

# Influence of Combination of Quail Egg Yolk and Coconut Water on the Frozen Semen Quality of Simmental (*Bos taurus* L.)

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**Abstract:** West Sumatera have artificial insemination program to improve production, and quality of cattle, but there are obstacles, such as the provision of diluents semen frozen by the government less than the optimum. So that the availability of diluents is insufficient to produce frozen semen. It is Necessary to find suplement diluents there for more practical, economical, and more importantly are Able to maintain the quality of frozen semen of cattle. This study aims to determine the effect of the combination of quail egg yolk and coconut water as diluents to the quality of frozen semen of Simmental cattle (*Bos taurus* L.). This research has been conducted in June-September 2016 in the Laboratory of Artificial Insemination (BIB) Tuah Sakato, Payakumbuh, used Completely Randomized Design with 4 treatments and 6 repetitions. The treatment as follows: andromed (Control), 25% yolk quail + 66% coconut water + 8% glycerol + 0.1% penicillin-streptomycin + 0:08% + 0.82% aquabidest (P1), 45, 5% egg yolk quail + 45.5% coconut water + 8% glycerol + 0.1% penicillin-streptomycin + 0:08% + 0.82% aquabidest (P2), 66% yolk quail + 25% coconut water + 8% glycerol + 0.1% penicillin-streptomycin + 0:08% + 0.82 % aquabidest (P3). The result showed percentage of viability controls 72.66%, 70.50% P1, P2 67.16%, 65.50% P3. The mean percentage of frozen semen motility control 71.33%, 69.66% P1, P2 65.00%, 61.66% P3. The percentage of average normality controls 85.50%, 84.33% P1, P2 84.66%, 84.16% P3. Based on the results of this study concluded that the combination of quail egg yolk and coconut water affects the quality of frozen semen of Simmental cattle (*Bos taurus* L.).

**Keywords:** yolk quail eggs, coconut water, frozen Semen quality, Simmental bull

## 1. Introduction

The livestock sector has an important role in the life and development of human resources in Indonesia. Improvement of public welfare will be followed by an increase in consumption of livestock products, thus it helped drive the economy in the livestock sub-sector [1]. According [2] problems faced by Indonesia in the field of animal husbandry is still low productivity and genetic quality of livestock. The factors causing low productivity of livestock in Indonesia, which is not optimal maintenance management[3]. These problems can be overcome through the application of technology Artificial insemination (AI).

IB success is determined by several factors, one of which is the quality of semen used. Semen quality include pH, color, viability, motility and concentration [4]. Every cows have semen quality varies depending on the age, condition of livestock, libido and nations.

One of the factors that also affect the quality of sperm in semen is frozen pengencer. Pengencer use functions ensure the physical and chemical requirements of spermatozoa so that sperm quality can be maintained, especially on the ability to capacitation [5]. Semen storage at low temperatures can damage sperm [6].

Terms of diluent used is inexpensive, simple, practical made, contains elements that are almost the same physical and chemical properties of cement, does not contain toxic

substances both on sperm and genital tract of the female, retaining and do not limit the power of fertilization of sperm, and allow sperm votes after dilution. Diluent present such as andromed can not meet all these requirements both in terms of price and in terms of the availability of diluent, so it requires a combination of diluents such as milk, egg yolks and coconut water [6].

Quail eggs has been known to the public for consumption rumahan. Manfaat the nutrients contained in the quail eggs are not inferior to the nutrients contained in eggs when used as diluents semen. Air young coconut is a natural isotonic fluid that is widely used as replacement for lost body fluids and prevent poisoning especially mineral poisoning. According [7]. Coconut milk contains 0.2% protein, 0.15% fat, 7.27% carbohydrates, sugars, vitamins, electrolytes and hormones that cause this growth. Young coconut water is widely used as a diluent of cement especially cows and goat.

Simmental cattle is one of the nation's beef cattle that have rapid growth. Cows of this type has two functions, namely to produce milk and meat. Based on these advantages, many farmers in Indonesia who maintain Simmental cows to meet the high demand for beef for the community [8].

## 2. Material and Methods

The experiment was conducted in January 2016, in the Laboratory of Artificial Insemination (BIB) Tuah Sakato Payakumbuh.

## 2.1. Research Materials

Materials were used that semen from bulls Simmental 3 years old are accommodated using an artificial vagina, then the egg yolk quail, penicillin and streptomycin, glycerol 8%, aquabidest, as diluents, eosin 2% is used to view the viability of spermatozoa, coconut water, nitrogen (-196 ° C).

