

## Comparative Studies of Semen Quality on Different Breed of Chicken in Poultry Breeding Center Temanggung-Central Java

Almahdi, A.B., Y. S. Ondho and Sutopo

Faculty of Animal Science and Agriculture, Diponegoro University-  
Campus drh. R.SoejonoKoesoemowardojo, Tembalang 50275 Semarang, Indonesia

**Abstract:-** The aim of the study was to compare the semen quality of Lingnan, Bangkok, Kedu and Arabic chicken. The parameters that be used was macroscopic characters consist of pH, color and odor of semen and microscopic of semen such as sperm abnormality and motility. Data resulting from study was analysed by SPSS-Wilcoxon test. The results of study showed that there was no different quality of semen if looking from pH of semen, color, odor, sperm abnormality, and sperm motility ( $p \geq 0.05$ ). It could be concluded that the degree of acidity (pH), the color of semen, odor, and sperm abnormalities in Lingnan, Bangkok, Kedu and Arabic chicken showed no significant differences ( $P \geq 0.05$ ) and had the same excellent quality as well as qualified for artificial insemination (AI).

**Keywords:-** Semen quality, Different chicken breeds

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### I. INTRODUCTION

One way to improve the quality of livestock was by artificial insemination (AI). Artificial insemination was one of the Indonesian government programs in order to enhance genetic quality and productivity of local breed of chicken in Indonesia. Technological innovation of Artificial Insemination was an alternative solution problem of germ requirement in a short time and used to multiply superior germ livestock or for research purposes. Artificial insemination in chickens was a process of inclusion of semen into the hen's reproductive tract with the help of humans. AI implementation in chickens had not been much done in the community, and the prospects and advantages obtained by using AI was quite good. Advantage to be gained by implementing AI such as: (1) increase the efficiency of the use of superior male, (2) save costs, and save energy maintenance, (3) cock used have undergone prior selection (4) prevent the transmission of disease and (5) improving the efficiency of reproduction (Toelihere, 1993).

Semen quality had a prominent role in artificial insemination, though the precision observing of semen quality was needed. The quality of semen will be revealed through its reproductive performance. Significant management aspect was necessary to be routinely monitored to make sure that the selected breeding males are sure to produce the desired outcomes.

Volume of poultry semen was relatively a few and concentration of spermatozoa was high enough. Poultry semen volume was low because cocks do not have any glands accessories such as in mammals, so the semen plasma volume was low. Differences semen per ejaculate volume was affected by differences in the breed, age, body size, nutrient feed, long the temperature environment, as well as deficiency of vitamin A and E.

The aim of the study was to compare the semen quality of Lingnan chicken, Arabic chicken and Indonesian local chicken and Bangkok chicken against semen qualities like pH of semen, color of semen, odor of semen, and abnormality of the sperms. Benefits of this research are expected to be used as the basic of information further processing of fresh semen to be into frozen semen and to establish the knowledge and understanding of the quality of semen of Lingnan, Arabic chicken, local breed of chicken and Bangkok chicken breed. By knowing the quality of semen the breeders could make appropriate selecting program for the improvement of the poultry industry.

Different strains, breeds and types of chicken have different semen qualities which could be influenced the production and quality of the breeding programs. The introduction of the exotic chicken breed as well as the chicken resulting from crossbreeds had made artificial insemination unpredictable, hence proper testing of semen was the best option to determine the quality and make it easy to predict the outcome of the breeding programs. The hypothesis to be tested was that there are differences quality of semen of Lingnan, Bangkok, Kedu and Arabic chicken.

## II. LITERATURE REVIEW

Lingnan chicken was a local breed chicken from China, with the approximate adult body weight was 3.5–4 kg, with the height of male approximately 80 cm and the female was 60 cm. The color was golden yellow with the combination of red, and the legs are yellow. The Lingnan chicken had better endurance compare to the red Arabian chicken in the aspect of adaptation to the surrounding temperature and the body resistance to the illness and disease, thus it suitable to be breed in Indonesia (Darmana and Sitanggang, 2003).

