

SOME STUDIES ON FERTILITY IN BALADI BUCKS, WITH SPECIAL REFERENCE TO SEASONAL EFFECT

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ABSTRACT

This study aimed to evaluate the fertility in Baladi bucks during three different seasons using ultrasonographic examination and semen analysis. Six mature (two years old) Baladi bucks were included in this experiment. Sonographic examination was carried out once a week. Moreover, Semen analysis was conducted twice weekly to evaluate its quality.

Ejaculate volume (0.99 ml), total sperm output per ejaculate ($5.26 \pm 0.10 \times 10^9$ /ml), mass motility score (3.75), live ratio (81.31%) and individual motility (70.63%) were highest at Autumn while sperm cell abnormalities (6.88%) and sperm cell concentration (5.26×10^9) were highest at Spring.

It could be concluded that season had significant influence on fertility of Baladi bucks and the fertility was best at Autumn.

Key words; Fertility, seasons, buck, ultrasonography and spermatozoa.

INTRODUCTION

Caprine production is one of the key elements contributing to the economy of farmers living in the arid and semi arid regions (Tavakkolian 1999). The Caprine population in Egypt is estimated at 4237270 head in 2007 (FAO 2008). Caprines have better adaptation to harsh tropical environments through, their abilities to reduce their body metabolism, efficiently use water, minimize nitrogen requirements and efficiently digest high fiber forage (Morand-Fehr et al., 2004).

For all these advantages of keeping goats, it becomes necessary to pay much attention to their reproductive performance particularly

under our local environmental conditions by applying the most recent techniques in sire testing and evaluation (Abou El-Roos, 2004).

This study aimed to evaluate the fertility in Baladi bucks during three seasons (spring, summer and autumn) using ultrasonographic examination and semen analysis.

MATERIAL AND METHODS

1. Experimental location and time

This study was conducted in the Veterinary Educational Hospital, Mansoura University, Egypt in the period from February to November 2009.

2. Animals :

The present study was carried out on 6 mature Baladi bucks, that had good general health and normal genital organs. The bucks were 2 years at start of the study. Each animal was fed 0.5 kg pelleted concentrates, Deris in dry season ad lptum, and barseem in green season, animals had free access to water.

Bucks were trained to mount each other. At the start of the study, the semen was collected for one month without any evaluation to accustom the animals and stabilize the reproductive performance, after that, ejaculates were collected and evaluated for 9 months, representing 3 different seasons. Spring, Summer and Autumn.

3. Evaluations :

A- Sonographic examination

Ultrasound imaging of testis and epididymis was carried out according to **Ahmed et al. (1991)** using B-mode, real time scanner fitted with 5 MHz linear array transducer and connected to video graphic printer. Scanning was carried out every week. The ultrasonic gel was applied to the scrotum to ensure good contact between the tissues and the transducer.

Each animal was prepared for scanning by shaving the scrotal hairs over both testicles and epididymes, both testicles were pulled down before scanning into the scrotum and retained by grasping the spermatic cord at the neck of the scrotum with one hand, while the other hand was used to move the transducer along and across the testes and epididymes. Transverse and longitudinal planes of testes and epididymes were frozen and printed.

B- Semen collection and evaluation :

Semen samples were collected from each buck twice weekly by aid of artificial vagina. The semen samples were evaluated immediately after collection, where ejaculate volume, mass motility, individual motility, live sperm ratio, sperm cell abnormalities percent and sperm cell concentration were recorded, Collection and evaluation were carried out according to **Evans and Maxwell (1987)**.

Statistical analysis :

Statistical analysis was made by SPSS version.18. One way ANOVA test was performed, mean and standard error were calculated as illustrated in **Julie Pallant (2007)**.

RESULTS

1. Ultrasonographic findings :

Ultrasound imaging in buck's testis revealed that normal testicular parenchyma appears as homogenous and moderately echogenic structure. The mediastinum appeared as centrally located hyperechoic line when the testis is viewed in longitudinal plane (Image 1), while it appears as a nearly circular echogenic area in the middle of testis when viewed in transverse plane (Image 2).

