

Sperm Quality of Gembrong Goat in Bali, East Java and North Sumatera after Extended with Citrate-egg Yolk, Tris-egg Yolk and Andromed®

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ABSTRACT: The aims of this study were to compare tris-egg yolk and citrate-egg yolk extender on the quality of Gembrong goats semen in three different place, Bali, East Java, and North Sumatera. Semen was collected from 9 heads aged 2-4 years using artificial vagina. Semen was evaluated macroscopic and microscopically. Collected semen divided in two tubes and extended with citrate-egg yolk (CEY) and tris-egg yolk (TEY). There were significant differences ($P < 0.05$) on the motility between CEY and TEY extender in the three places Bali (CEY (85 ± 3.5) TEY (90 ± 2.1)); East Java (CEY (82 ± 2.5) TEY (88 ± 3.1)); and North Sumatera (CEY (82 ± 4.5) TEY (85 ± 4.1)). There were no significant differences on viability and abnormality between CEY and TEY extender in the three places, viability in Bali (CEY (91 ± 3.5) TEY (92 ± 4.1)); East Java (CEY (88 ± 2.5) TEY (89 ± 3.1)); and North Sumatera (CEY (86 ± 2.5) TEY (85 ± 3.1)); abnormality in Bali (CEY (11 ± 1.5) TEY (10 ± 1.1)); East Java (CEY (13 ± 2.5) TEY (11 ± 2.1)); and North Sumatera (CEY (16 ± 4.5) TEY (14 ± 3.1)). In conclusion CEY support the sperm motility as good as TEY of Gembrong goats in three places Bali, East Jawa, and North Sumatera respectively.

Keywords: Gembrong goats, Semen, Citrate-Egg Yolk, Tris-Egg Yolk

INTRODUCTION

The Government has issued the Regulation No. 48/2011 on Animal Genetic Resources (AGR) and Livestock Breeding. One of AGR goats owned by Indonesia is Gembrong goat. Naming Gembrong on this goat come originally from the shape and condition of thick fur on the head, like long hair (Bali = Gembrong).

Sidadolog *et al.* (2013) reported that the number of Gembrong adult goats in farmer group of Wisnu Segara consists of 1 white goat aged 3.5 years, 2 brown goats (mixed) aged 2.5 years and 1 white goat aged 2 years. Body weight of Gembrong adult male goat varies from 18-35 kg in accordance with the age, with an average of 25 ± 7.44 kg. Ear length is relatively the same, between 12-15 cm with an average of 13.25 ± 1.29 cm. Head index, as the representation of head shape, is the ratio between the width and length of the head, ranging from 70.58-87.50%, with an average of $77.81 \pm 7.90\%$. Head profile of Gembrong goat tends to shape long ellipse. Horn length also varies greatly, it is arched back and the length varies according to age between 8-15 cm with an average of 11.75 ± 2.99 cm. Body size of Gembrong goat shows characteristic signs of Kacang goat. Besides in Karangasem Bali, Gembrong goats are also farmed in Pacet, Mojokerto, East Java and Sei-Putih, North Sumatera.

The Research Center for Agricultural Technology Bali reported that, in 1970s the number of this goat was still about 200 heads. In 1996 the number decreased to 80 heads and in 1998 remained 64 heads. Astuti *et al.* (2007) stated that at present, the population of Gembrong goats is

very alarming. It is presumed that the population is diminishing every year, so there are no more than 50 heads. According to the records of Indonesia Science Institute (LIPI) and Sidadolog *et al.* (2013) the population of Gembrong goat at present is 29 heads farmed in Karangasem Bali and 20 heads in Mojokerto, making a total of 49 heads. Based on FAO (2004) this population is categorized as very dangerous and endangered.

Based on those facts, the efforts to save Gembrong goat are necessarily required so as to increase the population and to provide economic value for the farmer of Gembrong goat. One concrete step in saving Gembrong goat to improve the population is the need for semen bank. Semen bank is necessary because the population growth of Gembrong goat with natural mating is very slow and having some problems especially the needs for superior male. Another effort is to perform mating arrangement either naturally or using frozen semen from the semen bank through the Artificial Insemination (AI) or natural mating.