Lingnan yellow breeds and Hongyu Wang chicken were used to test in Longde, Yanchi and Lingwu of Ningxia to evaluate the effect of management measures and free range environment on growth performance under free range system. Survival rate of Lingnan yellow chicken and Hongyu Wang chicken was 88.00%, 93.30% and 97.22% respectively where reared in Longde, Yanchi, Lingwu under free range system. Hongyu Wang chicken showed easily adaptation to local environment. Lingwu region is more suitable to rear quality broilers under free range system. Average individual body weight of 12 week Lingnan yellow chicken and Hongyu Wang chicken was 2660 g and 1906 g respectively, which indicated the growth rate of Lingnan yellow chicken was great higher than that of Hongyu Wang chicken; Birds showed two growth wave crest in the fifth to sixth week and ninth to tenth week, respectively under free range system. The level of feed supplementation and management in this period should increase. In different management levels and feeding conditions, the best time of slaughter sales should be chosen according to actual situation.

Generally believed, if the weekly weight gained less than 120 grams, the slaughter sale or feeding management adjustment should be considered. Lingnan yellow chicken and Hongyu Wang chicken could achieve better economic efficiency in the fine management, scientific feeding and stocking conditions. The two test results showed that the average net profit of a single species was quite different in different varieties and regions. The variety of body weight determined the net income. Firstly, the factor that affecting body weight was varieties. Lingnan yellow chicken grew faster than Hongyu Wang chicken while enhanced the economic benefits. Secondly, the factor that affecting body weight was stocked environment. The feed grass or orchard grass with a sufficient number of insects and appropriate protection measures would improve the economic efficiency of stocking. Thirdly, it was management measures.

The adjustment should added according to the different periods of weight change and feed conversion index, putting the amount of excessive or inadequate feed, low feed energy and other factors would affect the economic benefits. In addition, it was very important to strength adaptive training from the brood to the stocking. Lingnan yellow chicken and Hongyu Wang chicken had good adaptability, in which should be stocked in Longde and Yanchi, Lingwu respectively. During stocking stage, the peak of the growth should be increased feed and improved the management level. Lingnan yellow chicken and Hongyu Wang chicken could be achieved better economic efficiency in the fine management, scientific feeding and stocking conditions (Yu, 2013).

Arabic chicken was a type of local chickens from Europe. Local laying hens in Europe known several types, among others Bresse in France, Hamburg in Germany, mesian in the Netherlands, and braekels in Belgium. Among the types of local chickens, laying hens braekels was a kind of local well known in Indonesia. Braekels chicken had another name which *Gallus turcicus*. Arabs chicken were descendants of the chicken with a special of braekles: agile, active, and strong body power (Diwyanto and Prijono, 2007). Arab cock in Indonesia consists of two types of Silver and Golden Red chicken. According to his native Arabic Silver chicken suspected hybrid between the original Arabic chicken with a layer of silver braekels local females. Characteristics of Arabic chicken was glazed white round neck, black back and white spotted fur, black fur and white striped tail feathers mixed dominant black and white, red peak and small black eyes and yellow circled. Nataamijaya *et al.* (2003) stated that the weight adult male Arab chicken reaches 1.5-1.8 kg with a height of 30 cm, while the Arab hens reach 1.1 to 1.2 kg with a height of 22-25 cm body.

Arabic chicken had an advantage compared with other domestic fowl. Production of Arabic eggs chicken equivalent with Leghorn chickens, which on average could reach 80-90 % of the population, which was achieved by feeding only 80 g / chicken / day. Arabic chicken eggs were first brought to Indonesia and hatched using local hen. The results of the hatching chicks and grew up in the yard so released mate with a local chicken and called Arabs chicken. The offspring of this cross-breeding showed higher egg production compared with other local chicken eggs. Chicken was growing rapidly but the original strain (parent stock) was not there. Arab cock that growing today was the result of interbreeding with local chickens (Sarwono, 2001).

