

Original Research Article

Spermatozoa Abnormality Test of Boer Goats Frozen Semen with Addition Sweet Orange Essential Oil and Streptomycin in Tris Yolk Extender

ABSTRACT

Research aims to to determine the percentage value of spermatozoa abnormalities in Boer Goat frozen semen by adding a combination of streptomycin with sweet orange essential oil to tris yolk extender. The ingredients used in this study were fresh semen from Boer Goat, tris yolk extender, streptomycin, and sweet orange essential oil. Tris yolk extender is made using Tris (hydroxymethylaminomethane) (3.32g), citric acid (1.86g), fructose (1.37g), glycerol (6ml), egg yolk (20ml), aquabides (100ml). The research method used in this study was a non factorial Complete Randomized Design with 5 treatments and 5 replications. The treatment given is the addition of sweet orange essential oil 0%, 0.25%, 0.5%, 0.75% and 1%. The results showed that the addition of a combination of streptomycin and sweet orange essential oil into the yolk extender tris had a very significant effect ($P < 0.01$) on the percentage value of spermatozoa abnormalities of Boer Goats before and after freezing. The best average value of spermatozoa abnormalities is the addition of sweet orange essential oil is 1% (P4) with the percentage of spermatozoa abnormalities before freezing is 3% and after freezing is 6%.

Keywords: Boer Goat, essential oil, frozen semen, Streptomycin, Sweet orange.

1. INTRODUCTION

Opportunities for export of goats are high, especially on Eid al-Adha. However, at present Indonesia has not been able to meet this demand due to the limited goat population and low local Indonesian goat weight. Local goats have a body weight between 18-20 kg, while the minimum requirement for goat body weight for exports is 25 kg. For this reason, it is necessary to consider how to improve genetic quality, especially the body weight of goats in Indonesia.

Reproductive technologies such as Artificial Insemination can be a solution to increase population and genetic quality of livestock. Artificial Insemination can optimize the use of a superior buck that has the ability to inseminate many does. Another benefit of Artificial Insemination is that it minimizes the danger of disease transmission, does not require a lot of buck for inseminate and good quality frozen semen because it comes from superior buck.

The Boer Goat is one of the superior goats whose sperm can be used for the Artificial Insemination program. Boer goats have advantages such as body weight and high litter size.

Indonesian local goats, despite their low body weight, have advantages such as being able to adapt to extreme environments. With the Artificial Insemination program, it is expected to obtain offspring of goats with high body weight and can adapt in Indonesia obtained from Boer Goats and Local Goats.

The success of the Artificial Insemination program in goats depends on the quality of frozen semen [1]. One of the causes the low spermatozoa survival during frozen semen storage is caused by the bacteria development. Generally the addition of antibiotics in frozen semen extenders is done to minimize bacterial growth. Provision of antibiotics such as streptomycin in goat semen extender has been done. But the results are still considered unfavorable, so efforts should be made to suppress bacterial growth. In this research an attempt was made to combine the antibiotic streptomycin with sweet orange peel essential oil which could be used as an antibacterial because it contains limonene and linalool which are toxic to bacteria. the addition of sweet orange essential oil can improve the quality of frozen semen of the Goat Boer [2]. The hypothesis of this study is that if the bacteria in the frozen semen of the Boer Goat can be suppressed, then the percentage of abnormalities will decrease.

2. METHODOLOGY

The research material is Boer Goat semen which has been added trish yolk extender, streptomycin and various levels of sweet orange essential oil with the treatment given are as follows:

P₀ = Streptomycin + Sweet Orange Essential Oil 0%

P₁ = Streptomycin + Sweet Orange Essential Oil 0,25%

P₂ = Streptomycin + Sweet Orange Essential Oil 0,5%

P₃ = Streptomycin + Sweet Orange Essential Oil 0,75%

P₄ = Streptomycin + Sweet Orange Essential Oil 1%

The research method is carried out experimentally with quantitative or objective approaches. Experimental research was carried out by making several treatments using various levels of sweet orange essential oil and comparing it without sweet orange essential oil (control). Activities in experimental research aim to assess the effect of the addition of sweet orange essential oil or test the presence or absence of influence on that addition when compared to without the addition of sweet orange essential oil. The research design used was a non factorial Complete Randomized Design with 5 treatments and 5 replications.

The parameter observed was evaluation of spermatozoa abnormalities in frozen semen before freezing and after freezing, by observing deviations in the morphological shape of spermatozoa which can reduce the spermatozoa fertility. Abnormalities calculated are head too big, head too small, double head (duplicate head), circular tail and double tail. The percentage of abnormality is calculated using the formula:

$$\text{Abnormality} = \frac{\text{abnormal spermatozoa}}{\text{total sperm counted}} \times 100\%$$

3. RESULTS AND DISCUSSION

The reseach results of spermatozoa abnormalities in frozen semen of Boer Goats before and after freezing can be seen in Table 1.

