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offering deeper insights and more efficient solutions for the ongoing challenge of livestock health monitoring.

7.2. O13—Effect of Dietary *Hermetia illucens* Oil on Bovine Genome Stability: A Sister Chromatid Exchange (SCE) Study

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Hermetia illucens (HI) oil, extracted from black soldier fly larvae, represents a sustainable alternative to traditional fat sources in bovine feeding. However, its impact on bovine genome stability was never investigated. Sister chromatid exchange (SCE) is a biological indicator of genomic instability, useful to assess the effect of genotoxic agents. This study aimed to evaluate the effect of HI oil inclusion in the feed ration on bovine genome stability by analyzing SCE in vitro.

Twenty-six Valdostana Red Pied cows fed mixed hay *ad libitum* were divided into two balanced groups that received isonitrogenous and isoenergetic concentrates containing a conventional lipid source, palm oil (control group), or HI oil at 3% as fed (case group). Peripheral blood lymphocytes were cultured in vitro for conventional (normal cultures) and 5′-bromodeoxyuridine (BrdU) incorporation; the latter was added 26 h before harvesting at a final concentration of 10 μg/mL to obtain preparations for the SCE test. Slides obtained from both normal cultures were karyotyped by GTG banding, whereas the BrdU-treated cultures were stained for 10 min with acridine orange (0.01% in buffer phosphate), washed with distilled water, and mounted in P-buffer. Three time points were analyzed: zero time (T0—no HI oil inclusion), 30 days (T1), and 50 days (T2) after the start of the experimental feeding.

Cows were all karyologically normal (2n = 60,XX). A total of 2882 metaphases were counted for the SCE test. Statistical analysis using the Student's *t*-test showed no significant differences in SCE frequency between the control and case groups at T0 (6.84 ± 0.15 vs. 6.72 ± 0.14; $p = 0.53$) and T1 (6.28 ± 0.12 vs. 6.27 ± 0.12; $p = 0.89$). However, after 50 days (T2), a significant reduction in SCE frequency was observed in the case compared to the control group (5.73 ± 0.11 vs. 6.29 ± 0.12; $p = 0.002$).

In conclusion, results suggest that the tested dietary HI oil inclusion level does not have a negative effect on bovine genome stability in vitro. The reduction in SCE frequency in the case group appears to be a putative protective effect of the HI feed inclusion on genome stability, although further studies and other genotoxic tests are needed to confirm this trend.

7.3. O14—A Screening Methodology of the Cell Nuclei Based on Functional Status of the Chromatin in *Ziphius cavirostris*

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Utilizing methods capable of detecting changes in chromatin states as a means to screen cells based on their functional state offers a valuable approach for assessing the effects of pollutants such as PFAS on cetacean species' cells and evaluating the status of environmental living conditions. In this study, a myogenic cell line obtained from *Ziphius cavirostris* was examined using a computed set of morphometric parameters to analyze cell nuclear morphology. Additionally, cytogenetic analyses were performed to determine the diploid number, distribution of constitutive heterochromatin (HC), and telomeric regions.

Cells were stained with Hoechst 33342 to measure nuclear morphometric parameters through high-throughput screening analysis, combining various parameters such as nuclear length, inverse aspect ratio (Inv/AR), and nuclear intensity. This methodology was employed to assess the cytotoxic effects induced by PFAS in cetacean cells. Cytogenetic techniques, including CBA-banding and FISH-mapping with PNA-telomeric probes, were applied to metaphase chromosomes obtained from myogenic cells. Our model facilitated the grouping and quantification of nuclei into three populations and six groups: the normal population (nuclei in G0 phase, synthesis phase, and mitosis phase), the large population (senescent nuclei), and the small population (nuclei fragmentation). By plotting frequency distributions of Hoechst intensity, we generated cell cycle profiles of nuclei. The combination of cell nuclei counting with cell cycle analysis allowed us to determine the dose-response effect of PFAS. Cytogenetic results confirmed that Ziphius c. has 2n = 42, although several cells exhibited polyploidy, predominantly tetraploidy. CBA-banding revealed large blocks of HC in various chromosomes and chromosome arms. All chromosomes exhibited positive FITC signals in all telomeric regions.

This method provides an objective, semi-quantitative tool for screening different nuclear phenotypes depending on the functional status of the chromatin. Cytogenetic analyses revealed characteristic CBA-banding patterns and telomeric regions.

7.4. O15—Investigating the Impact of Short-Term Environmental Stress on Telomere Length in Goats

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Rapid environmental changes present novel challenges for animals, notably thermal stress, which triggers the hypothalamic-pituitary-adrenal axis, elevating stress hormone levels. Prolonged stress can disrupt the body's metabolic equilibrium, leading to increased oxidative damage and impacting vertebrate telomeres composed of repeats (TTAGGG), commonly associated with stressful conditions.

To investigate the effects of short-term environmental stress on goats, ten multiparous individuals with free access to water and permanent pasture were selected for the study. Milk samples were collected throughout the lactation period to assess telomere length, providing insights into the potential impacts of stress on cellular aging and health. In addition to milk sampling, comprehensive meteorological data, including temperature, dew point, humidity, wind speed, and precipitation, were meticulously recorded from the Italian Meteorological Centre. These data sets enabled a detailed analysis of the relationship between environmental parameters and telomere length in goats.

Telomere length, analyzed via qPCR, was found to be negatively correlated with both dew point ($r = -0.676$, $p < 0.05$) and relative humidity ($r = -0.769$, $p < 0.01$), underscoring the significant influence of environmental factors on cellular aging processes in goats.

These findings offer valuable insights for farm management to minimize stress conditions impacting both animal health and production aspects.