Nataamijaya *et al.* (2003) stated that Arabic cock had properties qualitative traits include comb single (single) and red colored, wattles red colored, had a uniform coat color with a black base color decorated in white the head, neck, chest, back and wings, and white on the beak, skin and scales foot. Sarwono (2001) and Pambudhi (2003) stated that Arabic cock a laying-type chickens that have the characteristics to be agile, a little wild, not incubate, the male sexual power on a high, high level of feed efficiency, high ability to produce eggs, and lean body postures. In addition, Arabic cock chickens have a high libido and good sperm quality. Natalia *et*

al. (2005) stated that the Arab chicken had produced characteristics eggs such as color and shape of a chicken egg shell.

According to the research Iskandar *et al.* (2006), characteristics of fresh semen Arabic male chickens are as follows: the volume of semen per ejaculate  $0.30 \pm 0.072$  ml, white semen, semen consistency ranged from slightly thickened until thick, mass movement of spermatozoa ranged from good (+ + +) to very good (+ + + +), 80 % motility, concentration  $2.200 \pm 0.372$  billion sperm cells / ml,  $6.95 \pm 0.32$  pH semen, and the percentage of abnormal spermatozoa  $14.75 \pm 1.28$  %. The results of other studies by Nataamijaya *et al.* (2003) stated Arabian chicken semen characteristics are as follows: volume per ejaculate of  $0.26 \pm 0.01$  ml, milky white semen, semen thick consistency, movement mass of spermatozoa good (+ + +) , and  $4.02 \pm 0.05$  sperm motility.

In principle, the properties of Bangkok chicken had no different from other types of chicken. Differences in Bangkok chicken with the other chickens more often found in physical observations (looking outside) only, for example the coat color, body size and the size of the egg productivity. Strain Bangkok pure chicken had colored shiny ornamental feathers, with a base color greenish black feathers. This was because the origin of this chicken included in the species Gallus. There are ornamental feathers on the neck and back (Sudrajat, 1994).

Body size could be determined based on weighing weight. Bangkok chicken adult cock had body weights ranging between 2-2.5 kg, while hen about 1.5 kg. Body weight was actually influenced by the thickness of the meat (muscular) and bone. Bangkok cock will mature between 7-8 months. At that time, the reproductive organs have started to work and produce hormones to reproduce off spring. The eggs will hatch after 21 days of incubation. Since having sex adult, the mother will produce a number of eggs in a single period. Each female parent could produce 12-15 eggs in a single spawning period. Bangkok chicken egg weights are generally heavier than common chicken eggs, which was between 40-50 g. Increasing of age, the weight of the eggs was increased (Sudrajat, 1994).

Outside observation as described above could not be separated from the biological underpinnings of the overall chicken. Basic consist of a complex process and the growth of chicken breeding. Could be explained in detail that the components affect the breeding include fertility, hatchability, egg production and innate immunity (maternal immunity). While growth was influenced by the development of body tissues, formation of chicken meat and the resulting conditions. According to Sudrajat (1994), if explored further, the biological of chickens was influenced by three factors, namely

1. Genetic factors, type of chicken (chicken, beef or a combination of both), mating, the selection and the correlation between the desired properties.
2. Environmental factors, consists of the temperature, lighting systems, air humidity and water composition. These factors are very important, because it could affect the entire body surface of livestock which will then lead to the other organs including the senses. This further continue with the environmental influences on the exchange of substances or metabolic processes. Central nervous system and will also react to the hormonal regulatory system.
3. Interaction between genetic and environmental factors was maintained even if the Bangkok chicken pure line, but if it was not supported by good environment (example: poor feed quality, do not do pest and disease control program or not kept in a cage that meets the requirements of health), the genetic potential that could not be raised optimally. Properties that should be possessed as other pure Bangkok chicken could not displayed well. Males do not have a high fighting ability, lacks the unyielding spirit, look flabby muscles, bones porous and so easily. Likewise, although the maintenance component was run with better seed quality if not good, then productivity Bangkok chicken was also not good (Sudrajat, 1994).

Kedu chicken was chicken that was grown locally in Magelang Regency and Temanggung or Kedu (Central Java). Based on color appearance, Kedu chicken could be divided into four types as follows.