## 2.2. Research Methods

This research used Complete Random Design (CRD) with 4 treatments and 6 repetitions. Implementation of research begins with a semen reservoir is then observed macroscopically and microscopically. If already qualified then continued with the process of freezing semen that has been diluted. Thawing process is performed after freezing semen for 24 hours in a container containing liquid nitrogen.

## 2.3. Data Analysis

Data were analyzed using ANOVA test and continued with Duncan New Multiple Range Test (DNMRT) at  $p < 0.05$

## 3. Results and Discussion

### 3.1 Semen Quality

First step of this research was analyzed the quality of semen as sample. The result showed at table 1 below.

**Table 1: Simmental Semen Quality**

Quality	Criteria/Value
Macroscopic	
Volume	5 ml
Color	Beige
pH	7
Consistency	Thick
Microscopic	
Individual Motility	80%
Mass Movement	+++
Abnormality	4%
Viability	78%

Description: +++ The mass movement of spermatozoa is moving waves of thick, dark, fast and accompanied rounds.

#### 3.1.1 Volume

From macroscopic observation showed that semen volume Simmental cattle have 5 ml after one penampungan. Sapi usually produces 5-6 ml in one shelter. This is in accordance with the opinion of [9] which states that cattle semen volume ranges from 5-8 ml /ejaculate.

#### 3.1.2 Color

Color of semen Simmental cattle on the macroscopic observation was beige. Beige is the normal color of Simmental cattle semen. Semen color depends on the type of cattle that accommodated it semen. According to [10] stated that several factors affect the color of semen as the level of arousal, ejaculation frequency, and quality of feed.

#### 3.1.3 pH

Simmental cattle semen after macroscopically tested has a pH of 7. The pH 7 is the normal pH of semen; this normality will assist in the process of cement in accordance with the opinion Freezing. According to [9] states that cattle semen pH between 6, 4 - 7,8.

#### 3.1.4 Individual Motility

Motility individual semen Simmental cattle after microscopically examined and seen in elevated percentages of view can result in 80%, where it is still within the range of opinions [11] which is between 50-80%. Motility will be reduced if it is not immediately followed by a dilution process.

#### 3.1.5 Mass Movement

Microscopic Observation fresh semen during the study, obtained an average mass motility of spermatozoa is +++ (3). [6]. Very good "(+++)" can be seen surging, many, dark, thick, and active and fast moving. Good "(++)" looks a little wave, thin, sparse, less clear and somewhat sluggish. Less good "(+)" if not visible wave but only the active individual movement progressive. Poor "(N / O)" when little or no individual movement.

#### 3.1.6 Abnormal Spermatozoa

Simmental cattle semen abnormalities after microscopic examination showed the percentage value of 4%. These results indicate that fresh semen of Simmental cows sampled have good quality because of the low percentage of abnormalities. High quality semen containing up to 5-15% of abnormal sperm [12].

## 4. Semen Quality Post-thawing

### 4.1 Sperm Viability

**Table 2: Mean frozen semen viability value Simmental cattle (%)**

Treatment	Mean value of Simmental cattle frozen semen viability (%)
Control	72.66 <sup>a</sup>
P1	70.50 <sup>b</sup>
P2	67.16 <sup>c</sup>
P3	65.50 <sup>d</sup>

Description: In the column the same number followed superscript letters differ significantly different at  $p < 0.05$  in Duncan test.

The percentage of viability which is higher than the diluent control P1 P2 and the percentage P3. Rataan approaching the average percentage of control is the diluent P1. P1 diluent containing 25% yolk quail + 66% coconut water + 8% glycerol + 0.1% penicillin + 0.08% + 0.82% streptomycin aquabidest so that adequate nutrients needed spermatozoa and the buffer solution is still stable and still isotonic osmotic pressure.

In addition 25% of quail egg yolk has been able to protect the sperm membrane damage when the temperature decreases (cold shock) it is due to have a quail egg yolk lipoprotein and

lecithin. Lipoprotein and lecithin will coat the semipermeable membrane so that the sperm cells are protected from temperature decreases. During the freezing process cement, the ice crystals that form will lead to increased electrolyte concentrations in cells that would dissolve the cell wall lipoprotein sheath spermatozoa, and the time *thawing* will change the permeability of the plasma membrane so that the sperm will die [9].

In addition 66% of young coconut water contains sucrose also suffice as a source of energy for spermatozoa. Viability of spermatozoa is affected by the need for nutrients.

