SRF VACATION SCHOLARSHIP REPORT 2022

The form below should be completed by the student, then forwarded to the supervisor for approval and submission to srf@conferencecollective.co.uk within 8 weeks of completing the project.
Please submit the form as a PDF document and save it as: First name, Last name and 'VS'.

A maximum of one figure (with legend of less than 100 words) may be appended if required.

Please note: excerpts from this form may be published on the SRF website, so please ensure content is suitable for website publication, and does not compromise future dissemination of data in peer-reviewed papers etc. The SRF reserves the right to edit responses to ensure suitability for publication on the website, newsletter or in promotional material.

Student's Name:	Zoe Jones	**Student's Institution/University:**	Oxford Brookes
Degree Title and year of study:	BSc Biomedical Science, Year 3		
Supervisor's Name:	Alison Forhead	**Supervisor's Department and Institution:**	Department of Biological and Medical Sciences @ Oxford Brookes
Project Title:	Effects of Glucocorticoid Exposure Before Birth on Adipose Tissue Structure in Adult Sheep		

Briefly outline the background and aims of the project *(max 200 words)*
Adipose tissue (AT) in mammals consists primarily of white adipose tissue (WAT) and brown adipose tissue (BAT), the latter of which possesses a unique uncoupling protein, UCP1, that enables it to fulfil its function of non-shivering thermogenesis primarily in neonates. WAT, on the other hand, acts as an energy reservoir with an extensive capacity for growth throughout adulthood. During late gestation, adipose mass increases significantly alongside a corresponding rise in the concentration of several hormones. Derangements within the development of adipose are thought to perpetuate throughout life and have been associated with a predisposition to the development of obesity and type II diabetes. The influence of glucocorticoids on the prenatal 'programming' and subsequent composition of adult AT are yet to be elucidated, although they are believed to induce maturational changes within the fetus in preparation for parturition. The aim of this project was to therefore examine the effects of an intrauterine cortisol infusion on the composition of adult ovine perirenal adipose depots. Specifically, the average size and number of white (UL) adipocytes were observed in order to determine whether cortisol induces a hypertrophic or hyperplastic effect.

Did the project change from that proposed in the application? If so, what changes were made and why? *(max 100 words)*
Originally H&E staining was selected to stain the mounted sections of adult ovine adipose tissue. Microscopic examination of the slides showed that the adipocyte membranes were faint, poorly defined and unlikely to be identified by the NanoZoomer slide scanner. Consequently, methylene blue was used to stain the slides instead, which proved effective. Furthermore, the digital image analysis was significantly more time-consuming than initially anticipated. Therefore, the decision was made to focus on the effects of the intrauterine cortisol-infusion of the composition of adult ovine adipose and exclude the fetal ovine specimens mentioned in the project application.

What were the main results/findings of the project? *(max 300 words)*

Table 1. Summary data for both the cortisol-infused adult sheep and the saline-infused adult sheep, the latter of which acts as the control.

Treatment Group	Mean UL Diameter (µm)	Total Number of UL Adipocytes Recorded
Saline	56.98	20505
Cortisol	52.47	20822

The median diameter of the UL adipocytes for each individual subject was determined using Microsoft Excel. The mean of the results was then calculated for each treatment group, generating values of 56.98 µm and 52.47 µm for the saline group and the cortisol-infused group respectively. The difference between these values was deemed to be insignificant ($P>0.05$) and likely occurred by chance.

The number of UL adipocytes measured for each treatment group were similar as shown in table 1. Again, the results of a T-test determined there to be no significant difference ($P>0.05$) between the total number of adipocytes in each group.

What do you conclude from your findings? *(max 150 words)*

The results of this investigation would suggest that exposure to excess cortisol *in utero* does not influence the composition/structure of adult ovine perirenal adipose depots in terms of hyperplasia or hypertrophy. However, a number of challenges were encountered during the digital analysis of the tissue sections which may have influenced the results. Most notably, the Adiposoft programme was difficult to use and required a significant amount of manual manipulation in order to determine the average size and total number of UL adipocytes. The staining of some of the sections made accurately tracing the membrane of the adipocytes difficult. Furthermore, some of the sections were damaged most likely due to errors within the initial tissue processing stage of the project which again made tracing the membranes difficult and led to the exclusion of some ill-defined adipocytes. Further investigations, potentially using different software, are required before we can say with certainty wether this conclusion is reproducible and reliable.

How has this experience influenced your thinking regarding your future/ongoing studies, and/or career choice? *(max 150 words)*

During my second year of Biomedical Science at Oxford Brooke's, I learnt in-depth about the process of tissue processing and microtomy. The SRF vacation scholarship provided me with the opportunity to put these teachings into practise in the laboratory which solidified my understanding of histological techniques considerably. The nature of the research project was exciting and highly relevant considering the increasing incidence of metabolic disease, including the aforementioned type II diabetes and obesity. The scholarship enabled me to pursue my interests within the fields of both reproductive and metabolic physiology and provided an insight into what it is like working within a research laboratory. Since undertaking this project, I am considering pursuing a research position after graduation, either at Master's or PhD level, possibly within the field of developmental programming.

Please use the space below to add any other comments/thoughts about the SRF Vacation Scholarship *(max 100 words)*

Student: I highly recommend the SRF vacation scholarship to students that would like to refine their laboratory skills as well as gain invaluable experience working within a research laboratory. I am grateful to the SRF for enabling me this opportunity as I gained a considerable amount of

confidence and was able to use equipment that I had previously only seen images of, such as the microtome and the Histocentre for wax embedding specimens.