1. Black Kedu Chicken  
Black Kedu cock had the physical appearance almost all black, but if observed carefully the color was not too dark. Skin appearance and comb still contain a reddish color. The weight of an adult male black Kedu between 2-5 kg, while the females only 1.5 kg.
2. Kedu Cemani Chicken  
Cemani had the appearance of a smooth black body figure, including the beak, nails, feet, tongue, hands down (palate), even meat and bones are also black. The figure Kedu cock are big and tall adult male weighs between 3 - 3, 5 kg, while adult hen weigh between 2 - 2,5 kg.
3. White Kedu Chicken  
Kedu white chicken marked with smooth white feather color, comb and red skin of his face, while his feet are white or yellowish. The weight of an adult white rooster Kedu reached 2.5 kg. While the weight of the white Kedu chicken hen 1.2 – 1.5 kg.
4. Red Kedu Chicken

Red Kedu chicken marked with a sleek black feather color, but the skin of the face and red cockscomb, while his white skin. The figure of red Kedu chicken was tall with weighing 3 – 3.5 kg for mature cock, while the weight of hen was 2 - 2.5 kg (Rukmana, 2003).

Sperm was a male sex gland secretions which normally ejaculated in the female genital tract during copulation, but could also be accommodated in various ways for the benefit of insemination (Toelihere, 1993). Sperm fall into two parts, namely sperm produced in the testes and sperm plasma in the form of a mixture of secretions produced by different organs and separate like the testes, epididymis, vesicularis gland, prostate and bulbourethral gland (Toelihere, 1993). Spermatozoa produced by rooster on primary sex organs of the reproductive tract that run through so-called secondary sex organs. The primary sex organs are the testes and the genital organs secondary form channels ripening process and brings different tools and channels such as appendages copulation organs such as rudimentary penis (Hafez, 1987). Poultry sperm produced in the testes very quickly with large amounts and mature faster than mammals (Freeman, 1984). Sperm cells could survive for long periods in the hen's reproductive tract as there are special areas in the oviduct to digest and protect it was the utero tubal junction. In the reproductive tract of sperm cells will be protected by antibodies and immunoglobulin bonds, so it will be protected from harmful infections to life (Wishart, 1994).

Semen was a substance that carries genetic material. Therefore, preservation, analysis and extraction method are all important, especially in artificial insemination (AI) program. AI had become an important component of reproductive used almost exclusively for the production of the commercial herd. For example, like broiler offspring fertility continues to decline as men selected for growth, the AI can be cost effective in the management of broiler breeders (Reddy, 1995). The procedure was not as simple AI in ducks and geese because they do not like chicken and turkey, could not be everted oviduct and commercial demand for AI in this species limited (Cooper, 1977). In the technique had also been successfully adapted to the species of cranes and non - domestic others with special attention to the differences in size and level of stress in these birds (Gee, 1995).

Significant progress had been made in developing semen thinners and preservation procedures for poultry semen in the 1970 decade and 1980 decade. However, the basic procedure for semen collection and AI was founded in 1930 (Lake, 1995). Methods shelter sperm for artificial insemination have been developed, such as: sorting methods, ejaculation and artificial vagina (Toelihere, 1985). Sperm retrieval techniques in poultry was done with sorting dorso abdominal followed by pressing the cloaca, because chickens run into rudimentary tools copulatoris then in sperm retrieval in birds was not so easy implementation (Yuwanta, 2004). Here in after referred by Lindsay *et al.* (1982) another technique was to use an artificial vagina, especially used to retrieve sperm in Manila or ducks Pekin ducks and to be able to take the sperm, the rooster must be trained several times frequency shelters increased and will lead to a decrease in the volume and number of sperm per ejaculate. However, the low frequency reservoir will cause hoarding sperm in the reproductive tract. A part of the dorso abdominal massage using the left hand, followed by pressing the cloaca, whereas the other one accommodate sperm out, and sperm that come out later accommodated in the reservoir bottle. After holding the movement of sperm was then evaluated and the number of sperm cells and then diluted (Wodzicka-Tomaszewska *et al.*, 1993), further said sperm retrieval and evaluation was the main capital in the farm rooster breeders, because retrieval and sperm evaluation was the basic of artificial insemination techniques and the selection of a rooster.

