The Effect of Extract Turmeric *(Curcuma longa*) on Spermatozoa Motility in Fresh Semen of Goats

ABSTRACT

Aims: Determine the motility of spermatozoa in fresh goat semen after being given turmeric extract.
Study design: Randomized Block Design
Place and Duration of Study: Sample: Galang, Deli Serdang Regency, Indonesia, between December 2022 and January 2023.
Methodology: Giving turmeric extract to the goat once a day. The treatment included adding 0ml, 25ml, 50ml, 75ml, and 100ml turmeric extract. The parameter observed was the percentage of motility spermatozoa in fresh goats semen. The preparation of turmeric extract, Feeding goats using turmeric extract every day at 08.00, collection of fresh semen, evaluating motility spermatozoa. This research obtained conducted using a Randomized Block Design consisting of 5 treatment levels and five replications. Semen storage using 30 Bucks, which has done for three days.
Results: The addition of turmeric extract 0ml showed an motility value of 65%, 25ml = 70%, 50ml = 75%, 75ml = 75% and 100 ml = 75%. The analysis of variance showed that the results give a real impact on the motility of spermatozoa. The results showed that the addition of turmeric extract had significant effect (P <0.01).
Conclusion: Adding 50 ml of turmeric extract was the best result on spermatozoa motility in fresh goat semen.

Keywords: Fresh semen, Goat, Motility, Spermatozoa, Turmeric.

1. INTRODUCTION

The goat livestock population still needs to be increased to meet the demand for meat as a source of animal protein [1]. Therefore it is necessary to make efforts to increase the population of goats. The goat breeding business is underdeveloped in several countries, and most are still considered side businesses. Business management is not good because the reproductive activity is not optimal, so the production and productivity of the resulting seeds are low [2].

Research on efforts to increase reproductive efficiency in male livestock still needs to be improved. In this study, the herbal feed comes from plant extracts. Herbal plant extracts have several advantages over fresh ingredients. The advantages of herbal plant extracts include that the body more easily absorbs the nutritional content, the chance of being contaminated with pesticides, heavy metals, and others is smaller than fresh ingredients, the handling is practical, and the dosage is easily adjusted, especially if need a large number of doses [3].

Turmeric is an herbal ingredient that is easy to find and cheap. Turmeric contains antioxidant ingredients that can improve sperm quality. Curcumin compounds contained in turmeric can increase the percentage value of spermatozoa motility. Motility is essential for

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fertilization because spermatozoa can move efficiently toward the egg (ovum). Curcumin can also protect sperm against oxidative damage from chemical exposure [4].

Turmeric's effect on animals can increase spermatozoa motility, increase concentration, protect against oxidative damage, and increase levels of the hormone testosterone. In addition, the curcumin compound contained in turmeric can help reduce stress, which also impacts male fertility [5]. Other ingredients contained in turmerics, such as vitamins C and E, are potent antioxidants that can help ward off free radicals. These compounds can also help increase male sperm volume [6].

Based on this background, this study will observe the effect of giving turmeric extract to increase the reproductive productivity of male goats, especially the motility of goat spermatozoa in fresh semen. Hopefully, this research can be applied to buck, which will be starters, and for producing fresh semen to produce liquid/frozen semen.

2. MATERIAL AND METHODS

This research is experimental. That is, researchers conduct experiments with several treatments on the samples obtained. The scope of this research focuses on observing sperm macroscopically and microscopically. The research materials used were Boer goats, 2% eosin, straw, liquid N2, aquabidestillata, warm water (45-55ºC), and tissue. The research tools used were a 400 ml beaker glass, deck glass, tissue, stir bar, a set of an artificial vagina, test tube, water bath, electric microscope, thermometer, pipette, object glass, cover glass, pH meter, Bunsen burner, denominator, holding cages and doormats. The population and sample in this study were Boer Buck that had been fed turmeric extract with the treatment given as follows:

P0 = Turmeric Extract 0 ml
P1 = Turmeric Extract 25 ml
P2 = Turmeric Extract 50 ml
P3 = Turmeric Extract 75 ml
P4 = Turmeric Extract 100 ml

The procedure of this research is as follows.

