PROJECT REVIEW

NAME:	**Miss Selene Jarrett**	**Full Time**	**Year 1**
INSTITUTE:	**The Roslin Institute, The University of Edinburgh**		
TITLE:	**The contribution of oocytes and follicular fluid to pig fertility**		

AIMS & OBJECTIVES:

A high fibre diet fed to pigs before mating has been shown to increase embryo survival and the number of live born piglets born to each pig. Additionally, the high fibre diet is associated with improved maturation of porcine oocytes and improved development of blastocysts following in vitro fertilisation (IVF).
The main aim of this study is to establish whether a high fibre diet fed to pigs before mating alters the composition of porcine follicular fluid and whether any differentially expressed proteins could act as biomarkers for fertility and/or nutritional status. Components in porcine follicular fluid such as proteins and metabilotes will be compared between fluids from pigs fed a control diet and pigs fed a high fibre diet but also fertile and non-fertile pigs. The effects of follicular fluid from gilts fed the different diets on oocyte maturation will also be assessed.
These studies will be carried out with the view of enhancing the oocyte maturation environment in vivo and in vitro. The ultimate objective would be to supplement porcine maturation media for in vitro maturation and in vitro fertilisation protocols and refine porcine feeding regimens in agriculture to optimise the animals' reproductive efficiency.

KEY MILESTONES:

	TARGET DATE:	**ACHIEVED DATE:**
Proteomic technique validation	April 14	June 14
Mass spectrometry results on Set 1 samples	June 14	September 14
Mass spectrometry results on Set 2 samples	July 14	October 14
Pathway analysis of differentially expressed proteins	December 14	
Candidate confirmation of handful of selected proteins	June 15	
Metabolic analysis on follicular fluid of control and high fibre fed pigs	May 16	
Nutritional trial for samples collection and IVF trials	December 16	
IVF trials (reciprocal and trials using abattoir derived oocytes)	April 17	
Submit thesis	December 17	

PROJECT REVIEW AND COMMENTARY:

Using an optimised proteomic workflow differentially expressed proteins have been identified in porcine follicular fluid of pigs fed a high fibre diet and a control diet. Furthermore, several of these proteins were identified as being differentially expressed between follicular fluids of fertile and non-fertile pigs. This is indicative of an influence of diet on fertility. Candidate proteins will be matched to relevant biological pathways to ascertain mechanisms that may be involved in nutritionally improved fertility. In addition to a proteomic analysis, metabolic analyses on porcine follicular fluid can be carried out to comprehensively characterise the composition of porcine follicular fluid in relation to nutrition and fertility. Further to the practical work carried out in my project I attended the BPEX innovation conference in June which provided and industrial perspective and highlighted the commercial objectives of this project.

POTENTIAL BENEFIT TO INDUSTRY:

The average litter sizes of UK herds lag behind several other EU countries, indicating that the efficiency of the British pig production industry can be improved. The results of this study could provide novel approaches to assess the characteristics of a healthy and fertile pig ovary and lead to the development of management strategies to enhance pig fertility and enhance litter sizes in UK herds.
This would involve a review on nutritional regimens with the view of increasing fertility and the success of early embryo development coupled with an on-farm nutritional study conducted at a JSR Genetics Ltd. Breeding Unit.

SUPERVISOR(S): Prof. Cheryl J. Ashworth, Dr Andrew C. Gill and Dr Grant Walling	**FUNDERS:** BPEX and JSR	**DATED:** **07/10/14**