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The Effect of Age on the Quality of Semen Turkeys (*Meleagris gallopavo*)

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ABSTRACT

The purpose of this study was to observe the macroscopic and microscopic quality of Bronze turkey fresh semen on various ages. The observed toms were at the ages of 9 to 10 months (P1), 13 to 14 months (P2), and 17 to 18 months (P3), with each taken from 3 different toms. The collection was done by abdominal massage, and collected for 3 times a week in triplicate. This data was analyzed by analysis of variance (ANOVA) in a completely randomized design, followed by Duncan's New Multiple Range Test (DMRT) if there was any difference. The results showed that the average volume of turkey fresh semen were P1 (0.16 ± 0.04 ml), P2 (0.13 ± 0.02 ml), and P3 (0.10 ± 0.02 ml). The average pH of fresh semen were P1 (7.19 ± 0.05), P2 (7.12 ± 0.10), and P3 (7.06 ± 0.06). The average motility percentage of fresh semen were P1 (78.11 ± 1.38%), P2 (82.55 ± 1.17%), and P3 (74.55 ± 4.16%). The average viability percentage of fresh semen were P1 (78.63 ± 1.55%), P2 (83.26 ± 1.54%), and P3 (79.20 ± 1.06%). The average abnormal percentage of spermatozoa were P1 (3.01 ± 0.04%), P2 (3.04 ± 0.88%), and P3 (3.21 ± 0.44%). In conclusion, the best fresh semen quality is found on toms aged from 13 to14 months (P2). Furthermore, at the age 17 to18 months and more, the semen quality was decreased.

Key words: Motility, Semen, Turkey, Viability

Introduction

Turkey (*Meleagris gallopavo*) in India is one type of poultry that occupies an important position after chicken, duck, pearl chicken and quail (Anandh and Jagatheesan, 2015). In Indonesia, turkeys developed as a source of animal protein in addition to chicken and beef, but until now turkey meat is still difficult to obtain because the population is still small (Suharyati, 2006). Turkey meat has a quite high protein quality and low in fat, when compared to native chicken, and the taste is good also (Widiatmoko et al., 2014).

The maintenance of turkey (*Melleagris gallopavo*) In Indonesia, generally still doing by traditional method and has not been develop by artificial insemination (AI) mating system. Whereas it is know that use of AI technology will maintain a good and superior genetically of toms. So that good and superior genetically of toms can develop to other turkey breeders. Wahyudi et al. (2014). Said that AI as one of the technologies introduced to breeders, is a program aimed at improving the genetic quality of livestock, so it is expected to increase livestock production.

The main problem that often arises in turkey farms is the use of the same male for a long time and continuously, causing turkey productivity to decline due to low fertility and hatchability (Widiatmoko et al., 2014). One factor that affects fertility and hatchability is egg quality. This study aims to determine the effect of turkey age on the characteristics and quality of turkey semen (Meleagris gallopavo). The benefits of this study are expected to provide information about the characteristics and quality of turkey semen (Meleagris gallopavo) and can be used as a reference so that it is expected to determine a good age for turkey males and can be a reference for farmers in choosing males so that they are effective and can increase business productivity turkey, as well as the results of this study can also be used as material for reference or reference to subsequent studies.

Materials and Methods

The material used in this study consisted of livestock, tools, and materials. The animals used in this study were nine toms of 9 to 10 months old (P1), 13 to 14 months (P2), and 17 to 18 months (P3) with a mean weight per head were 4, 5 kg to 6 kg. Hematoxylin-Eosin solution, hayem solution, aquadest, ice water 15oC, pH litmus paper, aluminum foil, bamboo cage with length 70 cm, 70 cm wide with 75 cm height 9 pieces, 9 semen collecting tube, 2 thermos, microscope (Tension, Germany), optilab, pipette haemocytometer (Assisten, Germany), neubauer

count chamber, dropper dropper, counter, glass object, coverslip.

The work sequences in the research include pre-research stage and research phase.

Pre-research phase. The pre-research stage was conducted for two weeks to adjust the turkey to the environment during the study. Nine randomly selected turkeys based on each age were numbered on the wing web, fed traditional chopped kale and bran, then sequencing training was done to familiarize with the sequencing at the time of semen shelter.

Research phase. Nine turkeys taken randomly were grouped according to age 9 to 10 months (P1), 13 to 14 months (P2) and 17 to 18 months (P3). Each age group consists of three turkeys that are kept individually so that every age there are three replications. The research feed provided is traditional food and water is given adlibitum. The process of semen shelter is done in the shade and protected from direct sunlight. The semen shelter is carried out by two people using the abdominal massage method by sequencing the base of the back neck to the soft tail and the abdominal portion to the cloaca simultaneously (Douard et al., 2005; Zaniboni et al., 2006; Laffaldano et al., 2011; Slowinska et al., 2012). The data were collected for three weeks and weekly data were taken at each turkey age for the purpose of time efficiency, and kept the semen quality of turkey ma

intained, then repeated with each repetition three times for each age turkey and then averaged based on each age of turkey.