The use of extender is required in the production of frozen semen and it plays an important role in maintaining the quality of spermatozoa during storage. It is therefore necessary to study the quality of Gembrong goat semen using extenders such as citrate-egg yolk, tris-egg yolk and Andromed®.

This study was conducted to determine the sperm quality of Gembrong goat using citrate-egg yolk (CKT), tris-egg yolk (TKT), and Andromed®(ADR) as extenders in three conservation places of Gembrong goat in Bali, East Java and North Sumatera.

MATERIALS AND METHODS

This study used 9 male Gembrong goats aged 2-4 years from three (3) different places. The sperms were collected using artificial vagina, and then were assessed macroscopically and microscopically which includes motility, viability and abnormality of spermatozoa. The sperms were divided into three tubes and extended with CKT, TKT, and ADR. The data observed were motility, viability and abnormality of spermatozoa. Mean and standard deviation were used to analyze sperm characteristics, while one-way ANOVA was used to analyze motility, viability, and abnormality of spermatozoa.

RESULTS AND DISCUSSION

The results showed that the motility of Gembrong goat in Bali using extender of CKT 85 ± 3.5 , TKT 90 ± 2.1 and ADR 93 ± 2.1 had significant effect ($P < 0.05$). While the viability CKT 91 ± 3.5 , TKT 92 ± 4.1 and ADR 91 ± 4.2 and abnormality CKT 11 ± 1.5 , TKT 10 ± 1.1 and ADR 10 ± 1.2 showed no significant differences in the three extenders (Table 1).

Table 1. Average of motility, viability and abnormality of spermatozoa of Gembrong goat in Bali extended with CKT, TKT, and ADR

Variable	CKT	TKT	ADR
Motility	85 ± 3.5^a	90 ± 2.1^b	93 ± 2.1^c
Viability	91 ± 3.5	92 ± 4.1	91 ± 4.2
Abnormality	11 ± 1.5	10 ± 1.1	10 ± 1.2

^{a,b,c} different superscripts in different columns indicate significant differences ($P < 0.05$)

Motility of Gembrong goat in East Java using extenders of CKT 82±2.5, TKT 88±3.1, and ADR 89±3.2 showed significant effect ($P < 0.05$). While the viability CKT 88±2.5, TKT 89±3.1, and ADR 92±3.3 and abnormality CKT 13±2.5, TKT 11±2.1 and ADR 10±2.4 did not show significant differences ($P > 0.05$) in the three extenders. (Table 2)

Table 2. Average of motility, viability and abnormality of spermatozoa of Gembrong goats in East Java extended with CKT, TKT, and ADR

Variable	CKT	TKT	ADR
Motility	82 ± 2.5 ^a	88 ± 3.1 ^b	89 ± 3.2 ^c
Viability	88 ± 2.5	89 ± 3.1	92 ± 3.3
Abnormality	13 ± 2.5	11 ± 2.1	10 ± 2.4

^{a,b,c} different superscripts in different columns indicate significant differences ($P < 0.05$)

Motility of Gembrong goats in North Sumatera using extenders of CKT 82±4.5, TKT 85±4.1, and ADR 87±4.1 showed significant effect ($P < 0.05$). While the viability CKT 86±2.5, TKT 85±3.1, and 86±3.3 and abnormality CKT 16±4.5, TKT 14±3.1 and ADR 15±4.1 showed no significant differences in the three extenders. (Table 3)

Table 3. Average of motility, viability and abnormality of spermatozoa of Gembrong goats in North Sumatera extended with CKT, TKT, and ADR

Variable	CKT	TKT	ADR
Motility	82 ± 4.5 ^a	85 ± 4.1 ^b	87 ± 4.1 ^c
Viability	86 ± 2.5	85 ± 3.1	86 ± 3.3
Abnormality	16 ± 4.5	14 ± 3.1	15 ± 4.1

^{a,b,c} different superscripts in different columns indicate significant differences ($P < 0.05$)

Motility showed significant differences among the three extenders. The highest motility was in ADR extender in three (3) different places 93±2.1 in Bali, 89±3.2 in East Java and 87±4.1 in North Sumatera. Andromed® is one of commercial extenders that is made from tris comprising of phospholipids, tris-(hydroxymethyl)-aminometan, citric acid, fructose, glycerol, tilosin tartrate, gentamicin sulfate, spektinomycin, and lincomycin (Minitub, 2001).