Duncan's test results further showed a significant difference between control, P1, P2, and P3. However, the difference between the control with the diluent P1 is not too far so that P1 diluent containing 25% yolk quail + 66% coconut water + 8% glycerol + 0.1% penicillin + 0.08% + 0.82% streptomycin, aquabidest better used as a diluent in order to maintain the life of a replacement cow spermatozoa containing andromed control (control). This study showed similar results with a previous study that combines duck egg yolk and coconut water. The 25% dilution of duck egg yolk and 75% coconut water is a combination of the most well-thinning to maintain abnormalities, viability and motility cow Bali [13]. Namun combine with duck egg yolk has a lower percentage of viability compared with researchers who combined with yellow quail eggs in this study.

#### 4.2 Motility

**Table 3:** The mean value of Simmental cattle frozen semen motility (%)

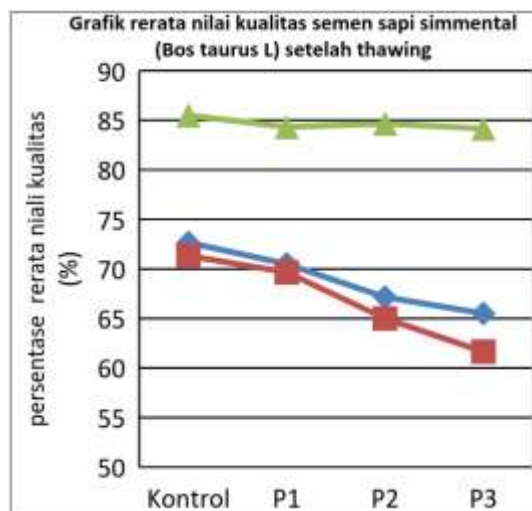
Treatment	Mean value of Simmental cattle frozen semen motility (%)
Control	71.33 <sup>a</sup>
P1	69.66 <sup>a</sup>
P2	65.00 <sup>b</sup>
P3	61.66 <sup>c</sup>

Description: In the same column numbers followed by superscript letters differ significantly different at  $p < 0.05$  in Duncan test.

The mean value of the diluent treatment motility P2 and P3 is a very significant trend factors suspected lack or abundance of fructose and instability that can lower the pH buffer excessively. Minimal use egg yolks as much as 5% of a diluent agent when directly used, while if the user will be saved yolk maximum of 20% of a diluent agent [9].

The mean value of the diluent P2 and P3 have motility percentage above 40% which still meets standar. [14]. states motile spermatozoa fertilization process requires approximately ten million spermatozoa, the spermatozoa requirements as standard insemination is  $2.5 \times 10^7$  spermatozoa per straw with 40% motility. Nevertheless, these results indicate that the combination of a quail's egg yolk 25% + 66% coconut water + 8% glycerol + 0.1% penicillin, streptomycin + 0.08% + 0.82% aquabidestis a combination Palikwell as diluent for have a higher percentage motility compared diluent P2 and P3. The decrease in the percentage

of progressive motility of spermatozoa may be due to the number of dead and become toxic to spermatozoa were still alive, so in general the quality is lowered [15]. It is showing motility and viability proportional and influence each other.



**Figure 1:** Percentage Quality of Semen Post Thawing

#### 4.3 Normality

**Table 4:** The mean value of normality Simmental cattle frozen semen (%)

Treatment	Mean Simmental cattle sperm normality value (%)
Control	85.50
P1	84.33
P2	84.66
P3	84.16

Percentage of normality of spermatozoa after *thawing* at each perlakuan menunjukkan that the combination of yellow telurpuh and coconut water does not affect the normality since the average normality ranges from 84-85%, so the average abnormality of each diluent is 4-5% [9] and [16]. This is in accordance with the recommended that during sperm abnormality has not reached 20% and not exceed the spermatozoa still in good condition and can be used for the IB program. According to [17] semen usually contains 5% abnormal spermatozoa, fertility will not be interrupted until the abnormal level of 20% to 25%. Abnormal spermatozoa showed progressive motility.

### 5. Conclusions and Recommendations

On these results it can be concluded that the combination of quail egg yolk and coconut water as a diluent influential in maintaining the viability, motility, and sperm normality Simmental cattle. Kombinasi pengencer with a concentration of 25% yolk quail + 66% coconut water + 8% glycerol + 0.1% penicillin + 0.08% + 0.82% streptomycin aquabidesta combination of diluent is able to maintain the quality of spermatozoa Simmental cattle (*Bostaurus L.*).

Suggestions To further research in order to better prepare the necessary tools so easy to do the research and get better results.

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