Semen is accommodated in a semen reservoir tube covered with aluminum foil, so as not exposed to sunlight. Semen that has been accommodated immediately inserted into a thermos containing ice water temperature 15^0C. Then fresh semen immediately tested the quality of fresh semen that includes macroscopic and microscopic evaluation. Macroscopic examination includes volume, pH, color and consistency. Microscopic examination includes concentration, morphology, mortality and motility using a microscope and obtaining with a 10x magnification.

Data collection

Data taken included macroscopic data (volume, pH, color and consistency) and microscopic data (motility, viability, concentration and abnormalities).

Data analysis

Percentage of concentration, motility, viability, and spermatozoa abnormalities was analyzed by analysis of variance completely randomized design (ANOVA), if there was a difference, test followed by Duncan's New Multiple Range Test (DMRT).

Result and Discussion

Macroscopic test of turkey fresh semen

Result of macroscopic turkey fresh semen consists of volume, pH, color, and consistency, presented in the Table 1.

Volume. According to the research result (Table 1) Average of turkey fresh semen volume is no significant difference and is in the normal range. Average of turkey fresh semen volume is 0,2±0,01 ml (Suharyati, 2006) and 0,5±0,01 ml (Zaniboni *et al.,* 2006).

The age of each turkey is different but the volume of semen produced is almost the same, presumably because the turkey studied has a similar average body weight of 4.5 kg to 6 kg and is still in the normal range according to the opinion Suharyati (2006) which said that flat the body weight of turkeys aged 8 to 13 months was 5.43 kg, so that with almost the same body weight, the testicles of each turkey were also almost the same. Mathevon et al. (1998) said that large testicular size has more seminiferous tubules, which causes more spermatozoa and plasma seminal fluid, and testicular size is positively correlated with body weight gain.

pH. According to the result (Table 1) Average of pH fresh semen turkey obtained as a whole turned out to be no significant difference but still within the normal range. Nalbandov (1990) said that the normal range of fresh semen pH in poultry is 6.3 to 7.8. Toelihere (1993) explained that the pH of poultry semen is normal to alkaline with a range of 7.0 to 7.6.

The age of the turkey is different, but the fresh semen pH remains the same as it is suspected because the volume and concentration of semen produced at the time of collection has almost the same rate so that the number of spermatozoa available is almost the same. The number of spermatozoa affects the increase in lactic acid during metabolism. Increased lactic acid causes the condition of the semen to become more acidic so that it has a fresh semen pH low. This is in accordance with Samsudewa et al. (2007) which said that an increase in the number of spermatozoa causes a decrease in fresh semen pH, a decrease in fresh semen pH is influenced by the formation of lactic acid in the metabolic process and an increase in lactic acid causes a pH decrease.

Color and consistency. The results showed that the color and consistency of turkey

Tabel 1. Average of macroscopic test of turkeys fresh semen

Parameter	Age (month)		
	9 – 10 (P1)	13 – 14 (P2)	17 – 18 (P3)
Volume (ml)	0,16±0,04	0,13±0,02	0,10±0,02
pH	7,19±0,05	7,12±0,10	7,06±0,06

P1: Turkeys at the age of 9 – 10, P2: Turkeys at the age of 13 – 14), P3: Turkeys at the age of 17 – 18).

P1, P2, and P3 fresh semen were white with thick consistency. Etches (1996) said that semen are usually white as pearls. This shows that the semen is not contaminated by feces or erythrocytes. The consistency of thick semen in research is due to the concentration of many spermatozoa in the fresh semen. Toelihere (1993) said that fresh semen consistency varies from a cloudy and thick suspense to a dilute liquid.

Microscopic test turkey fresh semen

Result of microscopic turkey fresh semen consists of motility, viability, concentration, and abnormality, presented in the Table 2.

Motility. Motility of the spermatozoa is one of component in the assessment of semen quality for artificial insemination. Based on the research conducted (Table 2), the average fresh semen motility of turkeys P1, P2, and P3 differed significantly but still within the normal range, according to the statement of Hafez (1993) which said that the motility of fresh semen poultry ranges from 60 to 80%.

The difference of fresh semen motility caused by differences in the activity and metabolic movements of each spermatozoa after being ejaculated. Motility activity of spermatozoa is strongly influenced by the temperature (Dumpala et al., 2006). The higher of temperature, can make higher of spermatozoa motility activity. High motility requires a lot of energy while the ability of spermatozoa to produce energy outside the body is very limited, causing the availability of energy sources for spermatozoa is also limited and different. Susilawati et al. (2003) said that differences of fresh semen motility in each age were due to differences in the availability of energy sources in the form of fructose, glycerin phosphoric choline (GPC) and sorbitol which affected the height or low motility of spermatozoa.

