

Level of Testosterone, Libido, and Sperm Quality of Bligon, Kejobong, and Etawah Cross-Bred Bucks

L Rachmawati^{1)*}, Ismaya¹⁾ and Pudji Astuti²⁾

¹⁾ Faculty of Animal Science, Gadjah Mada University, Jl. Fauna 3 Bulaksumur, Yogyakarta

²⁾ Faculty of Veterinary Medicine, Gadjah Mada University, Jl. Fauna 2 Bulaksumur, Yogyakarta 55281, Indonesia

Corresponding author email: laili.rachmawati@mail.ugm.ac.id, phone: +62 856 294 3315

Abstract. The aim of the study was to investigate the comparison and correlation among testosterone concentrations, libido, and sperm quality of Bligon, Kejobong, and Etawah Cross-bred (PE) bucks at similar age, feed, and season. Samples used were 9 bucks (3 Bligon, 3 Kejobong, and 3 PE) of approximately 18 months of age. The testosterone was measured by enzyme-linked immunosorbent assay (ELISA) method. Libido observation was quantified at the first time of sniffing, mounting, and finally ejaculation. Sperm was collected by using artificial vagina. The results showed that Kejobong's testosterone in the morning (12.00 ± 6.56 ng/ml) was significantly different compared to PE (6.82 ± 4.18 ng/ml), whereas Bligon's testosterone in the morning (9.23 ± 4.73 ng/ml) was similar compared to Kejobong and PE. The best time of Kejobong's libido was in the morning (6.77±5.96; 11.27±8.10, and 18.45±8.27 sec.) and in the afternoon (8.89±7.97; 11.03±8.74, and 21.05±9.60 sec.). The motility and concentrations of Kejobong's spermatozoa ($75.67 \pm 6.51\%$ and $5838.67 \pm 140.90 \times 10^6$ /ml) were significantly different compared to Bligon ($60.67 \pm 9.61\%$ and $4625.33 \pm 129.72 \times 10^6$ /ml) and PE ($63.13 \pm 8.33\%$ and $3756.00 \pm 52.76 \times 10^6$ /ml). It could be concluded that Bligon and PE bucks have the similar testosterone concentration, and the libido and sperm quality of Kejobong is better than Bligon and PE bucks.

Keywords: bucks, libido, sperm quality, testosterone

Abstrak. Penelitian ini bertujuan untuk mengetahui perbandingan serta hubungan antara kadar hormon testosteron, libido, dan kualitas sperma bangsa kambing Bligon, Kejobong, dan Peranakan Etawah (PE) dengan umur, pakan, dan musim yang sama. Sampel yang digunakan terdiri dari 3 ekor kambing Bligon, 3 ekor kambing Kejobong, dan 3 ekor kambing PE jantan berumur ±18 bulan. Kadar testosteron diukur menggunakan metode *enzyme-linked immunosorbent assay* (ELISA). Tingkat libido dilakukan dengan pengamatan waktu pertama mencumbu betina, menaiki betina, sampai ejakulasi. Penampungan sperma menggunakan metode vagina buatan. Hasil menunjukkan kambing Kejobong memiliki kadar testosteron pagi ($12,00 \pm 6,56$ ng/ml) yang berbeda nyata dari kambing PE ($6,82 \pm 4,18$ ng/ml), sedangkan kadar testosteron pagi kambing Bligon ($9,23 \pm 4,73$ ng/ml) sama dengan kambing Kejobong maupun PE. Tingkat libido kambing Kejobong pada pagi (6,77±5,96; 11,27±8,10, dan 18,45±8,27 detik) serta sore (8,89±7,97; 11,03±8,74; dan 21,05±9,60 detik) adalah paling baik. Gerakan massa dan konsentrasi *spermatozoa* kambing Kejobong ($75,67 \pm 6,51\%$ dan $5838,67 \pm 140,90 \times 10^6$ /ml) berbeda nyata dengan kambing Bligon ($60,67 \pm 9,61\%$ dan $4625,33 \pm 129,72 \times 10^6$ /ml) dan PE ($63,13 \pm 8,33\%$ dan $3756,00 \pm 52,76 \times 10^6$ /ml). Disimpulkan bahwa kambing Bligon dan PE memiliki kadar hormon testosteron yang sama. Kambing Kejobong memiliki tingkat libido dan kualitas sperma yang lebih baik daripada kambing Bligon maupun PE.