Evaluation of sperm could be done well if in a short time after the shelter. Evaluation of sperm generally include macroscopic and microscopic examination. Macroscopic assessment includes evaluation of semen volume, sperm color, the smell of sperm and sperm pH (Toelihere, 1993). Furthermore expressly includes microscopic evaluation of the mass waves, the movement of individuals, the concentration of spermatozoa in the unit volume of sperm, percentage of live spermatozoa, and the percentage of abnormal spermatozoa. Evaluation of the most important was the volume of sperm because it was information to determine the number of sperm per 100 million spermatozoa. The volume of sperm that could be accommodated directly readable on large-scale reservoir tube. The volume of each insemination was usually 50 ml (Etches, 1996). Nalbandov (1990), states that chicken sperm pH ranged from 6.3 to 7.8. Reported by Froman *et al.* (1995) volume of sperm collected from the male ranged between 0.4 - 1.0 ml with a pH of 7.0 - 7.6. Duck sperm volume ranged from 0.1 to 1.0 and quail sperm volume ranged from 0.05 to 0.15 (Rouvier *et al.*, 1984).

Semen quality could be affected by age, chicken lighting schedule, season, body weight, and diet (Sexton, 1986; Sexton, 1987) as well as semen collector. Meanwhile, according Toelihere (1985) factors affecting the quality and quantity of sperm was a hormonal system, feed, temperature and season, frequency of ejaculation, libido, physical factors, age and disease. AI timing was important and was usually conducted in the afternoon to minimize the number of chickens with hard shelled egg in the shell gland. In turkeys, Brillard and Bakst (1990) showed that the number of sperm in the chicken insemination before the onset of lay was twice that of chicken eggs inseminated in early production. Therefore, generally turkeys was inseminated before they begin to lay, usually 14 to 17 days after exposure to an increased stimulation of egg.

### III. MATERIALS AND METHODS

This research performed in Poultry Breeding Center-Temanggung and Laboratory of Animal Genetics-Breeding and Reproduction the Faculty of Animal Science and Agriculture, Diponegoro University.

#### Research Materials

The material used during this research was semen collected from 4 different males of Lingnan, Arabic, Kedu and Bangkok chicken. The ingredient used included aquabidest, eosin negrosin, test tube and antibiotic. The tools that used are test tube to process the semen collecting, water heater, scaled tube to figure out the volume of the semen that could be produce, universal indicator paper to find out the acidic degree, microscope to observe the motility, object glass, deck glass, and bunsen, beaker glass, filter paper, glass measurement to dilute the semen, and stationery to note the acquiring results.

#### Research Method

Method that used in the data collection consists of several steps, those are:

- Research preparation phase includes the preparation of the material and preparation tools.
- Material procurement. Material procurement begun with preparing for the male chicken in order to collecting sperm. After that, held the semen storage preparations.
- Adaptation process. The process of adaptation include adaptive the male cock for semen collection using massage method in order to get out semen, semen storage carried out in the morning.
- Equipment preparation. Preparation equipment was cleaning up all the equipments, and preparing research materials.
- Data collection process. The parameters that will be used are macroscopic characters consist of pH, color and odor of semen. Microscopic characters consist of percentage of live spermatozoa and percentage of sperm abnormality. Percentage of motility and percentage of sperm abnormality could be measured by dropping the semen in the middle of object glass than cover it with deck glass, and observe it under the microscope with magnificent of 40 x 10.

#### Research Design and Data Analysis

Data analysis in this study begins with a test of normality. If the data are normally distributed then it will continue to test the parametric Paired T-test and when the data was not normally distributed it will proceed with a non-parametric test using the Wilcoxon test with SPSS (21).

Hypothesis for this research are:

Ho:  $\tau_1 = \tau_n = 0$ , There was no difference in semen quality between the 4 chicken breeds.