Viability. According to the result (Table 2), average of turkey fresh semen viability P1, P2, and P3 differed significantly but still within the normal range. Dimitrov et al. (2007) said that the viability of fresh turkey semen was 77.56 ± 4.4%, (Laffaldano et al., 2011) 77.10 ± 6.13%, and Douard et al. (2003) said that the semen viability of fresh turkeys aged 10 months and 13 months were 75.9 ± 2.2% and 66.2 ± 1.6% respectively.

The cause of differences in the viability of fresh turkey semen is thought to be due to different motility and the consistency of different fresh semen of turkeys. The overall viability of fresh turkey semen obtained in the normal range. High viability and semen mortality in small amounts will not affect fertility (Nalbandov, 1990).

Concentration. According to the result (Table 2), average of turkey fresh semen viability P1, P2, and P3 differed significantly but still within the normal range. Suharyati (2006) said that the fresh semen concentration of turkeys aged 8 to 13 months are 5,31.10^3 million/ml, and Wahyuni (2002) said that the semen concentration in turkeys aged 5 to 9 months ranges from 3.10^3 until 7.10^3 million/ml.

Cause of the differences in the concentration fresh semen turkey was suspected due to differences in the volume and consistency of each turkey obtained in this study. Toelihere (1993) said that the volume of fresh as produced by a rooster in one ejaculation can

Tabel 2. Average of microscopic test of turkeys' fresh semen

Parameter	Age (month)		
	9 – 10 (P1)	13 – 14 (P2)	17 – 18 (P3)
Motility (%)	78,11±1,38	82,55±1,17	74,55±4,16
Viability (%))	78,63±1,55	83,26±1,54	79,20±1,06
Concentration (10^3 million/ml)	5,97±0,29	5,80±0,10	4,82±0,08
Abnormality (%)	3,01±0,04	3,04±0,88	3,21±0,44

P1: Turkeys at the age of 9 – 10, P2: Turkeys at the age of 13 – 14), P3: Turkeys at the age of 17 – 18).

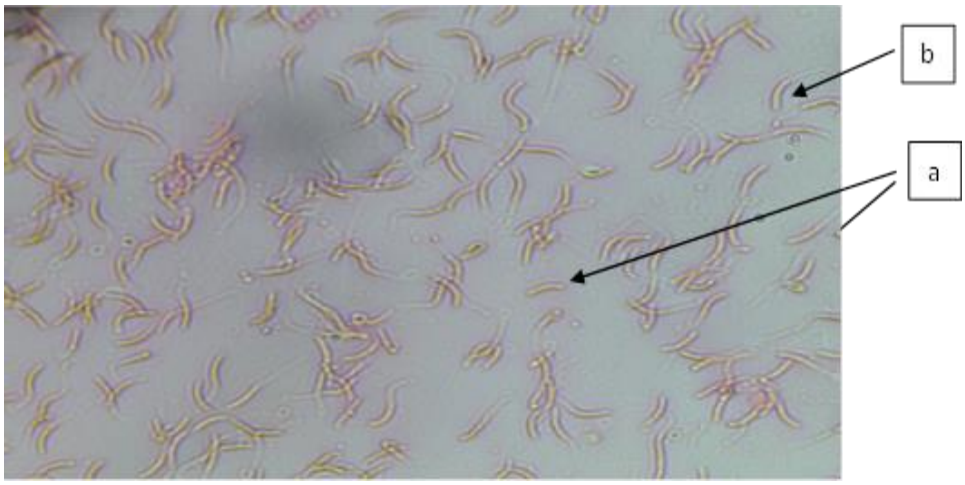

Figure 1. (a) Abnormal spermatozoa (broken tail) (b) normal spermatozoa.

vary. In general this difference is influenced by age, body size, health status, reproductive status, feed quality and shelter frequency.

Abnormality. Abnormality of fresh semen according to the result are double tail, broken or bent heads, broken tails, big heads, short or small heads. According to the result (Table 2), average of turkey fresh semen viability P1, P2, and P3 no significant difference but still within the normal range, but lower when compared to research Suharyati (2006) which states that abnormalities of fresh turkey aged 8 to 13 months are 21.41%.

Abnormality of spermatozoa classified in two groups are primary abnormalities and secondary abnormalities, primary abnormalities occur due to abnormalities in seminiferous tubules and testicular disorders, characterized by a head that is too small (micro cephalic) or too large (macro cephalic), a wide head, multiple lengthwise and shaped like per fruit (pyriformis), tail or a circular center, and abbatial linkage, whereas secondary abnormalities occur after cells or talents of male sex cells leave epithelial sprouts in seminiferous tubules or manipulation of ejaculates including excessive agitation and heating, cooling too fast, because of contamination with water, urine or antiseptics (Toelihere, 1993).

Conclusions

The results of this study concluded that the best age for toms to be used as breeding is between 13 to 14 months. The toms' age does not significantly affect the fresh semen volume, abnormalities, and pH, while toms aged 17 to 18 months and more showed a decreased semen quality.

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