Summary of the thesis

Title: The Effect of mycotoxin treatment in domestic chicken PGC Cultures
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The primary objective of my thesis was to investigate the effects of cell culture conditions on male (FCM5-ZZ) and female (FCF5-ZW) FUCCI reporter system-expressing PGC lines. Utilizing data derived from the Arthur cell counting machine, I aimed to compare the cell cycle phases of FCF5 and FCM5 PGC lines, distinguishing between high-quality and low-quality PGC cultures based on their in vitro integration capacity. In addition, I analyzed data from the Pico Cell Image Analyzer system, provided by my supervisor, to compare the doubling times of the male (FCM5-ZZ) and female (FCF5-ZW) PGC lines. This analysis included an examination of cell cycle alterations induced by T2 mycotoxin treatment.
Ultimately, I conducted a more detailed analysis using the most effective concentration of T2 mycotoxin identified through my experiments. In early time points (around T1 to T3), cells exposed to the toxin at various concentrations (1ng/mL, 2.5 ng/mL, and 5 ng/mL) demonstrated an increased percentage of red-labeled cells relative to the control, indicating an initial accumulation in the G1 phase. This suggests that toxin exposure initially causes a delay or arrest in the G1 phase. However, as the treatment continues, particularly noticeable at T10, the 5 ng/mL concentration group shows a substantial reduction in red cells compared to the control, reflecting a marked inhibition in cell proliferation or a shift in cell cycle dynamics, likely leading to fewer cells progressing through the cycle.
I emphasized that, in low-quality cultures, like the bad-quality FCF5 sample, the typical structured cycling pattern of healthy cells deteriorates, leading to higher cell death or exit from active cycling phases. These results highlight the importance of maintaining optimal culture conditions to preserve cell line integrity. If a cell line is found to be of poor quality, frozen stocks provide an opportunity to thaw a fresh sample and re-establish a healthy culture, ensuring continuity in research. This method guarantees that experiments can continue with cells that retain the desired transgenic characteristics and maintain high viability; this analysis underscores the usefulness of FUCCI technology in monitoring cell cycle dynamics, serving as a valuable tool for quality control in cell line management.
Overall, this study not only enhances our understanding of germ cell biology but also has broader implications for environmental safety, animal husbandry, and public health. By elucidating the cellular responses to mycotoxins, researchers can contribute to the development of safer agricultural practices, improved food security, and healthier livestock populations.