Kata kunci: kambing, kualitas sperma, libido, testosteron

Introduction

Livestock productivity is the result from the functions of reproduction and growth (Hardjosubroto, 1994). Assessment of male animals reproduction can not be separated from the ability of the males to produce sperm

and copulate females that is represented by libido.

Testes are the primary reproductive organs of males. Leydig cells are located in the interstitial testicular tissue, that serve to secrete testosterone. The testosterone hormone is important for at least one phase of

the spermatogenesis. The flow of testosterone into the blood can accelerate the ability of males to copulate females, which is expressed as libido (Guyton and Hall, 1997).

Every breed of buck has different sizes of testes in accordance with the development of weight and age. The different sizes of testes also provide different testosterone secretions, therefore, it will affect the level of libido and sperm quality (Kridli et al., 2007). Testosterone secretion is also influenced by season (Barkawi et al., 2006), and feed (Al-Sobayil et al., 2008).

Information concerning a data base of local bucks reproductive potential has not been widely reported. The aim of this study was to investigate comparison and correlation among testosterone concentrations, libido, and sperm quality of local bucks (Bligon, Kejobong, and Etawah cross-breed bucks) with the similar of age, feed, and season.

Material and Methods

The research was conducted in the Faculty of Animal Husbandry and Faculty of Veterinary Medicine, Gadjah Mada University, Yogyakarta, Indonesia. The data were collected during dry season (August to November 2012).

Animals

The samples used were 9 bucks; 3 Bligons (22.36 ± 2.29 kg), 3 Kejobongs (28.45 ± 2.64 kg), and 3 Etawah Cross-breeds (38.57 ± 5.82 kg) of approximately 18 months of age. Individual pens were used, equipped with temperature and humidity gauges. The feedstuffs for feeding were peanut forage hay and pollard as concentrate that were fed on the basis of weight adjustment. Water was given freely throughout the day.

Testosterone Levels Measurement

Blood was collected from the jugular vein as much as ± 3.0 ml every morning and afternoon. Testosterone levels was measured by enzyme-

linked immunosorbent assay (ELISA) method (DRG, 2009).

Libido Measurement

Libido observation was begun from the first time to sniff, to mount, and finally to ejaculate (Hastono and Arifin, 2006).

Collection and Examination of Sperm Quality

Sperm was collected with artificial vagina (Ismaya et al., 2008). The sperm was further examined for sperm volume, motility, viability, abnormality, and concentration of spermatozoa.

Data Analysis

Data were analyzed using One way Anova and then continued by using Duncan's new multiple-range test (Astuti, 2007).

Results and Discussion

Testosterone Levels of Bligon, Kejobong, and Etawah Cross-bred

Figure 1 presents the comparison of testosterone levels during dry season (August to November 2012). Figures 2, 3, and 4 show the testosterone levels in the morning and afternoon of Bligon, Kejobong, and Etawah Cross-bred.

Figure 1 shows Kejobong bucks had testosterone levels in the morning (12.00 ± 6.56 ng/ml) that was higher than testosterone levels of Etawah Cross-bred (6.82 ± 4.18 ng/ml) with P value of ≤ 0.05 . The testosterone levels in the morning of Bligon (9.23 ± 4.73 ng/ml) was not significantly different to testosterone levels of Kejobong and Etawah Cross-bred. There were no differences among testosterone levels in the afternoon of Bligon, Kejobong, and Etawah Cross-bred (9.33 ± 4.96 ng/ml; 11.96 ± 6.86 ng/ml; and 7.61 ± 4.16 ng/ml, respectively). The differences of testosterone levels was also indicated in individual of each breed of buck (Figure 2, 3, and 4).

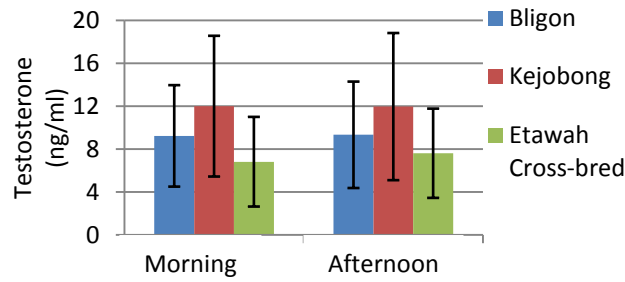


Figure 1. Testosterone levels of Bligon, Kejobong, and Etawah Cross-bred.

