

Artificial insemination in pig

for enhancing the pig productivity in North Eastern Hill region

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Artificial insemination (AI) is a technique in which semen collected from the male is processed in the laboratory and deposited into female reproductive tract artificially with the catheter at appropriate time. Artificial insemination is widely adopted reproductive technique in breeding programmes for livestock improvement. The technology has been standardised for most of the domestic livestock species with species specific modifications. This is being widely used in cattle and buffalo in India. However, in pig, AI has not been exploited commercially despite its huge perceived benefits. It is an extremely easy and low cost technique and holds great promise for the Indian pig farmer.

Keywords: Artificial insemination, Boar, Estrus, North-Eastern Hill Region, Pig, Semen

TRIBAL farmers rear pigs under scavenging system in major parts of India and under backyard production in North-eastern India. The bulk of the pig population in India is of indigenous type with poor growth rate and productivity.

Pig production has a high potential to contribute to higher economic gain as pigs have higher fecundity, higher feed conversion efficiency, early maturity, shorter generation interval and relatively smaller space requirement. As per the XIX Livestock Census (2012), the swine population of India is 10.29 million, with a decrease in population by 7.54% over the previous census. Pork production in India is limited, representing only 7% of the country's animal protein sources. Consumption of pork is concentrated mainly in the north eastern States of the Country and there is huge demand and supply gap. Farmers rear pig mainly for meat purpose. There is a lack of interest among farmers for pig rearing for breeding purpose mainly due to non-availability of breeding boar, high cost of breeding and lack of

awareness among the farmers. In NEH region, tribal farmers generally keep one boar for 4-5 villages for breeding purpose and they have to transport female pig at the time of estrus which further adds cost to the farmers.

Therefore, to address the above challenges and in view of the importance of pig farming to rural poor in our Country, large-scale application of Artificial Insemination (AI) technology under field conditions and horizontal spread of superior germplasm needs to be taken up expeditiously. Compared with natural mating, artificial insemination is the better way to introduce superior genes into sow herds, with a minimal risk of disease. Artificial insemination coupled with estrus synchronization is very useful in planned and controlled breeding. Artificial insemination also helps in avoiding inbreeding due to repeated use of same boar in natural mating. It will also eliminate the need of keeping boar at every farm or household for breeding purpose which will lower the cost of

production. Also, AI helps in better maintenance of record at the farm.

Artificial Insemination Technology in NEH Region

Artificial insemination in Nagaland was successfully introduced under ICAR-Mega Seed Project on Pig. National Research Centre on Pigs (NRCP), Rani, Guwahati successfully introduced AI technology at field level in Assam. In Mizoram, pig farming cooperatives are carrying out AI extensively which has been an enormous success. It is also the first State in the Country to start AI programme in pig. ICAR Umiam too has been carrying out AI in pig. However, In India, hardly 1-2% of pigs are bred through artificial insemination.

Artificial insemination technique requires certain infrastructural facilities as well as expert manpower for carrying out various aspects of the technique successfully. The requirements of AI are a standard boar station; semen processing and analysis laboratory; trained manpower and proper

communication chain with farmers.

ASPECTS OF ARTIFICIAL INSEMINATION IN PIG

Boar training

Good male piglets of superior pedigree are selected and kept in groups away from female animals upon weaning. After they reach the age of puberty (6-7 months), they are isolated and kept in isolation for some time before commencement of dummy training. It is preferred to keep the male piglets in separate shed at least 50 to 100 feet away from female shed. Generally the boar should start mounting the dummy within 15 days and start donating ejaculates within 20-25 days. Boar displaying low libido should be rejected from breeding programme. The young boars are introduced to the dummy and allowed to sniff the dummy which may be smeared with the saliva, urine or vaginal discharges of sows in heat. Otherwise the saliva and semen of older boars may also be used. Prior to training, dummy mounting and semen collection of older boars may be done in view of the younger boars as this influences a positive response in faster mounting by the trainee boars. Once a young boar mounts the dummy, its ejaculate may be collected and analysed for concentration and viability, and the semen may be inducted into the AI programme. Semen must be collected at an interval of 3 days (minimum interval).

Semen Collection

Semen is collected by the gloved hand method in which the cork screw tip of the boar penis is grabbed and held by the hand of the collector using a polyvinyl glove (do not use latex gloves). The semen is collected into a collection flask or thermos flask (maintained at 37°C) through a Buchner funnel fitted with milk filter to filter out the gel plug of the boar ejaculate. The pre-sperm fraction (about 10-20 ml) consisting of preputial fluid and urine accumulated in the prepuce is not collected and only the sperm rich fraction is collected. The collected ejaculate is immediately brought for processing

and dilution.

Semen Quality

Once a boar is to be included in the AI programme, its semen should be of standard quality. Workers have reported varying sperm concentrations in boar semen but it is widely agreed that undiluted boar semen consists of 100-300 million sperm cells per ml of ejaculate and 30-60 billion sperm cells per ejaculate. The volume of ejaculate varies but in normal conditions it varies from 200-300 ml per ejaculate with some boars ejaculating as high as 300-400 ml of semen. Consistency of semen should be milky white. Ejaculates having more than 70% progressive motility and less than 20% abnormal spermatozoa are processed for use in breeding programme.

