American-Eurasian Journal of Sustainable Agriculture
ISSN: 1995-0748

JOURNAL home page: http://www.aensiweb.com/aejsa.html 2014 Special; 8(7): pages 35-38.

Published Online 2014 February 30. **Research Article**

Reproductive Performance and Success of Artificial Insemination in Indonesian Crossbreed Goats in Research versus Small Holder Farm

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Received: 25 June 2014; **Received**: 8July 2014; **Accepted**: 10 August May 2014; **Available online:** 30 August 2014

ABSTRACT

Artificial inseminasion (AI) of crossbreed goats was initiated to introduce better and new genetic at the small holder farmer level by using frozen semen. In Indonesia, AI using Boer goat freezing semen have been introduce to overcome reproductive inefficiency and accelerate genetic gain in local goat which animals were reared under field condition on small holder farm. This research was performed to compare of the success rate of AI with frozen semen at the level of small holder farmers versus a researh farm. Mature female local goat (PE and Kacang goat) grouped in two different environment with the total of 38 head at the researh farm and 18 in a small holder farm. Animals were synchronized with progesterone double injection of $PGF_2\alpha$. All the does were inseminated at the fixed time of 43-45 hrs after second injection of $PGF_2\alpha$ at 12 hrs interval. Pregnancy of the does test was determined by observing he animal didnot show estrus between 18-21 days post insemination for at least 2 estrus cycle (Non Return Rate). Pregnancy was also diagnosted using tl paplation method. Results showed that 80,0 % of does showed estrus signs and 70 % of them were detected between 24 – 42 hrs after $PGF_2\alpha$ injection. An overall 57.85 % pregnancy rate was recorded. Higher pregnancy rate (69.54%) was obtained in does inseminated in research farm compare to 53.57 % at small holder farm. Sex ratio of the 125 offspring is 53 %. All variable observed of reproductive performance had a significant effect ($P< 0.05$) except of PE vs Boer crossbreed. Results were encouraging in that this is one of the first report of kidding through AI in estrus induced of local Indonesian goats then cross to Boer goat in both research farm versus a small holder farm.

Moreover, it indicated the feasibility of using synchronization and fixed time AI to enhance the reproductive efficiency and genetic quality in local goat which crossed with Boer goat.

Key words: AI, Indonesian Goat, Boer Goat, $PGF_2\alpha$, Pregnancy.

INTRODUCTION

Artificial Insemination (AI) of goats is a new method of animal genetic and reproduction quality improvement in Indonesia, especially in the small holder farms. The improvement of poor local goat performance is considered important and there are effort to improve many aspect of animal husbandry ie. feed quality, animal health, breeding and reproduction. For the local goat, it is neccessary to improve the genetic potential, especially in small holder farms, one of the limiting factors has been limited number of genetically improved animals.

Recently, estimated goat population in East Jawa province is 2.95 million heads and it is about 16,0 % of 18.57 million total population goat in Indonesia. The reproduction rate of goats is an mportant economical factor in small holder farms. A crossbreeding programe between local female goats namely Kacang Goat and Peranakan Etawah (PE) goat with male Boar goat are a reasonable approach for targeting better performance and meat quality production. Because, in general, the production potential of local goat are relatively poor.

Artificial insemination is not a viable alternative for all Indonesian goat farms, especially for small holder farm. However, artificial insemination using frozen semen is starting to be implemented in crossbreeding programmes, especially with Boer goat for rapid multiplication of superior male germ plasm.

Objectives:

This research was aimed to compare of the

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success rate of AI of the Indonesian Goat with frozen semen of Boer goat at the level of small holder farmers versus a researh farm .

Materials and Methods

Animals Selection and Estrus Synchronization:

A total of 56 local goat were used in this study. Non-pregnant does (n=18) controled at the reserech farm of the faculty of animal husbandry, Brawijaya University at Sumber Sekar village and also animals (n=38) kept by common farmers around Dau Distric, Malang Regency were selected for synchronization and AI.