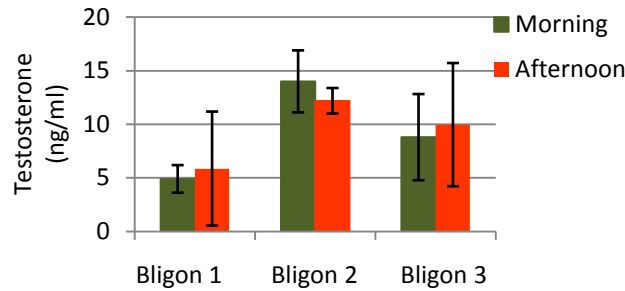


Figure 2. Testosterone levels in the morning and afternoon of Bligon.

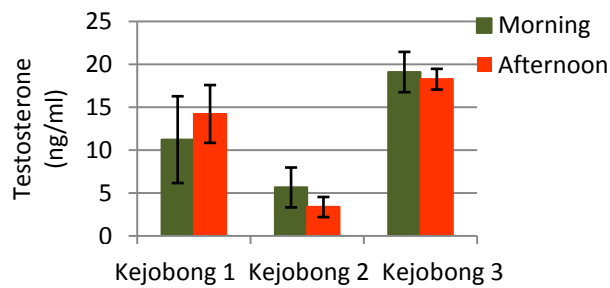


Figure 3. Testosterone levels in the morning and afternoon of Kejobong.

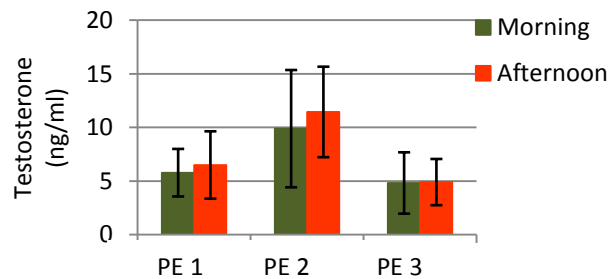


Figure 4. Testosterone levels in the morning and afternoon of Etawah Cross-bred (PE).

The testosterone levels of Bligon, Kejobong, and Etawah Cross-bred bucks were higher than Mountain Black (4.6 ± 0.6 ng/ml), Mountain Damaskus (4.4 ± 0.6 ng/ml), and Mountain Black-Damaskus hybrid (3.9 ± 0.6 ng/ml) (Al-Omari,

2012). There was an indication that genetic can affect testosterone levels. The genetic influences appear if the bucks are raised in a suitable environment.

This study used Bligon, Kejobong, and Etawah Cross-bred bucks of approximately 18 months of age, and the obtained testosterone levels were higher than White bucks (Turkey) of 2 years and 4 years of age (4.3 ± 0.47 ng/ml and 4.95 ± 0.80 ng/ml, respectively) (Polat et al., 2011). Indonesian bucks generally attain the age of puberty at approximately 12 months of age. Males who have achieved the age of puberty generally show high plasma testosterone levels (Bearden et al., 2004).

The observation of the testosterone levels of Bligon, Kejobong, and Etawah Cross-bred during dry season showed different results relative to several other studies. Barkawi et al. (2006) obtained the levels of testosterone in Zaraibi bucks (Egypt) during autumn, winter, spring, and summer, as much as 8.2 ± 0.47 ng/ml; 1.2 ± 0.53 ng/ml; 2.6 ± 0.56 ng/ml; and 10.0 ± 0.56 ng/ml, respectively. Alkass and Ahmed (2011) reported the testosterone levels of Black Goat (Iraq) from three months of collections and found they were as much as 8.82 ng/ml (October); 11.15 ng/ml (November); and 1.16 ng/ml (February), respectively. The testosterone plasm changes with the change of seasons. Testosterone levels increase during the mating season, and each buck has different mating season (Barkawi et al., 2006).

Libido Levels of Bligon, Kejobong, and Etawah Cross-bred

Figure 5 presents the comparison of the levels of libido during dry season (August to November 2012).