The content of fructose, beside as a source of energy that can be readily used in metabolism, is also known to be able to maintain osmosis pressure in extender (Azawi *et al.*, 1993). Surachman *et al.* (2009) reported that the addition of sucrose 4% in Andromed® extender will be able to maintain the quality of epididymis spermatozoa of Belang buffalo up to 24 hours of storage in liquid form.

The energy generated from the process of sucrose breakage can be used for biomolecular processes such as protein synthesis to maintain cell organelles to remain active to perform its functions in keeping spermatozoa alive. Andromed® has the best effect on the quality of Limousin-cow spermatozoa than tris-egg yolk and skim milk (Suharyati and Hartono, 2011).

The viability of the three extenders in the 3 (three) places showed no significant differences. This is because the basic material of the three extenders is egg yolk which acts as an energy source and a protective agent containing lipoproteins and lecithin to protect and maintain the integrity of protein coat on the cell membrane of the sperm to prevent cold shock (Salisbury and Van demark,

1985).

Abnormality of the three extenders in the 3 (three) places showed no significant differences. Abnormality was still within the limits of the abnormality for artificial insemination (AI) as recommended by Toelihere (1993) and Hafez (2000), as long as it does not reach 205. Abnormal spermatozoa is usually caused by the shock of cold or heat, X-ray, an imbalance of nutrients and protein (Arifiantini *et al.*, 2005)

CONCLUSION

The use of extender of CKT, TKT, and ADR affected the motility but did not affect the viability and abnormality in sperm of Gembrong goats in some places of Bali, East Java and North Sumatera.

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REFERENCES

- Arifiantini, R. I., T. L. Yusuf, dan N. Graha. 2005. *Longivitas dan recovery rate pasca thawing semen beku sapi Frisian Holstein menggunakan bahan pengencer yang berbeda*. Bulletin Peternakan 28(3):53-61
- Astuti, M., A. Agus, I.G.S Budisatria, B. Aryadi, L.M. Yusiati dan A.U. Mujazanah. 2007. *Peta Potensi Plasma Nutfah Ternak Nasional*. Ardana Media. Yogyakarta.
- Azawi, O. I., S. Y. A. Al-Dahash, and F.T. Juma. 1993. Effect of different extenders on Shami goat semen. *Small Rum. Res.* 9:347-352
- Hafez, E. S. E. 2000. *Reproduction in farm animal*. 7th (ed). Lea and Febiger. Philadelphia
- Minitub. 2001. *Certificate Andromed*. Minitub Abfullund Labortechnik GmbH&CoKG. Germany
- Salisbury G.W., and N. I. Van demark. 1985. *Fisiologi reproduksi dan inseminasi buatan pada sapi*. R. Januar (Interpreter). Gadjah Mada University Press. Yogyakarta
- Sidadolog J.H.P., Sumadi, L.M. Yusiati, I.G.S. Budisatria, S. Bintara, dan D, Maharani. 2013. *Studi Karakteristik Biologis Kambing Gembrong Sebagai Plasma Nutfah Indonesia*. Laporan Penelitian. Fakultas Peternakan. Universitas Gadjah Mada. Yogyakarta.
- Suharyati, S. dan M. Hartono. 2011. *Preservasi dan kriopreservasi semen sapi Limousin dalam berbagai bahan pengencer*. *Jurnal Kedokteran Hewan* September Vol.5 No. 2 Page.53-58
- Surachman, M., Herdis, Yulnawati, M. Rizal, H. Maheswari. 2009. *Kualitas semen cair asal epididimis kerbau Belang dalam bahan pengencer Andromed yang mendapat penambahan sukrosa*. *Media Peternakan* Agustus Vol. 32 No.2 88-94
- Toelihere, M. R. 1993. *Inseminasi buatan pada ternak*. Penerbit Angkasa, 3rd edition Bandung