H1: at least one  $\tau_i \neq 0$ , There was difference in semen quality between the 4 chicken breeds. The data was analyzed using statistical program (SPSS, version 21). The criteria used was if F count  $\leq$  F table Ho will be accepted and if F count  $\geq$  F table H1 will be accepted

### IV. RESULTS AND DISCUSSION pH

#### Semen of Lingnan, Bangkok, Kedu and Arabic Chicken

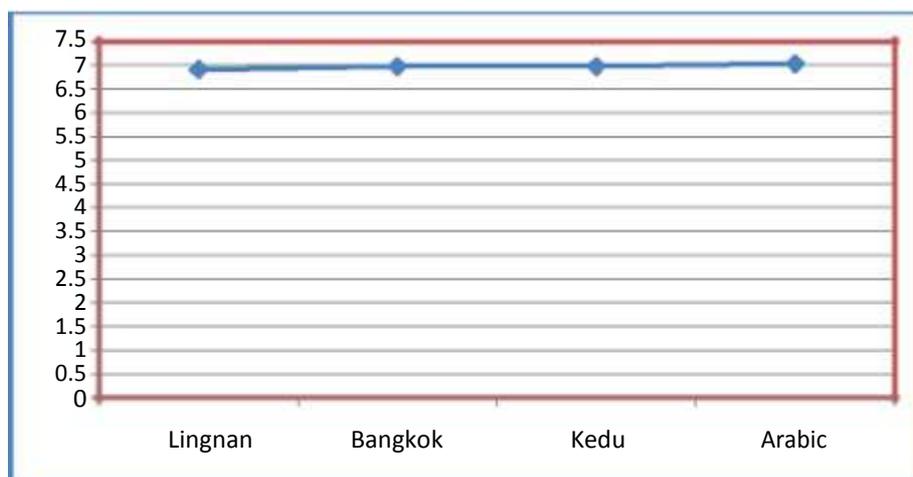
Consider to collected semen known that the average of pH semen of Lingnan, Bangkok, Kedu chicken and Arabic chicken were 6.92; 6.98; 6.98 and 7.04, respectively. From all breeds, Lingnan chicken had lowest pH and Arabic had highest of pH (Table 1 and Illustration 1).

Table 1. pH Semen of Lingnan, Bangkok, Kedu and Arabic Chicken

Replication	Chicken Breeds			
	Lingnan	Bangkok	Kedu	Arabic
1	7.0	7.0	7.0	7.0
2	6.7	7.0	6.7	7.2
3	6.7	7.0	7.0	7.0
4	7.0	7.2	7.2	7.0
5	7.2	6.7	7.0	7.0
<b>Summary (<math>\Sigma</math>)</b>	34.6	34.9	34.9	35.2
<b>Average</b>	6.92±0,21	6.98±0,17	6.98±0,17	7.04±0,09

Based on analyzed Wilcoxon test there was no differences ( $p \geq 0.05$ ) between pH semen of Lingnan chicken and Bangkok chicken. Wilcoxon test between Lingnan chicken and Kedu chicken shown there was no differences ( $p \geq 0.05$ ) between pH semen Lingnan chicken and Kedu chicken. Wilcoxon test between Lingnan

chicken and Arabic chicken shown there was no differences ( $p \geq 0.05$ ) between pH semen Lingnan chicken and Arabic chicken. Wilcoxon test between Bangkok chicken and Kedu chicken shown there was no differences ( $p \geq 0.05$ ) between pH semen Bangkok chicken and Kedu chicken. Wilcoxon test between Bangkok chicken and Arabic chicken shown there was no differences ( $p \geq 0.05$ ) between pH semen Bangkok chicken and Arabic chicken. Wilcoxon test between Kedu chicken and Arabic chicken shown there was no differences ( $p \geq 0.05$ ) between pH semen Kedu chicken and Arabic chicken. Based on analyzed Wilcoxon test no differences between Lingnan, Bangkok, Kedu and Arabic chicken it means that there was no differences on pH semen of that breed.



**Illustration 1. Graphic Average pH Semen of Lingnan, Bangkok, Kedu and Arabic Chicken**

pH semen in all breeds including acidic pH for semen. However, spermatozoa are still able to survive in the pH range. According Kismiati (1997) the degree of acidity (pH) of poultry semen was alkaline which have an average variation 8,5-9). The degree of acidity of the semen affects the viability of spermatozoa. The lower of pH value, will effect of the live spermatozoa due to the lower production of lactic acid and process metabolism spermatozoa. Spermatozoa could survive at the lowest pH in the range 6.8 (Lake, 1971).