Prior to start of the experiment, animals were selected which had at least one parity (P1) then monitored for at least 1-2 cycles of estrus for considering as normal reproduction performance. Estrus synchronization treatment was doneusing single injection of base on redorded normal cyclycity and double injection for unpredicted reproduction cyclicity. Female treated goats treated were observed for estrus signs (mucus discharge, restlessness and vaginal visualization) and confirmed estrus was detected by visual observation using apronised buck 4 times a day at 6 hour intervals for 48 to 73 hrs after latest injection of $PGF_2\alpha$

Artificial Insemination:

Semen was collected from one buck with artificial vagina at 38 °C. Samples were evaluated for volume, percentage of progressively motile spermatozoa and sperm concentration. The ejaculate was selected for at leat 70 % motility, 60 x 10^6 sperm/ml and and diluted with commercial diluter (Andromed,IMV-Prance) and frozen in liquid nitrogen with conventional standard low freezing method.

AI was performed at 48-72 hrs after double/single injection of $PGF_2\alpha$. All females were inseminated twice (fist insemination was done 12 hrs interval after estrus onset and the thawed witn having minimum motility of 50-70%. AI was performed using double AI method. The pregnancy was confirmed by ultrasonography transabdominal approached 60 days post insemination**.** second 6 to 12 later) with 0.25 ml semen post Pregnancy test was performed after 45 days after AI and based on 2 times of Non Return Rate (NRR) on the small holder farms [3].

Statistical analysis on reproduction performance (pregnancy rate, service per conception, kidding interval and pregnancy lenght) were compared student t-test and a chi-quare test was performed to determinine sex ratio . Analysis was done using a standart software statistic analysis of microsof excell. The values were expressed as the mean ± the standard error of the mean (S.E.M) and the level of statistical significance was considered as $P<0.05$.

Result and Discussion

Artificial insemination should take place 12 to 24 hours after onset of estrus or standing heat. This is when cervical mucus changes from clear to slightly cloudy. When estrus is seen in the morning, the goats should be breed or inseminate in the late afternoon. If double AI is desired, breed again the following morning. When estrus is observed in the afternoon, AI the doe the following morning and again the following afternoon. Results showed that 80,0 % of does showed estrus signs and 70 % of them were detected between 24 – 42 hrs after $PGF_2\alpha$ injection. An overall 57.85 % pregnancy rate was recorded Problem in small holder farm is faced on many does in the herd may not be good AI candidates. Does that are very young or old, in poor health, or too thin or fat may be difficult to breed artificially. Performance of reproduction two types of crossed had differnt effect ($P> 0.05$ tablel 1.)in service per conception, kidding interval and pregnancy, except of service per conception PE vs Boer.

All variable observed of reproductive performances had a significant effect ($P< 0.05$) except of PE vs Boer crossbreed . The results show that AI using Boer goat freezing semen to both two management conditions could be used effectively (table.1). Further work is needed on method of pregnancy detection and synchronization of estrus (hormonal treatment) especially for optimal local goat conception rate in small holder farm. Success rates for pregnancy of one service (s/c 1.0) is common and would be considered acceptable for most goat AI *endeavors*. However, this percentage can be increased to 70-80% with practiced technique and improved heat detection.

The small holder farms results showed a pregnancy rate of 49.4% (Table 2). Higher pregnancy rate (69.640%) was obtained in does inseminated at the research farms. The 65% average pregnancy rate in goats was reported with AI [6] to 71.43 % [2] and this might be due to the relatively lower oestrus on the small holder farm. In case of small holder farm, many does in the herd may not be good AI candidates. Does that are very young or old, in poor health, or too thin or fat are difficult to breed. Pregnancy success rates are very important reproductive performance to be considered for increasing AI demand of small holder fams. So, it is important schedule breeding periods to assure a normal kidding number per year.

