The Pharma Innovation Journal 2017; 6(7): 86-88

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating 2017: 5.03
TPI 2017; 6(7): 86-88

www.thepharmajournal.com
Received: 12-05-2017
Accepted: 13-06-2017

N Vamshikrishna Reddy
M. V. Sc Scholar, Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science, P. V. Narasimha Rao Telangana Veterinary University, Hyderabad, India

K Muralimohan
Associate Professor, Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science, P. V. Narasimha Rao Telangana Veterinary University, Hyderabad, India

K Ramchandra Reddy
Associate Professor and Head, Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science, P. V. Narasimha Rao Telangana Veterinary University, Hyderabad, India

C Latha
Assistant Professor, Department of Veterinary Surgery and Radiology, College of Veterinary Science, P. V. Narasimha Rao Telangana Veterinary University, Hyderabad, India

Correspondence
N Vamshikrishna Reddy
M. V. Sc Scholar, Department of Veterinary Gynaecology and Obstetrics, College of Veterinary Science, P. V. Narasimha Rao Telangana Veterinary University, Hyderabad, India

A study on reproductive efficiency of artificial inseminations in swine with PRIMX cell and NBSE diluted boar semen with natural and synchronized estrus

N Vamshikrishna Reddy, K Muralimohan, K Ramchandra Reddy and C Latha

Abstract
The two main objectives of the present study were a) To compare fertility results of artificial insemination performed with liquid boar semen diluted in PRIMXcell and NBSE extenders. b) To study the efficacy of PGF2α (175 µg D-Cloprostenol) for synchronization of estrus in seasonal infertile pigs. An experiment was designed with 32 crossbred LWY pigs which were randomly divided into two groups: group 1 (12 cycling animals) and group 2 (20 seasonal anestrus pigs) which were further divided into two subgroups (6 animals in each sub group) to study the efficiency of PRIMXcell and NBSE extenders. The animals which responded for D-cloprostenol i.m. injection were 60% (12 of 20). The mean interval for onset of estrus was 3.75 ± 0.44 days, mean duration of estrus was 42.00 ± 1.80 h. The overall conception rate (%) was higher with NBSE than PRIMXcell (75 Vs 66) which did not differ significantly. The results of the present study indicate that AI can be practiced with NBSE which is as good as PRIMXcell.

Keywords: Pigs, estrus synchronization, artificial insemination, fertility, PRIMXcell and NBSE

Introduction
Prolonging the storage time of semen without compromising reproductive performance could increase the economic benefit and production efficiency, which makes the choice of extender a major focus of concern for the swine-breeding industry [6]. The fertility of liquid boar semen decreases with duration of storage [1] and is associated with a reduced ability of sperm to bind with oviductal epithelium [17]. However, in pig production systems where all semen is used within 2-3 days, short-term extenders are as good as expensive long term extenders [7]. NBSE was the first short term porcine semen extender to be prepared and filed for patent in Indian subcontinent. Hence it was proposed to investigate the reproductive performance of swine with NBSE extended semen with natural and synchronized estrus.
Major problem associated with summer infertility is a higher number of sows not returning to estrus after weaning during the summer months [10]. It is proposed that LH is reduced during summer-fall period [10]. These changes in LH secretion may explain, at least partially the prolonged weaning to oestrus interval as well as the reduced fertility in sows mated during the low fertility season [12]. The injection of 5mg of PGF2α into the vulvar lips at insemination is an effective method of compensating for the low fertility together with the decreased fertility of the summer months [11]. The injection of D-cloprostenol (37.5 µg) in 0.5ml through the vulvar lips at weaning and at insemination is an effective method to increase the reproductive performance of swine herds during the low fertility season [12]. The effective therapeutic dose of D-cloprostenol for induction of farrowing in pigs is 175 µg [5]. Hormonal preparations like PG 600 are restricted to certain nations and are expensive. Hence, in the present study PGF2α was selected for estrus synchronization as they are economical and are available worldwide.

Materials and methods:
The study was performed in an intensively managed piggery at Instructional Livestock Farm Complex, College of Veterinary Science, Hyderabad and at a private farm in Mahabubnagar, Telangana, India. Experimental animals consisted of LWY cross breed or local pigs. Water was provided *ad libitum* and 2.5 - 3 kg well balanced ration was provided per animal per day.
A total of 32 non-pregnant, healthy crossbred sows (75% LWY x 25% local) irrespective of parity were selected and randomly divided into two groups: group 1 (12 animals observed for

natural estrus) and group 2 (20 seasonal anestrus pigs treated for estrus synchronization). The seasonal anestrus pigs were injected with 175 µg of D-Cloprostenol (VETMATE^{TM}) intramuscularly irrespective of the day of oestrus cycle. The animals in group1 and group 2 (which responded for PGF2α treatment) were further divided into two sub groups equally based on the semen diluents used - PRIMXcell (IMV, France) and NBSE – Normal Boar Semen extender (ICAR CCARI, Goa, India). Three LWY cross bred boars were trained for semen collection using a stainless steel dummy sow and semen was collected by "Double hand gloved method" twice a week from each boar. Ejaculates having thick consistency, rapid wave motion, > 70% motility, ≥ 85% normal sperm morphology and concentration > 25 to 65×10^6 sperm/ml were used for AI. Semen was extended with a dosage of $3x10^9$ sperm cells in 60 ml volume and was utilised within 24 hours after collection.