Semen Processing and Preservation

The extender is prepared in double distilled water at 35-37°C and the semen is mixed with it. The

minimum sperm concentration per AI should be at least 2-3 billion spermatozoa in 80-100 ml of insemination volume. The processed semen is packed in pouches made of neutral non-spermicidal material and preserved at 16-18°C in BOD incubators.

Heat Detection and Insemination

The estrus duration in sows is 2-3 days. In gilts, the heat lasts for 40-48 hours. After weaning, the sow may return to heat by 3-8 days. Standing heat is the period when a female stands still and rigid when weight is applied on her loin. Lordosis or standing heat, is identified by signs such as swelling and reddening of the vulva, vulvar discharge, vocalization, in-appetance, boar seeking behaviour, ear popping and standing for back pressure. Gilts should be bred 12-24 hours after heat is detected, and again 12 hours later. Sows should be bred 24-36 hours after detection of heat, and again 12 hours after the first insemination. Generally the

Success Story

Aomeren Langu, aged 51, from Diphupar village, Dimapur, has been rearing pigs in the traditional way for many years. He was rearing the breeding boar for providing natural service to the sow of fellow farmers of his village. He attended a three days training on AI in pig at ICAR Jharnapani in 2016. After the training, he started doing AI in his own sows and thereafter for other farmers in his village. He was carrying out the inseminations with liquid boar semen from Mega Seed Project-Pig along with technical aid from experts at ICAR Nagaland Centre, Medziphema. He got high success rate in his work and AI became more popular than natural service in Diphupar village. In 2017-18 and 2018-19, he carried out 132 inseminations; of which 92 farrowed. He is charging 500-1000 rupees per AI depending on the distance to be covered and earning ₹ 15,000-20,000 per month. He also keeps breeding sows and sold 112 piglets from his farm born through AI. With a total farrowing of over 732 piglets, litter size varying from 2-16 piglets, Aomeren has successfully established the advantages of doing AI in Diphupar village. He particularly emphasized on the cost, availability and ease of doing AI by the farmers itself and also now there is no need to take the sow to boar for breeding purpose.



Particular	Unit Price in (₹)	Cost for each collection (Minimum 15 doses) (₹)	Cost of Natural Breeding (₹)
Transportation of animal	0	0	300
Cost of breeding	-	-	2000
Diluent	220.00 per litre	220	0
Semen pouches	20	300 (20 X 15)	0
AI catheter	18	270 (18 X 15)	0
Collection gloves (1 pair)	13	13	0
Filter (1 Sheet)	12	12	0
Miscellaneous	50	50	0
Total		794	2300
Cost of breeding per animal (Single insemination)		865/15= 57.66	2300

farrowing rates are 70 to 85% when the semen is used within 2 days of collection.

Intra-cervical artificial insemination is done in pigs with a golden pig catheter and an 80 ml capacity semen pouch. A non-spermicidal lubricant is smeared on the foam tip of the catheter. The vulvar region of the animal is cleaned with single use disposable wipe so that no dirt or manure is introduced into the reproductive tract when the AI catheter is inserted. The catheter is inserted at an angle of 30° to the backbone after proper lubrication until resistance is felt. The inseminating catheter is gently twisted counter clockwise until the tip is properly locked into the cervix.

The pouch is connected to the catheter and the liquid semen is deposited slowly with the help of gentle pressure on the pouch. Simultaneously rubbing the flank and underlying region stimulate the female to suck semen into the uterus. After complete deposition of the semen, catheter is gently withdrawn by simultaneously twisting it in a clockwise direction.

SUMMARY

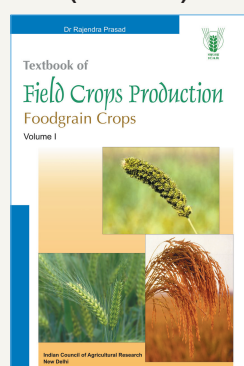
Artificial insemination in northeast India has been introduced only recently but the response from the farmers is quite favourable. It has already taken off in parts of Assam, Meghalaya and Mizoram with enormous success. In Nagaland,

ICAR has introduced this technology and is getting popular among farmers. ICAR Nagaland has carried out a total of around 2,500 inseminations from 2013 till 2019 and produced around 20,000 piglets. The average litter size has increased from 7.15 to 10.21 as compared to natural service. The farrowing rate has also stayed at an average of 75% through the period. The cost of AI is also 1/10th of the cost of natural service. There are piecemeal efforts mainly by research institution and lack of interest among various state departments for its implementation. In order to replicate the successes achieved in different countries, a proper understanding of the technique, its adaptability to local conditions and the regulations that need to be put in place need to be explored in India. The establishment of support services is vital to achieve success. To reap the full potential of this technology, concerted efforts are needed from all stakeholders. The technology has the potential for enhancing the profitability of pig farming in sustainable way.

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TECHNICAL SPECIFICATIONS

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