The testicular tunics and testicular capsule appeared as distinct hyperechoic lines encircling the testicular parenchyma (images 1&2). The inter testicular septum appeared as a highly hyperechoic line in between the two testes when they were viewed medio-laterally (Image 3).

Ultrasound imaging of buck's epididymal tail appeared as hypoechogenic structure, where it was less echogenic than the testis (Image 4).

2. Semen characteristics

Mean (\pm SE) of ejaculate volume (ml), sperm cell concentration ($\times 10^9$ /ml), total sperm output per ejaculate (10^9), mass motility, individual motility (%), live ratio (%) and sperm cell abnormalities (%) during Spring, Summer and Autumn were illustrated in table. 1.

DISCUSSION

The buck's testis appeared as homogenous and moderately echogenic structure. The mediastinum testis appeared as centrally located hyperechoic line in longitudinal plane view, and nearly circular echogenic area in the testis in transverse plane view. The testicular tunics and testicular capsule were evident as distinct hyperechoic line encircling the testicular parenchyma. The inter testicular septum appeared as highly echogenic line between the two testes in the medio-lateral view. The epididymal tail was hypoechoic structure, where it was less echogenic than the testis. These results were in agreement with Ahmed et al., (1991) and El-Sayed (2002).

Ejaculate volume of bucks under study averaged 0.81 ± 0.01 ml. This value was close to Furstoss, et al. (2009) and Barkawi, et al. (2006). However much lower values ranged from 0.41 to 0.62 ml were reported in different breeds (Akusu, et al., 1984 and Ahmed and Noakes 1996). Much higher values ranged from 0.92 to 1.27 ml in different breeds were recorded (El-Sayed, et al 1981 and Karagiannidis, et al., 2000 and Al-Ghalban et al., 2004). The difference may be attributed to breed (Nelson, et al 1987), age (Al-Ghalban et al, 2004) and plane of nutri-

tion (Tegegne et al., 1994) method of collection (Memon, et al., 1982).

Bucks under study displayed a highly significant ($P < 0.01$) seasonal variation in the ejaculate volume with higher volume recorded during Autumn and lower volume recorded during Spring and Summer. This result was in agreement with Karagiannidis et al., (2000); Barkawi, et al. (2006) and Talebi, et al., (2009).

The sperm cell concentration for bucks under study averaged $5.49 \pm 3.01 \times 10^9$ per ml. This value was close to Ramez (1996) and Barkawi et al., (2008). Much lower values ranged from 1.7 to 4.50×10^9 reported by Ali and Mustafa (1986); Pandey et al., (1985); Karagiannidis et al., (2000) and Furstoss et al., (2009). The discrepancy in these results can be explained due to differences in age, breed, body weight, method of collection, sexual preparation, plane of nutrition and climate (Karagiannidis, et al., 2000 and Tegegne et al., 1994).

Sperm cell concentration displayed a highly significant ($P < 0.01$) seasonal variation, where highest concentration was in Spring and lowest concentration was in Autumn. This result was in agreement with Karagiannidis et al., (2000); Al-Ghalban et al., (2004); Barkawi, et al., (2006) and Talebi et al., (2009).

In regards to total sperm per ejaculate, the obtained result averaged $4.45 \pm 0.06 \times 10^9$, which was close to Karagiannidis et al., (2000). Much lower values ranged from 1.8 to 3.78×10^9 were recorded in different breeds

reported by **All and Mustafa (1986)** and **Barkawi, et al (2006)**.

Total sperm output per ejaculate in this study displayed a highly significant ($P < 0.01$) seasonal variation, where its highest value was in Autumn and its lowest value was in Spring. This result was in agreement with **Barkawi, et al., (2006)**, **Ramadan et al., (2009)** and **Talebi et al., (2009)**.

The study revealed that, the mass motility score averaged 3.65 ± 0.02 , where this result was close to **El-Sayed et al, (1981)** and **Ahmed et al., (1997)**. Much higher values (ranged from 3.96 to 4.51) were recorded by **Ahmed and Noakes (1998)** and **(Karagiannidis et al., 2000)**.