**Semen Color of Lingnan, Bangkok, Kedu and Arabic Chicken**

Consider to collected semen known that all breeds of the chicken have color white milk for semen (Table 2). Semen with color white milk it means that semen contain of a lot of spermatozoa and have good quality.

**Table 2. Semen Colour of Lingnan, Bangkok, Kedu and Arabic Chicken**

Replication	Chicken Breeds			
	Lingnan	Bangkok	Kedu	Arabic
1	white milk	white milk	white milk	white milk
2	white milk	white milk	white milk	white milk
3	white milk	white milk	white milk	white milk
4	white milk	white milk	white milk	white milk
5	white milk	white milk	white milk	white milk

According to Parker (1969) chicken semen generally white to yellow. Meanwhile, according Sturkie (1976) macroscopic, semen quality chicken and not bright white opaque, while semen had much lower concentrations of sperm mixed with clear liquid, white light and watery.

**Semen Odor of Lingnan, Bangkok, Kedu and Arabic Chicken**

Consider to collected semen known that all breeds of the chicken have odor spermin or odor typical sperm for semen (Table 3). Semen with odor typical of sperm means that there was no contamination with another material.

**Table 3. Semen Odor of Lingnan, Bangkok, Kedu and Arabic Chicken**

Replication	ChickenBreeds			
	Lingnan	Bangkok	Kedu	Arabic
1	spermin	spermin	spermin	spermin
2	spermin	spermin	spermin	spermin
3	spermin	spermin	spermin	spermin
4	spermin	spermin	spermin	spermin
5	spermin	spermin	spermin	spermin

**Sperm Abnormality of Lingnan, Bangkok, Kedu and Arabic Chicken**

Result on chicken semen collecting known that average sperm abnormality of Lingnan, Bangkok, Kedu and Arabic chicken were 10.40%;13.78%; 17.03% and 9.07%, respectively. From all breeds, Arabic chicken had lowest sperm abnormality and Kedu chicken had highest of sperm abnormality (Table 4).

**Table 4. Sperm Abnormality of Lingnan, Bangkok, Kedu and Arabic Chicken**

Replication	Chicken Breeds			
	Lingnan	Bangkok	Kedu	Arabic
1	13.82	18.27	22.75	8.92
2	7.30	16.21	25.45	4.74
3	8.41	12.29	20.77	12.24
4	9.87	11.42	10.42	12.18
5	12.60	10.73	5.75	7.28
<b>Summary (Σ)</b>	52.00	68.92	85.14	45.36
<b>Average</b>	10.40±2,75	13.78±3,28	17.03±8,49	9.07±3,22

Based on analyzed paired t-test that there were no differences ( $p \geq 0.05$ ) between abnormality sperm of Lingnan chicken and Bangkok chicken. Paired t-test between Lingnan chicken and Kedu chicken shown there was no differences ( $p \geq 0.05$ ) between abnormality sperm Lingnan chicken and Kedu chicken. Paired t-test between Lingnan chicken and Arabic chicken shown there was no differences ( $p \geq 0.05$ ) between sperm abnormality Lingnan chicken and Arabic chicken. Paired t-test between Bangkok chicken and Kedu chicken shown there was no differences ( $p \geq 0.05$ ) between abnormality sperm Bangkok chicken and Kedu chicken. Paired t-test between Bangkok chicken and Arabic chicken shown there was no differences ( $p \geq 0.05$ ) between abnormality sperm Bangkok chicken and Arabic chicken. Paired t-test between Kedu chicken and Arabic chicken shown there was no differences ( $p \geq 0.05$ ) between abnormality sperm Kedu chicken and Arabic chicken.

Abnormalities in sperm morphology was a deviation from the normal shape. Factors affecting sperm abnormality was the environment (Toelihere, 1985). Gilbert (1980) stated that temperature affects the reproductive activity. According to Hafez (1987) that sperm abnormalities grouped into 3primary abnormality, secondary abnormalities and tertiary abnormalities. Primary abnormality occurs during the process of spermatogenesis in the testis tubulessemiferi precisely. Primary abnormality characterized by a head that was too small (microcephalic) or too large (macrocephalic), head width, tail or body double, etc. Secondary abnormality occurs in the epididymis during ejaculation. Sperm abnormality characterized by the presence of granular protoplasm at the base of the sperm tail precisely in the head epididymis.