Pigs were checked twice daily for estrus behaviour and cervical artificial insemination was performed twice in pigs using golden pig catheter (IMV, France), at 12 & 24 h after standing heat was detected in the presence of a boar. Pregnancy was diagnosed 30 days after AI was done with ultrasound scanner (Aloka, Japan) using 5 MHz transabdominal probe to determine conception rate. The estrus response was noted as percentage of sows showing estrus after treatment and duration of estrus was observed as the period between onset and end of estrus signs. The conception rate, expressed as the ratio of number of sows positive for pregnancy to the number of sows inseminated, litter size was recorded as total number of piglets born alive, birth weight per piglet was calculated as individual weight of piglet. The estrus response, duration of estrus, litter size, and birth weight per piglet was analysed by t-test using compare means procedure of IBM SPSS Statistics version 21. (2012), conception rate was analysed by using the chi-square test.

Results and Discussion

The results of the present study were represented in Table 1 and Table 2, which indicate that the seasonal anestrus pigs could be successfully synchronized using 175 µg D-Cloprostenol. At the same time it was concluded that AI can be performed using NBSE and PRIMXcell diluted semen without much variation in the fertility when utilised within 24 h of dilution.

Increased production of a farm begins with improved reproductive management of the herd. Successful AI depends on proper heat detection, time of semen deposition and availability of sufficient spermatozoa to fertilize the ova released. The overall fertility by AI with both the diluents used in the experiment was satisfactory. However, the composition of NBSE diluent used in the experiment is not available to public as it was filed for patent right considerations (patent serial number of NBSE is 3037/MUM/2015). Similar results of artificial insemination with natural estrus were reported [13, 9]. The estrus response rate with 175µg D-cloprostenol was 60% which was lower than 85% [2] and was higher than 40% [15]. The variable degree of estrus response rate after PGF2α treatment of sows might be due to treatment of animals in the unknown stage of spontaneous estrous cycle [14, 4].

Highest fertility in the present work, with natural estrus might be attributed to the utilisation of semen within 24 hours of dilution and deposition of semen within 12–24 h after standing reflex was noticed which was well supported by [16]. Use of AI doses older than 12–24 h following extension of the semen may lead to fertility losses, particularly in terms of litter size [3]. Hence, eighty-five percent of all inseminations are conducted on the day of collection or on the following day [8].

Table 1: Fertility results of artificially inseminated pigs with PRIMXcell and NBSE with natural and synchronized estrus

Natural estrus		
Diluents	**PRIMXcell**	**NBSE**
Conception rate (%)	100% (6/6)^a	100% (6/6)^b
Litter size (n)	10.00 ± 1.03^a	9.50 ± 0.76^b
Litter size at weaning (n)	8.25 ± 1.19^a	7.50 ± 0.91^b
Birth weight per piglet (kg)	1.03 ± 0.06^a	1.02 ± 0.04^b
Body weight at weaning per piglet (kg)	7.96 ± 1.05^a	7.89 ± 0.96^b
Synchronized estrus		
Conception rate (%)	33.33% (2/6)^a	50.00% (3/6)^b
Litter size (n)	7.00 ± 0.50^a	6.67 ± 1.20^b
Litter size at weaning (n)	6.13 ± 0.64^a	6.00 ± 0.90^b
Birth weight per piglet (kg)	1.13 ± 0.95^a	1.21 ± 0.76^b
Body weight at weaning per piglet (kg)	8.25 ± 0.05^a	8.00 ± 0.52^b
Overall performance of diluents		
Conception rate (%)	66.66% (8/12) ^{a}	75.00% (9/12) ^{b}
Litter size (n)	8.5 ± 0.84^a	8.08 ± 0.98^b
Litter size at weaning (n)	7.19 ± 0.91^a	6.75 ± 0.90^b
Birth weight per piglet (kg)	1.08 ± 0.50^a	1.11 ± 0.40^b
Body weight at weaning per piglet (kg)	8.10 ± 0.55^a	7.94 ± 0.74^b

The values with different superscripts in the above table did not differ significantly (p>0.05).

Table 2: Different fertility parameters noted for synchronized estrus in pigs during summer with single intramuscular injection of 175 µg D-cloprostenol.