In this study, the individual motility percent averaged $68.96 \pm 0.37\%$, this result was close to **Karagiannidis et al., (2000)**. Much lower values were recorded by **Greesh Mohan et al, (1980)** and **Karagiannidis et al., (2000)**. Much higher values (ranged from 74.59 to 89.4%) were recorded by **Ahmed and Noakes (1998)**, **Barkawi et al., (2006)** and **All and Mustafa, (1986)**.

The discrepancies in the motility could be attributed to age (**Chandler et al, 1988**), breed and season of the year (**Karagiannidis et al., 2000**).

In regards to the mass and individual motility, they displayed highly significant ($P < 0.01$) seasonal variation, whereas highest motility was in Autumn and lowest motility was in Spring. That result was in agreement with

Nelson et al (1987) and **Talebi et al (2009)**.

The live spermatozoa percent averaged $78.66 \pm 0.29\%$. Which was close to **Abdel-Rahman and Kandil, (1984)** and **Greesh Mohan et al., (1980)**. Much higher values ranged from 82.35 to 96.57% were recorded by **Ahmed and Noakes (1998)** and **Oyeyemi, et al., (2001)**.

The live spermatozoa percent displayed a highly significant ($P < 0.01$) seasonal variation, where highest percent was recorded in Autumn and lowest value was recorded in Spring. This result was in agreement with **Mohamed El-Fateh et al., (1988)** and **Ahmed and Noakes (1996)**.

In regards to the sperm cell abnormalities percent, it averaged $5.61 \pm 0.10\%$. This result was close to **Metwally, (1994)**. Much lower values ranged from 3.63 to 4.08% were recorded by **El-sayed (1997)** and **El-Sley (1997)**.

Much higher values ranged from 6.55 to 13.5% were recorded in different breeds by **El-Sayed (2002)** and **Barkawi et al. (2006)**.

Sperm cell abnormalities displayed a highly significant ($P < 0.01$) seasonal variation, where highest percent was recorded in Spring and lowest percent was recorded in Autumn. This result was in agreement with **Ahmed and Noakes (1996)** and **Eitedal, (2000)**.

It could be concluded that, season had significant influence on fertility of Baladi bucks and the best fertility was in Autumn.



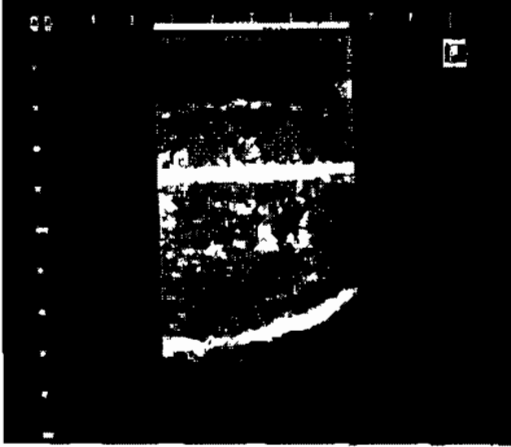
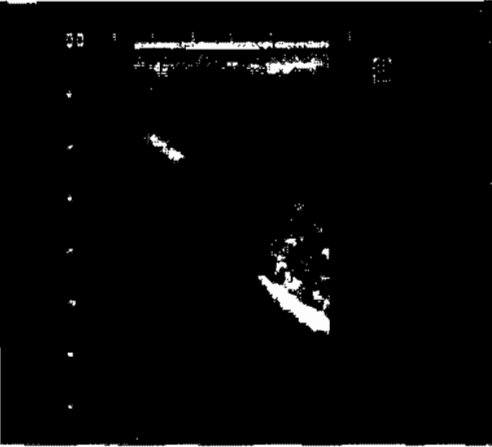
	
<p>Image(1): Shows homogenous and moderately echogenic testicular parenchyma and the mediastinum appeared as centrally located hyperechoic line (Longitudinal plane).</p>	<p>Image(2): Shows homogenous and moderately echogenic testicular parenchyma and the mediastinum appeared as a nearly circular hyperechoic area in the middle of testis (transverse plane).</p>
	