Based on the results of the study showed that the abnormality was still included in the normal range the highest was 7.03% and the lowest was 9.07%. This was in accordance with the opinion Toelihere (1985) which states that in the majority of the ejaculate sperm abnormality percentage ranges between5-20%. Bearden and Fuquay (1984) states that if the abnormal spermatozoa of more than 25 % of the total spermatozoa in the ejaculate, it will reduce fertility.

According Toelihere (1985), the factors affecting sperm abnormality was the environment. Not different sperm abnormalities in four chicken breeds likely due to the same environmental factors at the time of maintenances it does not affect the process of spermatogenesis. Selvan (2007) reported that an abnormal spermatozoon of Rock roosters was 3.09-5.75% dependent on influence of age, dietary protein, vitamin-E and calcium. According to Gilbert (1980) the temperature could affects the reproductive activity. The ambient temperature between 20°C-25°C tend resulting in optimal semen production. Furthermore Yuwanta (2004) stated that homiothermic birds including animals body temperature was always constant 40°C - 41°C. Etches (1996) stated that the testes contained in the body because it was the process of spermatogenesis in chickens

occurs at body temperature 41°C. Furthermore Toelihere (1985) states that the temperature elevation due to high humidity could lead to failure of formation and decreased sperm production.

### Sperm Motility of Lingnan, Bangkok, Kedu and Arabic Chicken

Result on chicken semen collecting known that average of sperm motility of Lingnan, Bangkok, Kedu and Arabic chicken were 84%; 84%; 84% and 80%, respectively. From all breeds, Arabic chicken had lowest sperm motility and another breeds of chicken had the same sperm motility (Table 5).

**Table 5. Sperm Motility of Lingnan, Bangkok, Kedu and Arabic Chicken**

Replication	Chicken Breeds			
	Lingnan	Bangkok	Kedu	Arabic
1	80	85	85	75
2	85	85	80	70
3	85	85	85	85
4	85	80	85	85
5	85	85	85	85
<b>Summary (Σ)</b>	420	420	420	400
<b>Average</b>	84±2,23	84±2,23	84±2,23	80±7,07

Based on analyzed Wilcoxon test that there was no differences ( $p \geq 0.05$ ) between sperm motility of Lingnan, Bangkok, Kedu and Arabic chicken. According to the standard Lembang Artificial Insemination Centre, individual motility above 40% was still fit for IB (Nurfirman, 2001). The chicken will produce good quality spermatozoa have reached a certain maturity when sexual (Nalbandov, 1990). Followed by Sastrodiharjo and Resnawati (1999), males aged between 10-20 months werethe best producer of semen. Furthermore, if the males age was unknown, it could be estimated using long spurs. At the age of 10-20 months, cock spurs males have between 0.5-2 cm long. According Toelihere (1985) that the spermatozoa abnormalities and percentage mortality was influenced by several factors. One of them was the age factor.

Poor initial sperm motility could be caused low semen pH which ranged from slightly acidic to slightly alkaline (Tomar *et al.*, 1966). Sperm motility also has positive and insignificant correlation with semen volume that increase in the volume may not translate to higher sperm concentration. The correlation estimated obtained for semen volume and sperm motility was expected because the more the volume of fluid, the more space was available for sperm cells to move easily. Also selecting cocks for higher semen volume could also mean selecting them for high sperm motility (Peters *et al.*, 2008).

## V. CONCLUSION

Based on the observations and analysis of the parameters observed could be concluded that the degree acidity (pH), the color of semen, semen smell, sperm abnormalities and sperm motility in Lingnan, Bangkok, Kedu and Arabic chickens showed no significant differences( $P \geq 0.05$ ) and had the same excellent quality as well as qualified for artificial insemination(AI).

### Suggestion and Future Work

Suggestions for further researchthat the chickens should be reared in different environments, with different patterns of maintenance to determine differences in the quality of the semen produced.

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