diarrhoea prior to calving, the oxidative stress has a detrimental effect on the immune status of their offspring. In this study, injectable trace mineral supplementation slightly improved the immune status, but also mitigated the correlation between the redox status at the time of vaccination and the immune status of newborn calves. This study also enlightens the need for further research on the relationship between the redox status and efficacy of therapeutic actions in the transition period of dairy cows.

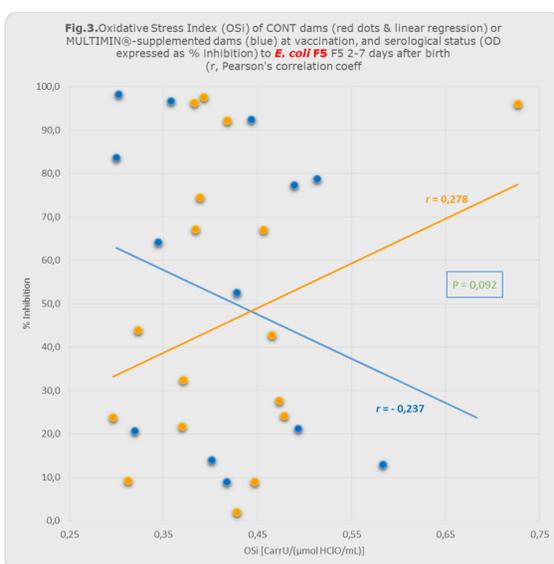
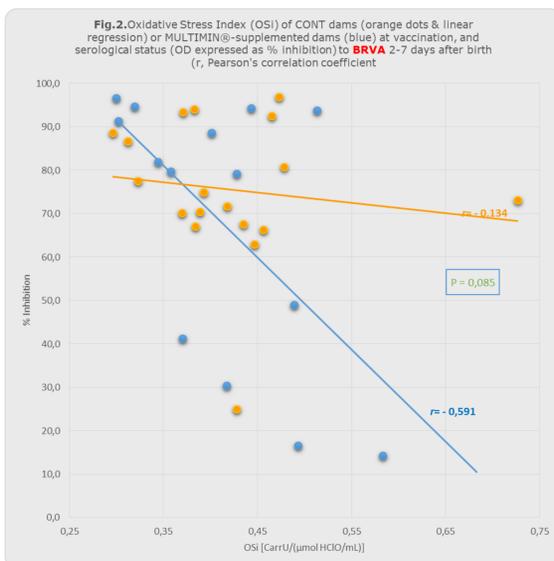
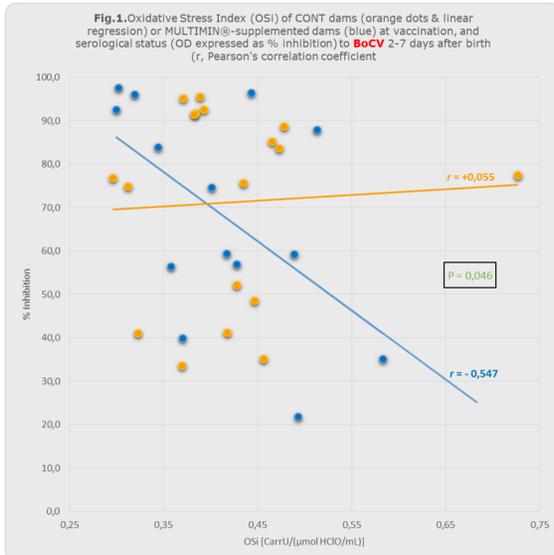
# Harmful effect of the oxidative stress on the passive transfer of immunity from cow to calf

## Mitigation by injection of trace elements

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## The dam's health status has an impact on passive transfer of immunity to the offspring

In cattle, vaccination of cows at the end of pregnancy is a recognized means of controlling neonatal calf diarrhea (NCD). This vaccine strategy exploits the passive transfer (PT) of the dam's immune status to her offspring, mainly obtained by the transfer of IgG1 from the colostrum. Several factors can interfere with PT, and one generally attributes failures of passive transfer (FPT) to poor management of early colostrum meals. Less is known of the effect of the dam's health status (parasitism, nutritional status) on FPT; still, the supplementation of pregnant cows with selenium and vitamin E has a beneficial impact on PT. This work aimed to assess the effect of the intensity of oxidative stress (OS) of dams at the time of vaccination on the quality of PT measured on calves after birth and estimate the interest of a multi-mineral supplementation in Zn, Cu, Mn, and Se at the time of the vaccine injection.

## Trace mineral supplementation decorrelates the dam's redox status and the immune status of its newborn calf

In dams, the median OSi at vaccination was 0.40 (95%CI[0.38;0.43]). The immune status of calves was satisfying, being better than the dams' status, thanks to the concentration of IgG into colostrum and proper colostrum management. Immune status to RVA and BoCV of calves were negatively correlated to OSi in dams ( $r < -0.200$ ), whereas it had no influence on antibodies to *E. coli* F5 ( $r = +0.055$ ). There was an OSi x treatment interaction on antibody titers in calves (Fig. 1, 2 & 3). Regarding the BoCV, Pearson's  $r$  coefficients were  $-0.546$  and  $+0.055$  in CONT and MM animals, respectively ( $P = 0.046$ ). Similar trends were observed for the RVA ( $r = -0.591$  vs.  $-0.134$ , for CONT and MM animals, respectively,  $P = 0.085$ ), and for *E. coli* F5 ( $r = -0.237$  vs.  $+0.278$ , for CONT and MM animals, respectively,  $P = 0.092$ ).

### Material & Methods

One-hundred thirty eight pregnant heifers and dairy cows were enrolled in this study. All were injected with a multivalent (BoCV, RVA, *E. coli* F5) calf scour vaccine (BOVIGEN@SCOUR, Virbac, France). At the time of vaccination, half of the animals ( $n = 70$ ) were randomly allocated to a treatment group (MM) and dosed with a parenteral multi-mineral solution (MULTIMIN®, Virbac, France, according to the product label), whereas remaining animals formed a control group (CONT). Shortly before vaccination, oxidative balance status (reactive oxygen species [ROS] and serum antioxidant capacity [SAC]) were assessed in a subset of animals ( $n = 16$  and  $20$  for CONT and MM, respectively), ROS and SAC were evaluated using commercial test kits (Diacron International, Italy) and expressed as CarrU (Carratelli unit) and  $\mu\text{mol HClO/mL}$ , respectively. The oxidative stress index (OSi) was as  $\text{ROS/SAC}$ . The immune status of newborn calves against the 3 antigens was evaluated between 2-7 days after birth (Monoscreen AbELISA test kits, BioX, Belgium, expressed as optical density turned into % of inhibition). Data were processed using XLSTAT and the level of significance was 0.05.