1. Preparation of Materials and Tools

The equipment was cleaned and sterilized using an autoclave at 121ºC for 15 minutes.

2. Preparation of Turmeric Extract

Chopped turmeric of ± 5 mm, then dried in the oven at 50ºC for 6 hours until constant final weight. The dried meat is then mashed using a blender and filtered into powder (Simplicia). The simplicial was extracted by maceration method using 70% ethanol and distilled water for three days at room temperature. Then filtered and concentrated with a vacuum rotary evaporator at 60ºC.

3. Provision of Turmeric Extract

100 ml of turmeric extract is given orally every morning using a bottle

4. Fresh Semen Collection

Semen collection uses the artificial vagina method, in which males collect semen using a method similar to natural mating activities. The shelter is carried out in the morning using an artificial vagina (temperature 40ºC – 42ºC). The ejaculate results were immediately brought to the laboratory for microscopic evaluation [7].

5. Motility Evaluation

Observations using a microscope. Motility by looking at the spermatozoa, which move progressively forward. The evaluation used observing the spermatozoa in eight different fields of view with a 400x magnification light microscope [8].

3. RESULTS AND DISCUSSION

Table 1. Spermatozoa motility before equilibration with turmeric extract supplementation

Parameter	Treatment	Percentage (%)
Motilitas	0 ml	65±0.00
	25 ml	70±0.00
	50 ml	75±0.00
	75 ml	75±0.00
	100 ml	75±0.00

Note: Different superscripts in the column show a significant difference (P<0.01)

The motility test results of fresh goat semen spermatozoa showed that the lowest percentage value was without treatment, namely 65%, while the highest was with the addition of 50 ml, 75 ml, and 100 ml of turmeric extract, namely, motility 75%. From the data obtained, adding turmeric extract increased the motility percentage of fresh goat semen spermatozoa. The higher the administration level of turmeric extract will further increase the percentage value of spermatozoa motility.

The analysis of variance showed that adding turmeric extract feed had a significant (P<0.01) effect on spermatozoa motility in fresh goat semen. The results of the BNT follow-up test showed the highest motility in the 50ml, 75ml, and 100ml treatments, namely 75% motility.

The percentage of motility in spermatozoa or the motility of spermatozoa is one of the determinants of the success of spermatozoa in reaching the ovum in the fallopian tubes. It is the simplest way of evaluating sperm for artificial insemination [9].

The results showed that the average observed sperm motility in goat semen of all treatments met the standards for use as goat semen for Artificial Insemination because the above motility was 40%, and this figure met the requirements for Artificial Insemination. Requirements for proper semen Artificial Insemination has a minimum motility of 40% [10]. The best spermatozoa motility that can be used and meets the standards in this study is in the treatment of 50 ml of turmeric extract. Semen quality will decrease if storage is not with the correct diluent [11].

Hydroxynonenal is a lipid peroxidation that can inhibit glycolysis and motility of spermatozoa. In addition to the damage caused by lipid peroxidation, decreased motility can also occur due to several factors [12]. Factors that can reduce motility are changes in pH medium, osmotic pressure, and electrolyte and non-electrolyte effects [13].

The motility percentage decreased due to reduced food reserves after being stored for four days, significantly affecting livestock reproduction [14]. Semen contains many compounds needed for the metabolism and movement of spermatozoa [15]. In cement, the primary carbohydrate source is fructose [8]. Spermatozoa will utilize fructose in plasma for survival and movement. After fructose runs out, GPC (Glyceryl Phosphoryl Choline) will break slowly to resupply fructose [16].

4. CONCLUSION

The best research result is the administration of 50 ml of turmeric extract per day to get the highest motility. Recommended to research by evaluating spermatozoa microscopically using other parameters.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between all authors. Sukma Aditya Sitepu designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Julia Marisa managed the analyses of the study. Muhammad Miftah Farid managed the literature searches. All authors read and approved the final manuscript

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