Fertility parameters recorded	
Estrus response rate (%)	60 (12/20)
Animals with high estrus intensity (%)	25 (5/20)
Animals with low estrus intensity (%)	35 (7/20)
Onset of estrus (days)	3.75±0.44
Duration of estrus (h)	42.00±1.80
Conception rate (%)	41.25
Litter size (n)	6.83

In summary artificial insemination with both the diluents have shown to be beneficial for efficient utilisation of a breeding boar, as acceptable conception rate, litter size at birth and weaning, litter weight at birth and weaning were noticed. Also good estrus response rate was noticed with cloprostenol synchronised estrus. However further studies are addressed with larger herds to know the efficiency of cloprostenol synchronised estrus and also to know the efficiency of the newly launched semen diluents. AI of swine in the Indian subcontinent is very rare and so this experiment was designed to study the beneficial effects of AI. The lower performance of AI in field condition most likely to be due to the failure in maintaining of correct temperature while storage and transportation [9]. Hence, extenders which could preserve the semen at low temperature (5 ºC) and ultra low temperature (cryopreservation) without effecting conception rate and litter size are needed to address the successful spread of AI under field conditions in India.

Acknowledgements

The authors are thankful to ICAR-CCARI, Goa and to the

College of Veterinary Science, Rajendranagar, Hyderabad for providing necessary financial and infrastructure facilities for this study.

Reference

1. Bennemann PE, Diehl GN, Milbradt E, Vidor RM, Fries HCC, Wentz I *et al*. Artificial Insemination of Gilts with 1.5 Billion Sperms Stored in Different Periods Associated with Different Pre-ovulatory Intervals. Reproduction in domestic animals. 2005; 40(6):507-510.
2. Chakurkar EB. Synchronization of estrus in local and large white Yorkshire sows under costal climatic conditions. Indian Journal of Animal Reproduction. 2009; 30(2):39-41.
3. Christensen P, Knudsen DB, Wachmann H, Madsen MT. Quality control in boar semen production by use of the FACSCount AF system. Theriogenology. 2004; 62(7):1218-1228.
4. De Rensis F, Saleri R, Tummaruk P, Techakumphu M, Kirkwood RN. Prostaglandin F2α and control of reproduction in female swine: a review. Theriogenology 2012; 77:1-11.
5. Dudhatra GB, Mody SK, Patel HB, Modi CM, Chukewar AB, Kumar A *et al*. Prostaglandins and its analogues: An approach for treatment of anoestrus and to enhance breeding efficiency. Veterinary World. 2012; 5(6):378-384.
6. Gadea J. Review: semen extenders used in the artificial inseminarion of swine. *Spanish* Journal of Agricultural Research. 2003; 1(2):17-27.
7. Haugan T, Gaustad AH, Reksen O, Gröhn YT, Hofmo PO. Fertility Results of Artificial Inseminations Performed with Liquid Boar Semen Stored in X-CellTM vs BTS Extender. Reproduction in domestic animals. 2007; 42(1):94-99.
8. Johnson LA, Weitze KF, Fiser P, Maxwell WMC. Storage of boar semen. Animal reproduction science. 2000; 62(1):143-172.
9. Patra MK, Kent Y, Rungsung S, Ngullie L, Nakhro R, Deka BC. Performance Appraisal of Artificial Insemination Technique in Pig under Organized Farm and Field Condition in Nagaland. Indian Research Journal of Extension Education. 2016; 14(4):55-60.
10. Peltoniemi OAT, Tast A, Love RJ. Factors effecting reproduction in the pig: seasonal effects and restricted feeding of the pregnant gilt and sow. Animal Reproduction Science. 2000; 60:173-184.
11. Pena FJ, Domínguez JC, Alegre B, Pelaez J. Effect of vulvomucosal injection of PGF2α at insemination on subsequent fertility and litter size in pigs under field conditions. Animal reproduction science. 1998; 52(1):63-69.
12. Pena FJ, Gil MC, Pena F. Effect of vulvomucosal injection of D-cloprostenol at weaning and at insemination on reproductive performance of sows during the low fertility summer season under field conditions. Animal reproduction science. 2001; 68(1):77-83.
13. Ronald BSM, Jawahar TP, Gnanaraj PT, Sivakumar T. Artificial insemination in swine in an organized farm – A pilot study. Veterinary World, 2013; 6(9):651-654.
14. Stancic I. Indukcija estrusa i fertilitet nazimica sa prolongiranom preinseminacionom anestrijom, tretiranih preparatima gonadotropina i progestina. PhD, Univerzitet u Novom Sadu, Poljoprivredni fakultet, 2010.
15. Stancic I, Radovic I, Gvozdic D, Savic B, Stancic B, Bosnjak D. Estrus Induction in Sexually Mature Gilts with Different Hormonal Treatments. Proceedings of the International Symposium on Animal Science 2014, September 2014, Belgrade-Zemun, 2015, 37-42.
16. Steverink DWB, Soede NM, Bouwman EG, Kemp B. Influence of insemination–ovulation interval and sperm cell dose on fertilization in sows. Journal of Reproduction and fertility, 1997; 111(2):165-171.
17. Waberski D, Magnus F, Ardon F, Petrunkina AM, Weitze KF, Töpfer-Petersen E. Binding of boar spermatozoa to oviductal epithelium in vitro in relation to sperm morphology and storage time. Reproduction, 2006; 131(2):311-318.