<p>Image(3): Shows homogenous and moderately echogenic testicular parenchyma, the mediastinum appears as centrally located hyperechoic line and the inter testicular septum appears as a highly hyperechoic line in between the two testes (Medio-lateral view).</p>	<p>Image(4): Epididymal tail appears as hypoechoic structure, where it was less echogenic than the testis (Longitudinal view).</p>

Table (1): Mean (\pm SE) of ejaculate volume (ml), sperm cell concentration ($\times 10^9$ /ml), total sperm output per ejaculate (10^9), mass motility, individual motility (%), live ratio (%) and sperm cell abnormality (%).

Parameters	Spring	Summer	Autumn	Total
Volume (ml)	0.71 \pm 0.01 ^a	0.73 \pm 0.01 ^a	0.99 \pm 0.01 ^b	0.81 \pm 0.01
Sperm cell concentration ($\times 10^9$ /ml)	5.60 \pm 0.05 ^a	5.57 \pm 0.05 ^a	5.29 \pm 0.05 ^b	5.49 \pm 3.01
Total sperm output per ejaculate ($\times 10^6$)	4.01 \pm 0.09 ^a	4.08 \pm 0.09 ^a	5.26 \pm 0.10 ^b	4.45 \pm 0.06
Mass motility	3.50 \pm 0.04 ^a	3.71 \pm 0.04 ^b	3.75 \pm 0.04 ^b	3.65 \pm 0.02
Individual motility (%)	66.25 \pm 0.58 ^a	70.00 \pm 0.64 ^b	70.63 \pm 0.63 ^b	68.96 \pm 0.37
Live ratio (%)	74.38 \pm 0.26 ^a	80.29 \pm 0.48 ^b	81.31 \pm 0.50 ^b	78.66 \pm 0.29
Sperm cell abnormalities (%)	6.88 \pm 0.18 ^a	5.33 \pm 0.15 ^b	4.6 \pm 0.16 ^c	5.61 \pm 0.10

Different letters within the same row denote significant variation at $P < 0.01$.

$n = 144$ for each season

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الملخص العربي

بعض الدراسات على الخصوبة في تيروس البلدي مع إشارة خاصة إلى التأثير الموسمي

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تهدف هذه الدراسة إلى تقييم الخصوبة في تيروس العرق البلدي خلال المواسم المختلفة (الربيع والصيف والخريف) باستخدام الفحص بالأشعة الفوق صوتية وتحليل صورة السائل المنوي.

أجريت هذه الدراسة على عدد ستة من تيروس العرق البلدي البالغة من العمر سنتان عند وقت بدء التجربة، في هذه التجربة تم إجراء الفحص بالأشعة الفوق صوتية إسبوعياً لتابعة هيئة الخصية والريخ وملاحظة أية تغيرات.

وبالإضافة إلى ذلك تم تحليل السائل المنوي مرتين إسبوعياً للقياس الواحد بقياس حجم القذف وتركيز الحيوانات المنوية والعدد الكلي للحيوانات المنوية في القذف والحركة الجماعية والفردية ونسبة الحيوانات المنوية الحية والنسبة الكلية للحيوانات المنوية المشوهة.

وكان أعلى حجم للقذف هو (0.99 مل) والعدد الكلي للحيوانات المنوية للقذف ($10^9 \times 5.1 \pm 5.26$) والحركة الجماعية (3.75) والحركة الفردية (70.63%) ونسبة الحيوانات المنوية الحية (81.31%) موجودة في فصل الخريف.

بينما كانت أعلى تركيز للحيوانات المنوية ($10^9 \times 5.26$) ونسبة الحيوانات المنوية المشوهة (6.88%) موجودة في فصل الربيع، ويمكن استخلاص أن الموسم لديه تأثير معنوي على الخصوبة في تيروس العرق البلدي حيث كانت الخصوبة في فصل الخريف أفضل ما يكون مقارنة بباقي الفصول.

الكلمات المفتاحية : خصوبة ، فصل، تيس، أشعة الفوق صوتية، حيوانات منوية.