Figure 5 shows that Kejobong bucks libidos that were measured at the first time to sniff, mount, and ejaculation were 6.77 ± 5.96 ; 11.27 ± 8.10 ; and 18.45 ± 8.27 seconds, respectively in the morning, and 8.89 ± 7.97 ; 11.03 ± 8.74 ; and 21.05 ± 9.60 seconds, respectively in the afternoon. The Bligon bucks libidos that were measured at the first time to sniff, mount, and ejaculation were 39.20 ± 38.64 ; 45.83 ± 42.31 ; and 55.73 ± 43.93 seconds,

respectively in the morning, and 35.83 ± 29.06 ; 42.61 ± 32.46 ; and 53.04 ± 33.32 seconds, respectively in the afternoon. Etawah Cross-bred bucks' libidos that were measured at the first time to sniff, mount, and ejaculation were 43.10 ± 35.67 ; 54.28 ± 43.49 ; and 67.12 ± 48.05 seconds, respectively in the morning, and 43.69 ± 42.79 ; 50.10 ± 44.48 ; and 61.63 ± 49.45 seconds, respectively in the afternoon.

Kejobong bucks had libido levels that was better than Bligon and Etawah Cross-bred bucks during dry season with P value of ≤ 0.05 . There was an indication that genetic can affect the libido levels of Bligon, Kejobong, and Etawah Cross-bred bucks. Genetic influences appear if the animals are raised in a suitable environment behavior (Bearden et al., 2004).

Sperm Quality of Bligon, Kejobong, and Etawah Cross-bred

Figure 6 presents the comparison of sperm quality during dry season (August to November 2012).

Mating action/copulation time of Kejobong bucks (18.45 ± 8.27 sec.) in this research was shorter than Damaskus bucks (29.31 ± 1.36 sec.) (Al-Sobayil et al., 2008), but longer than Aradhi bucks (17.37 ± 1.70 sec.) and Karakul bucks (7.0 ± 1.6 sec.) (Kafi et al., 2004). Time to ejaculate of Bligon (55.73 ± 43.93 sec.) and Etawah Cross-bred bucks (67.12 ± 48.05 sec.) in this research was shorter than Zaraibi bucks in Mesir (87.4 ± 2.8 sec.) (Barkawi et al., 2006) during dry season. Hypothalamus part of the brain has a capability to stimulate the desire of males to copulate females, that varies depending on the season, and every buck has different response (Bearden et al., 2004).

Feeds with different nutrient contents are known to affect libido levels. In this research, bucks were fed peanut hay as forage and pollard as concentrate. The results showed that the libido levels of Bligon, Kejobong, and Etawah Cross-bred (55.73 ± 43.93 ; 18.45 ± 8.27 ; and 67.12 ± 48.05 sec., respectively) were lower

than Damascus and Aradhi bucks (12.01±1.36 and 17.37±1.70 sec., respectively) (Al-Sobayil et al., 2008). Feeds with high protein content is able to trigger males to copulate females, protein can increase the synthesis of reproduction hormones that stimulate sexual behavior (Bearden et al., 2004).

Sperm Quality of Bligon, Kejobong, and Etawah Cross-bred

Figure 6 presents the comparison of sperm quality during dry season (August to November 2012).

Figure 6 shows that sperm volume, motility, viability, concentration, primary abnormality, and secondary abnormality of spermatozoa were 0.54±0.19 ml; 60.67±9.61%; 72.29±17.28%; 4625.33±129.72 (10⁶/ml); 1.67±0.97%; and 10.02±8.82%, respectively for

Bligon bucks, 0.62±0.16 ml; 75.67±6.51%; 78.24±10.33%; 5838.67±140.90 (10⁶/ml); 1.28±0.85%; and 8.45±5.57%, respectively for Kejobong bucks, and 0.88±0.25 ml; 63.13±8.33%; 71.46±13.46%; 3756.00±52.76 (10⁶/ml); 2.39±1.23%; and 9.51±8.21%, respectively for Etawah Cross-bred bucks. Generally, the best sperm quality was that of Kejobong bucks with P value of ≤0.05.

Spermatozoa motility and concentration of Kejobong bucks were higher than Bligon and Etawah Cross-bred bucks (P≤0.05). The increasing levels of testosterone was followed by increasing concentration of spermatozoa in the process of spermatogenesis (Muryanti, 2005). The sperm volume of Etawah Cross-bred bucks was higher than Bligon and Kejobong (P≤0.05), because sperm plasm of Etawah Cross-bred was more abundant than seminal.

