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Artificial insemination and freezing goat semen –new techniques in Vietnam

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Introduction

Artificial Insemination (AI) for pig and cattle is a routine and very popular in Vietnam. This technique is, however, still new for goats in Vietnam even if it has been applied widely in several countries such as France, India, Philippines, etc. Recently, goat production has increased in the rural and mountainous areas, where the climate is suitable for this kind production. Bachthao goat, Indian dairy goats, and the crossbreeds between them are favorite breeds of the farmers at present. However, the number of bucks of those breeds is not enough for the female goats. Good bucks are needed in the breeding seasons, especially in the farms that are far away from the Breeding Center. In addition, there are many difficulties when producing crossbreeds due to the difference of the body weight between Bachthao males and females of the local Co goat.

The objectives of the present study were to determine a method of semen collection using a homemade artificial vagina and a media of semen extender for goats, to establish an AI method for does to get a pregnancy rate of about 60%, using semen extender and to examine advantages and disadvantages of AI technique applied on goats on smallholder farms.

Material and methods

Semen collection

Semen was collected with an artificial vagina. Warm water (39-40^{o}C) and air was injected into an artificial vagina to maintain the proper temperature and pressure for the ejaculation. The rubber part of the artificial vagina was lubricated by vaseline. The semen was collected into the tube when the buck mounted a doe in heat..

Semen can be collected from some bucks with very good libido without does in heat. In most cases, however, a doe is needed to collect semen from male goats. The young doe should practice 2-5 times before the first semen collection..

Evaluation of semen

Evaluation of semen was based on the following criteria: Volume (V), Motility (A), Concentration (C), pH, Abnormality rate (K). Acrosome proportion (Acr %) and Osmotic pressure. Semen that has A≥0.7 can be used for AI.

Semen dilution

One part of the semen was diluted with three parts of extender before using for AI. The extender is composed of 90 ml buffer with 10 ml chicken egg yolk, 50 000 IU Penicillin and 0.05g Streptomycin. The buffer solution contains 20g Sodium Citrate, 2.1g Sodium Bicarbonate, 0.4g KCl, 3g Glucose, 3g Sulfanilamide, and 1000 ml distilled water.

Diluted semen need to be checked for motility before use. The diluted semen had slightly lower motility compared to undiluted semen. Diluted solution can be kept at 5-7^{o}C up to 3-4 days.

AI method

The doe is kept tightly by two legs of the helper. The hind legs of goat are lifted so the rear part is kept higher than the fore part of the body. A lubricated speculum is used to open the vagina and a flash-light to illuminate the cervix. The AI tube is inserted deeply into the cervix and the semen is released slowly.

Results and discussion

From the study of AI for goats of local breed in Vietnam it can be concluded that even though the number of female goats used for AI is still low (only 15 goats) and the pregnancy rate was not very high (66%), the study can be considered to be successful. Semen was collected, which is difficult to do in goats, and AI was done successfully for the first time in Vietnam. Transport of the semen long distances (about 15-20 km) and the difficulty of estrus detection for AI in the farm are factors that affected the pregnant rate in this study (Table 1).

Table 1. Result of AI for Co goats

				Number of AI goats		
Volume of ejaculation (ml)	Motility (A)	Acrosome (Acr%)	Volume for AI (ml)	October 1995	December 1995	February 1996
x= 0.6 (0.3-1)	x= 0.75 (0.7-0.8)	x= 75 (70-93)	x= 1.2 (1-1.5)	5	6	4
			Pregnant goat	3	4	3
			Crossbred offspring	5	5	5

Osmotic pressure of semen: 415 mosmol
Pregnancy rate: 66.66%
Crossbred offsprings: 15 goats

To use diluted semen was not practical and samples were wasted since they could only be kept for a short time and it was not possible to collect semen without a female goat in heat. In addition the goats are distributed over a large area. To solve all these problems methods for freezing semen were studied.

To determine a suitable extender for freezing the two following solutions were tested:
Solution 1: Lactose 11%, 75 ml; Egg yolk, 20 ml; Glycerol, 5 ml; Penicillin, 100.000 IU; Streptomycin, 0.1 mg; Osmotic pressure, 1283 mosmol/kg.
Solution 2: Buffer (Tris, Fructose, Citric acid), 73 ml; Egg yolk, 20 ml; Glycerol, 7ml; Penicillin, 100.000 IU; Streptomycin, 0.1 mg; Osmotic pressure, 1563 mosmol/kg

The study showed that the second solution can be used to freeze goat semen with good sperm motility after dilution and equilibration

Table 2. Solution 2 for freezing goat semen

Parameter	Value
Volume (ml)	x=0.722 (0.3-2)
Motility of undiluted semen	x=0.75 (0.7-0.8)
Percentage goat which has A≥0.7	50%
Motility of diluted semen	x=0.7 (0.6-0.8)
Motility of equilibrated semen	x=0.7 (0.6-0.8)
Concentration ($x10^7$)	x=269.3 (160-500)
pH of semen	x=6.97(6.5-7)
pH of solution	x=6.71
Dilution rate	1:3
Motility after freezing	x=0.3 (0.2-0.4)
Good quality rate of pellet semen	73%
Number of pellets per goat and ejaculation	20

The percentage of goats with A≥0.7 was only 50% suggesting the necessity of semen freezing not only for production of semen pellet for AI, but also for selecting the best males for breeding.

Conclusions

The pregnancy rate for goats using AI was 66.66%, which means that AI may be a solution for farmers who want to produce crossbred goats but have no male Bachthao or Indian goats. AI can also contribute to a faster improvement of the local breed.

A suitable freezing solution for semen was found. The good quality rate of semen pellets was 73%. Number of pellets per goat per ejaculation was 20. In the future this technique may be applied widely as it has been done in cattle.

It is recommended that AI technique with frozen semen should be applied in goats to produce crossbred goats and to record the pregnancy rate.