Although AI with hormonal estrus synchronization of PGF2A due to high cost relatevely compare to natural service, this reproductive technologies can be impplemented to to allow extra genetic gain through the increse number production offspring of males with highest

genetic quality. Pregnancy was diagnosed and obtaining an mean pregnancy rate of 53.57% (Kacang Vs Boer) and 47.05% (Peranakan Etawah Vs. Boer) in small holder farm..In researh farm this resukt is signifinaty increasing to 60 % (table 2.). This result is better than Arrebola *et al* . [1] reported pregnancy rate of 48.7 % using AI progrm with cooled semen but lower than result reported by Kulakzis and Daskin [5] who reported a 59.5 % fertility in Saanen goat.

Local goats in this tropical area are being able to reproduce throughout the year.Estrus synchronization. Estrus synchronization performed for the reason both technical and genetiv. Freitas *et al* [4] mention that estrus synchronization treatment currenly use for goat in tropical region were originally developed for goat in temparate region, so it need for improving the efficiency of the hormonal treatment. AI may be too expensive and time consuming for many small holder farms. However, if a producer's objective is to only impregnate the does, investment in a quality buck may be less costly and far less time consuming. Genetic and economic benefits should be considered in advance of major investments in AI. Economic benefits should be considered in advance of major investments in AI. Therefore, a breeding plan and objective must be in place beforebeginning AI.If a producer wishes to AI his herd he must become more proficient in the process of AI, estrus synchronization and heat detection. In small scale farms the total cost of AI using Boer goat semen is considered expensive. Semen costs for an excelent Pure Boer goats, produced by UB Boer, exported from Australian Boer Assoc, are also presently considered expensive, at 50.000 IDR to 100.000 IDR (US $5 to US10$) per dose of 0.25 cc straw.

Table 1: Performance Reproduction of Lobal Goat (Kacang and Atawah Goat crossed with Boer Goat).

No	Type of crossed	Reproduction performance			
No	Breed Crossing Type	Variable Observed	Goat Number (n)	Research farm (Mean ± SD)	Small Holder Farm (Mean ± SD)
1	Kacang vs Boer	Service per conception (s/c):	56	1.05 ± 0,24[a]	1.32± 0.47[b]
		Kidding Interval (days)	56	156.88 ± 2.27[a]	164.59 ± 6.68[b]
		Pregnancy Length (days)	56	235.01 ± 7,27[a]	258,70 ± 7.10[b]
2.	PE x Boer	Service per conception (s/c):	34	2.29 ± 0.75	2.54 ± 0.60 (n.s)*
		Kidding Interval (days)	34	269.52 ± 6.30[a]	288.9 ± 5.63[a]
		Pregnancy Length (days)	34	156.58 ± 4.50[a]	186.24 ± 5.17[b]

*n.s : non significant difference[a,b] Differences between treatments are statistically significant (P<0.05)

Table 2: Comparison of the precentage pregnancy rate and sex ration in does inseminated artificially in research versus small holder farm

No.	Type of crossed/Breed Goat	Female Inseminated (n)	Type of farm	
			Small holder farm (%)	Research farm(%)
1.	Kacang vs Boer			
	Pregnancy rate	56	53.57	69.64
	Sex Ratio	56	48.80	52.20 (n.s)
2	PE Vs Boer			
	Pregnancy rate	34	47.05	61.17
	Sex Ratio	34	50.80	49.20 (n.s)

*n.s : non significant difference.

Conclusion:

Higher pregnancy rate (69.64.0%) was obtained in does inseminated at reasearch farm compared to 53.57 % at small holder farms (Kacang vs. Boer). Overall sex ratio offspring resulted from AI is considered normal (57,85 %). Synchronization methods using $PGF_2\alpha$ are considerd effective to enhance the reproductive efficiency in local goat. Boer semen costs become more reasonable, AI will become a less costly tool for genetic improvement.

Acknowledgments

This field action research was supported by the grant of *IbIKK* Program from Directorate General of Higher Education (DIKTI), Departement of National Education , Republic Of Indonesia, 2011-2013. Contract No. 321/SP2H/ KPM/DITLIBTABMAS/V/2013. The teams would like to expressed great thank to the services of technical staff in Lab of Sumber Sekar, Fac of Animal Sci. UB. We are gratefull to Dr. Cynthia Bottema from Univ of Adelaide for correcting the English of manuscript

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