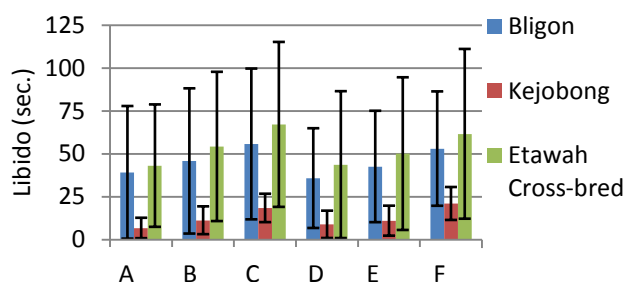


Figure 5. Libido levels of Bligon, Kejobong, and Etawah Cross-bred. Time to sniff in the morning (A), time to mount in the morning (B), time to ejaculation in the morning (C), time to sniff in the afternoon (D), time to mount in the afternoon (E), and time to ejaculation in the afternoon (F).

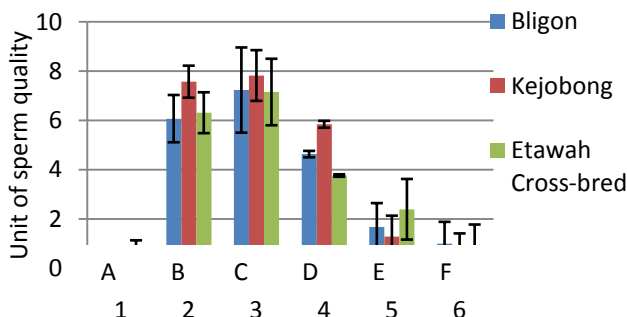


Figure 6. Sperm quality of Bligon, Kejobong, and Etawah Cross-bred. Sperm volume (ml) (A), motility (x10%) (B), viability (x10%) (C), concentration (x10⁹/ml) (D), primary abnormality (%) (E), and secondary abnormality (x10%) (F).

In this research, sperm quality of Bligon, Kejobong, and Etawah Cross-bred was different compared to those of other studies. The sperm volume, motility, and concentration of spermatozoa were 0.53 ± 0.21 ml; $80.03 \pm 6.83\%$; and 2575.70 ± 431.46 (10^6 /ml), respectively for Boer bucks (Mahmilia et al., 2006). Sperm volume, concentration, motility, viability, and abnormality of spermatozoa were 0.62 ± 0.2 ml; 2840 ± 383 (10^6 /ml); $50.0 \pm 7.1\%$; $67.5 \pm 9.4\%$; and $8.6 \pm 2.4\%$, respectively for Kacang bucks (Bintara, 2011). Sperm volume, motility, abnormality, and concentration of spermatozoa were 1.47 ± 0.07 ml; $66.90 \pm 3.80\%$; $22.35 \pm 2.70\%$; and 2660.00 ± 260.00 (10^6 /ml), respectively for Black Bedouin bucks, and 1.12 ± 0.10 ml; $75.30 \pm 5.40\%$; $22.95 \pm 3.86\%$; and 3140.00 ± 370.00 (10^6 /ml), respectively for Black Bedouin-Damascus crossbred (Kridli et al., 2007).

In this research, Kejobong bucks had sperm quality that was better than Etawah Cross-bred bucks during dry season, whereas the research of Rachmawati et al. (2011) found that Kejobong bucks had sperm quality that was lower than Etawah Cross-bred bucks during wet season. Kejobong bucks had sperm volume, motility, viability, concentration, and abnormality of spermatozoa, as much as 0.57 ± 0.16 ml; $46.67 \pm 14.79\%$; $52.72 \pm 28.97\%$; $5.09 \pm 6.38\%$; and 2859 ± 958 (10^6 /ml), respectively in wet season, whereas Etawah Cross-bred bucks were 1.06 ± 0.50 ml; $65.56 \pm 9.17\%$; $81.09 \pm 9.08\%$; $3.72 \pm 3.70\%$; and 2937 ± 1267 (10^6 /ml), respectively in wet season.