Tabel 1. Average percentage of spermatozoa abnormalities in Boer Goat semen before and after freezing

Parameter	Treatment	Observation	
		Before Freezing	After Freezing
Abnormalitas	P ₀	8±0.59	13±1.37

P ₁	7±1.24	10±1.37
P ₂	5±1.15	9±0.72
P ₃	4±0.69	8±1.24
P ₄	3±1.24	6±1.56

Explanation: Different superscripts in the column show very significant differences (P <0.01)

The results showed a decrease in the quality of spermatozoa during freezing and thawing. Spermatozoa motility after the cooling process has decreased, this decrease is caused by egg-yolk coagulating enzyme factors in goat semen plasma which are toxic, as well as due to cold shock [3].

Abnormality is a condition in which spermatozoa have defects in one or all parts of the body of spermatozoa [4]. Primary abnormalities occur during the process of spermatogenesis or testicular disorders, secondary abnormalities occur after spermatozoa leave the seminiferous tubules into the male reproductive tract, whereas tertiary abnormalities occur after ejaculation to the handling process.

The results of the analysis of variance showed that the effect of adding a combination of streptomycin with sweet orange essential oil as a diluent had a very significant effect (P <0.01) on spermatozoa abnormalities both before and after freezing. Further test results showed that the best abnormality was found in the P4 treatment of 3% before freezing and 8% after freezing.

Decreased spermatozoa motility is also caused by treatments that cause damage and death of spermatozoa. During the thawing process spermatozoa are susceptible to cell damage due to sudden changes in osmotic pressure caused by rapid thawing. Only spermatozoa have the ability of a strong plasma membrane to survive [5].

spermatozoa with normal acrosomes will be significantly reduced after the process of freezing and thawing [6]. Temperature changes can cause changes in spermatozoa cell membrane permeability and result in disharmonism, membrane breakdown, and enzyme removal. This condition can cause an increase in spermatozoa abnormalities [7].

The number of abnormal spermatozoa is increasing, causing low fertility of semen. Defective spermatozoa cells, although they can fertilize eggs, usually end with the death of a child before birth [8]. Other factors that influence the increase in abnormalities are inadvertent actions at the time of treatment, diluting semen with a fluid that is not as isotonic, cold shock, heat, and nutritional disorders [9].

Spermatozoa that experience abnormalities are caused by physical influences at the time of treatment, where spermatozoa rub against each other, causing both abnormality and death [10]. Factors that influence the abnormal percentage are inadvertent actions to dilute semen with a fluid that is not as isotonic, cold shock, heat, nutritional disorders or endocrine disorders that affect normal spermatogenesis [11]. During the freezing and storage of membranes there is a membrane imbalance, which can reduce the resistance of spermatozoa so that after thawing the quality of the semen becomes low [12].

4. CONCLUSION

The use of a combination sweet orange essential oil and streptomycin in the Boer Goat semen extender that is best used in the addition 1% sweet orange essential oil which can reduce the value of the percentage spermatozoa abnormality in frozen semen Boer Goat.

REFERENCES

1. Evans G. and W. M. C. Maxwell. 1987. Salamon's Artificial Insemination of Sheeps and Goats. Butterworths. London.

2. Sitepu, S. A., & Zaituni, U. 2018. Improved quality of frozen boer goat semen with the addition of sweet orange essential oil on tris yolk and gentamicin extender. In IOP Conference Series: Earth and Environmental Science (Vol. 122, No. 1, p. 012125). IOP Publishing.
3. Widjaya. N. 2011. Pengaruh Pemberian Susu Skim dengan Pengencer Tris Kuning Telur Terhadap Daya Tahan Hidup Spermatozoa Sapi pada Suhu Penyimpanan 5⁰C. Sains Peternakan Vol. 9 (2), September 2011: 72-76.
4. Fifi, A., Herdis., dan S. Said. 2013. Pembibitan Ternak dengan Inseminasi Buatan. Penebar Swadaya, Jakarta.
5. Maxwell W. M. C. and P. F. Watson. 1996. Recent Progress in the Preservation of Ram Semen. Animal reproduction.
6. Dorado, J., Munoz-Serrano, A., and Hidalgo, M. 2010. The effect of cryopreservation on goat semen characteristics related to sperm freezability. Animal reproduction science, 121(1-2), 115-123.
7. Partodihardjo, S. 1982. Ilmu Reproduksi Hewan. Mutiara Sumber Widya. Jakarta.
8. Feradis. 2014. Bioteknologi Reproduksi pada Ternak. Alfabeta, Bandung.
9. Kotsampasi, B., B. Tsiplakou., C. Christodoulou., A. Mavrommatis., C. Mitsiopoulou., C. Karaskou., and V. Christodoulou. 2018. Effects of Dietary Orange Peel Essential Oil Supplementation on Milk Yield and Composition, and Blood and Milk Antioxidant Status of Dairy Ewes. Animal Feed Science and Technology, 245, 20-31.
10. Inounu, I. 2014. Upaya Meningkatkan Keberhasilan Inseminasi Buatan Pada Ternak Ruminansia Kecil. Wartazoa, 24 (4), 201-209.
11. Yulianti, E. R. 2006. Pengaruh Beberapa Pengencer Dengan Waktu Equilibrasi Yang Berbeda Terhadap Kualitas Semen Kambing Boer Sebelum Pembekuan. Fakultas Peternakan UB. Malang.
12. Toelihere, M. R. 1993. Fisiologi Reproduksi pada Ternak. IPB Press, Bogor.