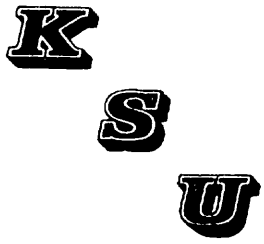

Swine Embryo Culture and Transfer for Export to England

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Introduction

A major threat to swine enterprises is the possible introduction of disease when new breeding animals are purchased and introduced. So, methods of introducing new genetic material while minimizing the potential for introducing disease are needed.

Transfer of embryos from a donor sow in another herd or country would minimize disease risks. Already used to introduce new breeding stock into Specific Pathogen Free herds and other closed herds, embryos now are placed in the recipient gilt's or sow's uterus within a few hours after their recovery from the donor. That method prevents export and limits application of swine embryo transfer in this country, so we evaluated the feasibility of using an in vitro culture system to store embryos between donor sows and recipient females.

Summary

Pig embryos were collected surgically in Sullivan, Ill., and exported to England. Storage was accomplished by culturing the embryos in a modified Krebs-Ringer bicarbonate medium containing 1 mg/ml of glucose and 4 mg/ml bovine serum albumin; 227 eggs were exported and inserted into uteri of 12 recipient gilts. Seven recipient gilts farrowed 58 pigs.

Procedures

The embryos were sent in two shipments. Embryo donors were registered Chester White and Hampshire sows and gilts, with some females used as embryo donors for both shipments. Large White gilts in England were the recipients. For embryo transfer to succeed, both the donor and recipient must come into heat at the same time. Donor and recipient heats were synchronized by feeding a synthetic progestogen, allyl trenbolone[4]. Donors were fed the drug once daily for 18 consecutive days; recipients,

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twice daily for 17 consecutive days. The last feeding of allyl trenbolone for both donors and recipients was the same day, and most of the animals were in heat 4 to 6 days later.

Donors were bred to boars of their respective breeds. Embryos were recovered from donor sows and gilts by surgery 3 to 5 days after they were first detected in estrus. Preparation of donor and recipient animals is described in table 5.

As soon as the embryos were recovered, they were examined under a stereo microscope and placed in a small test tube containing 2 ml of a modified Krebs-Ringer bicarbonate medium containing glucose (1 mg/ml) and bovine serum albumin (4 mg/ml). The air in the culture tube was replaced with 5% CO_2, 5% O_2, and 90% N_2, and the tube capped. This culture system permits survival and growth of pig embryos for 3 to 4 days. The tubes were then placed in a styrofoam box which was maintained at 35 C.[5] Details of the egg storage are in table 6.

Embryos were then transported to England by air and surgically inserted into the uteri of recipient gilts. Duration of *in vitro* egg storage was 20.5 - 27 hours.

Results and Discussion

Transfer results are presented in table 7. In all, 227 eggs were recovered, shipped to England, and inserted into 12 recipient gilts. Seven gilts farrowed 58 pigs which represents 26% of the eggs transferred. Transfer of pig embryos without storage would be expected to produce better results with 40-50% of the eggs transferred being realized as pigs born. The reduced survival rate of transferred eggs is most likely due to the approximately 24 hours of storage. Refinements of the culture technique can be expected to improve results. No reason is apparent for the superior results of shipment II as opposed to shipment I.

These results demonstrate swine embryos can be stored and transported for up to 27 hours between recovery and insertion into a synchronized recipient. A similar procedure would be applicable for transfer of pig embryos into closed herds within this country. For example, embryos could be recovered, transported by land or air, and inserted into the uterus of a recipient gilt in a closed herd. In addition to a minimized chance of introducing disease, the new pigs would grow up in the new herd and should be better adapted to its environment and diseases.

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[5] Trans temp^{R}, Kay Laboratories, Inc., Moberly, MO 65270.

Table 5. Preparation of Donor and Recipient Females for Egg Transfer.

Item	Egg donors	Egg recipients
Breed	Chester White and Hampshire	Large White
Estrus synchronization	Allyl trenbolone (fed once daily for 18 days)	Allyl trenbolone (fed twice daily for 17 days)
Breeding	To boars of their respective breeds	Not bred
Egg recovery (at Sullivan, Ill.)	3-5 days after first in heat	---
Egg insertion (in England)	---	4-6 days after the onset of heat

Table 6. Egg Storage

Item	Description
Medium	MKRB including glucose (1 mg/ml) and BSA (4 mg/ml)[1]
Storage vessel	12 x 75mm (6 ml) polystyrene tubes
Storage	
Temperature	35 C
Duration	20.5 - 27 hr.

[1]Davis and Day (1978) J. Anim. Sci. 46:104.

Table 7. Egg Transfer Results

	Eggs Transferred		Recipients		
Phase	Total	Per recipient	Total	Farrowing	Pigs born
I	113	16 - 24 ($\bar{x}$=18.8)	6	2	16
II	114	13 - 35 ($\bar{x}$=19.3)	6	5	42
Total	227		12	7 (58%)	58 (26%)