



Australasian Pork Research Institute Ltd APRIL

PROJECT SUMMARY

Project Number and Title:

A3B-103; *Identifying reciprocal chromosomal translocations in boars to reduce early embryo mortality*

Project Leader: Dr Darryl D'Souza (SunPork Solutions)

Project Participants: Prof Tariq Ezaz and Mr Foyez Shams (University of Canberra)

Aims and Objectives:

1. Validate a methodology involving molecular cytogenetic tools to screen boars for reciprocal chromosomal translocations (RCT) affecting early embryo survival.
2. From a sample of boars in a commercial stud, determine the incidence of hypoprolificacy.

Experimental design (if applicable):

Blood samples from 94 boars were collected from a commercial nucleus herd.

Pairwise arranging of chromosomes based on size and the centromere position was performed. A Zeiss Axioplan epifluorescence microscope equipped with a CCD (charge-coupled device) camera was used to capture images of DAPI stained chromosome spread.

Fluorescence *in situ* hybridisation (FISH) was carried out using a multi-probe device, specific to pigs, using sub-telomeric genes. The FISH images were captured using a Zeiss Axioplan epifluorescence microscope equipped with a charge-coupled device camera (RT-Spot) and the Zeiss fluorescence filter. The Isis imaging software was used for image capture and analysis.

Key Findings:

- Successful establishment of a short-term blood culture protocol and preparation of high-quality metaphase chromosomes with high mitotic indices from 94 boars suitable for karyotyping.
- Successful karyotyping of all 94 boars (pairing homologous chromosomes), with data successfully validated using a proprietary Chromoprobe Multiprobe® System device.
- Identification of a high incidence (6.4%) of RCT in a commercial nucleus boar herd, with four types of RCT identified in six of the 94 boars tested.
- The incidence of RCT (6.4%) in this commercial stud was higher compared to the reported incidence from other countries (The Netherlands 0.7%, France 0.5%).
- Boars with RCT had a lower litter size compared to normal boars.

Applications to Industry:

The closed genetic status of the Australian herd and consequently the limited genetic herd diversity may be a causative factor in the increased incidence of these RCTs, and subsequently lower litter sizes.

The higher incidence of RCT is likely to be similar for other commercial Australian herds given the closed genetic herd and common ancestry.