Conclusions

This research concludes that Kejobong bucks has testosterone levels that is better than Etawah Cross-bred bucks, whereas Bligon bucks has similar testosterone levels compared to Etawah Cross-bred bucks. The libido levels and sperm quality of Kejobong bucks are better than Bligon and Etawah Cross-bred bucks.

References

- Alkass JE and KA Ahmed. 2011. A comparative study on some semen characteristics and testosterone level of Black Goat and Meriz bucks. *Journal of Agriculture and Veterinary Science*. 14(1):1-8.
- Al-Omari HY. 2012. Study of testosterone concentrations during breeding season of two breeds of goat bucks and their crossbred under exogenous GnRH treatments. *Asian Journal of Animal and Veterinary Advances*. 7(8):693-701.
- Al-Sobayil KA, MM Zeitoun, MH Khalil and AM Abdel-Salam. 2008. Effect of oral administration of a functional synbiotic syrup on libido, semen characteristics, serum testosterone and liver and kidney function of goat's bucks. *Asian J. of Biological Sciences*. 1(1):11-18.
- Astuti M. 2007. *Pengantar Ilmu Statistik Untuk Peternakan dan Kesehatan Hewan*. Binasti Publisher. Bogor. Pp. 83 - 120.
- Barkawi AH, EH Elsayed, G Ashour and E Shehata. 2006. Seasonal changes in semen characteristics, hormonal profiles and testicular activity in Zaraibi goats. *Small Ruminant Research*. 66 (10):209-213.
- Bearden HJ, JW Fuquay and ST Willard. 2004. *Applied Animal Reproduction*, 6th ed., Pearson Prentice Hall. New Jersey. Pp. 36-57.
- Bintara S. 2011. Rasio spermatozoa x:y dan kualitas sperma pada kambing Kacang dan Peranakan Ettawa. *Sains Peternakan*, 9(2):65-71.
- DRG. 2009. *User's Manual Testosterone ELISA*, EIA-1559. DRG Instruments GmbH, Division of DRG International, Inc. Germany.
- Guyton AC and JE Hall. 1997. *Medical Physiology*, 9th ed., Saunders Company. Philadelphia. Pp. 1159-1281.
- Hardjosubroto W. 1994. *Aplikasi Pemuliabiakan Ternak di Lapangan*. PT. Grasindo. Jakarta. Pp. 157-161.
- Hastono and J Arifin. 2006. Hubungan bobot badan dengan lingkaran skrotum, jumlah naik, dan jumlah ejakulasi domba Garut. In: *Proceeding of National Seminar on Animal Farming and Veterinary Technology*. Bogor. Pp 388-391.
- Ismaya, Kustono, S Bintara and DT Widayati. 2008. *Teknologi Reproduksi Ternak*. Fakultas Peternakan, Universitas Gadjah Mada. Yogyakarta. Pp. 8-22.
- Kafi M, M Safdarian and M Hashemi. 2004. Seasonal variation in semen characteristics, scrotal circumference and libido of Persian Karakul rams. *Small Rum. Res*. 53(10):133 - 139.
- Kridli RT, MJ Tabbaa and F. S. Barakeh. 2007. Seasonal variation in scrotal circumference and

- semen characteristics of Black Bedouin and Black Bedouin-Damascus crossbred bucks. *Asian - Australasian Journal of Animal Sciences*. 20(30):359-364.
- Mahmilia F, M Doloksaribu and F. A. Pamungkas. 2006. Karakteristik semen kambing Boer. In: *Proceeding of National Seminar on Animal Farming and Veterinary Technology*. Sungei Putih, Galang. Pp. 533-536.
- Muryanti Y. 2005. Kadar testosteron serum darah dan kualitas spermatozoa mencit (*Mus musculus L.*) setelah diberi ekstrak biji saga (*Abrus precatorius L.*). Fakultas Kedokteran Hewan, Universitas Gadjah Mada. Yogyakarta. Pp. 51-53.
- Polat H, G Dellal, I Baritci and E Pehlivan. 2011. Annual change of the testosterone hormone in male White goats. *Journal of Agricultural Science in China*. 10(2):312-316.
- Rachmawati L, Ismaya and Panjono. 2011. Perbandingan kuantitas dan kualitas sperma kambing Kacang, Kejobong, dan Peranakan Etawah. In: *Proceeding of National Seminar on Universitas Jendral Soedirman*. Purwokerto, Oktober 2011. Pp. 509-518.