

EFFECT OF SEASONAL VARIATION ON PHYSICAL AND BIOCHEMICAL PROPERTIES OF LOCAL HAMDNI RAMS SEMEN IN ERBIL REGION

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ABSTRACT

Five Hamdani rams weighting 56-64 kg have been included in this experiment. A total of 120 semen samples were collected. The objectives of this experiment were to investigate the effect of seasonal variations on the physical properties of the semen, including volume, color, mass motility, individual motility, and percentage of dead and live sperm, percentage of sperm abnormality percentage and sperm concentration and pH of seminal plasma. Biochemical properties of seminal plasma they are transaminases enzymes AST, ALT, alkaline phosphate enzyme (ALP) total protein, albumin, globulins and total cholesterol. Result show a significant effect ($P < 0.01$) of the seasonal variation on the physical and biochemical properties of seminal were also determined. Increased ejaculate volume and change in colour to creamy were recorded higher motility of mass and individual sperms in summer season were recorded, while increase number of dead and abnormal sperms were recorded in winter, sperm concentration/ml. increased ($P < 0.01$) in summer and spring in comparison with other three seasons. Concerning the biochemical properties, the result showed that there was increased ($P < 0.01$) activity of AST enzyme in winter, while no effect of the seasons on the activity the ALT enzyme. The ALP, total protein and globulins were significantly ($P < 0.01$) increased in summer, while albumin was increased ($P < 0.01$) in autumn and winter. The total cholesterol concentration decreased ($P < 0.01$) in summer. These results indicated were that the best season for breeding Hamdani ram summer season.

INTRODUCTION

In many countries sheep are of tremendous economic importance, not for they are of meat and wool but being used more and more for milk production and milk products.

Sheep breeding in Iraq is extremely significantly economic. Sheep population in Erbil region is about 603265 (Rathia, 2000). The changes in environmental conditions have been reported to bear significant effect on sexual activity and seminal attributes activities (Thatcher and Hansen, 1993). The cyclic changes in pituitary and testicular activity in seasonally breeding mammals in temperate climates are prompted by changes in photoperiod, nutrition, social interactions and temperature (Bronson and Heideman, 1994).

In view of that fact little information are available of the effect local environmental of the north region of Iraq on reproductive physiology of local Hamdani breed.

The present work was conducted to study the effect of seasonal changes on semen physical and biochemical properties.

MATERIALS AND METHODS

The study was conducted at Girdarasha field, College of Agriculture, University of Salahadin, Erbil (north of Iraq) from 1st October 2001 to 30th September, 2002.

The experiment was carried out on 5 matures local Hamdani rams weighting 56-64kg. A total of 120 samples were collected every two weeks from each ram by artificial vagina.

The physical of ejaculates were estimated by standard techniques (Hussain, 1995). The colour of semen was determined according to Hafez (2000) method. The Aspartate transaminase (AST) and Alanine transaminase (ATL) enzymes activities in the seminal plasma were determined using kits (Randox, Laboratories U.K.). The activity of Alkaline phosphatase (ATP) enzyme was determined using kits (BioMrieux, Sa, France). Total protein concentration was estimated by Biruet method using kits (Randox, Laboratories, U.K.). Albumin concentration was determined (Randox, Laboratories, U.K.). Total cholesterol concentration measured by kits (Biocon, Com. Germany). Result was statistically analyzed using Computer Program System, SAS (1992). The means values were compared by Duncan s Multiple Range Test.

RESULTS AND DISCUSSION

Result showed significant effect ($P < 0.01$) of the season on physical and biochemical properties of semen. Table (1) showed that in summer however the volume of ejaculated animal increased significantly ($P < 0.01$) to simulate the volume reported for Awassi rams (Al-Wahab, 1987) and Merino rams (Kaushish and Sahni, 1977). On monthly basis volume increased ($P < 0.01$) in August (Table 2).

These result are in direct linked with increased in sexual desired of animals during summer season and may reflect the hormonal profile of the animals as suggested by Hafez (1987).

The present study showed a better ($P < 0.01$) color during summer and spring (between milky to creamy) while it was thin in density in autumn and winter. Visual evaluation of the ejaculate in respect of color can be a good index for concentration (Rekowitz *et al.*, 1987).

Over all mean of semen pH observed during the present study was changes during different months of year (Table 1). That show lowest pH value recorded in summer which was significantly ($P < 0.01$) lower than other seasons of the year. Concerning specific months the PH among seasons May and June were the lowest ($P < 0.01$) value (Table 2). It can be inferred from the present finding that the decrease in the PH of the semen in Hamdani rams in summer is due to increase the concentration of sperms (Dessauky and Juma, 1968 and Inijdi, 1974). Highest mass and individual motility were recorded in summer (Table 1) were significantly ($P < 0.01$) higher than other seasons of the year, considering that summer was a season with decreasing day-length ward the fool (Karagiannidis *et al.*, 2000) The higher mass and individual activity in rams were probably due to higher concentration of sperms (Javed *et al.*, 2000). Concerning the months of the year the highest concentration of mass and individual activity were found in August (Table 2).

Sperm concentration was highest ($P < 0.01$) during summer compared to other seasons (Table 1) this was similar to the finding in Awssi rams (Wahab *et al.*, 1987) and in Rahman rams (El-Fouly *et al.*, 1980).

The percentage of death sperm was significantly ($p < 0.01$) decreased in summer season (Table 1). In January the highest ($P < 0.01$) percentage of dead sperm was recorded (Table 2). These were findings also reported by Rekwot *et al.* (1987).

Total sperm abnormalities are shown in (Table 3). Sperm defects are seen in the head, midpiece and tail and significantly ($P < 0.01$) highest sperm abnormalities are seen in winter. However in February the highest ($p < 0.01$) a sperm abnormality has been noted (Table 4). This finding agree with other reports (Injidy, 1974, and Abid, 1984), but differ from the results of other workers the disagreement might be due the different breeds used by different workers (Karagiannidis *et al.*, 2000 and Al-Molaly, 2000). Biochemical properties were significantly ($P < 0.01$) effected by seasonal variation.

There was an increase in concentration of total protein in seminal plasma during the summer season (Table 5), and the highest ($P < 0.01$) plasma protein concentration was recorded in August (Table 6). However Hussian (1994) reported that the highest total protein in local goat was observed during autumn. On the other hand Juma, (2000) in his previous work on Friesian bulls suggested that the highest total protein concentration in plasma was found in winter.

The increased concentration of total protein related to increase testicular, epididymal and accessory glands function during the increased in sexual activity. (Rao Veeramachnen *et al.*, 1990; Hafez and Hafez, 2000).

In the present study (Table 5) albumin rose highly significantly ($P < 0.01$) during winter and decline ($P < 0.01$; Table 6) during June and August (summer season). A result which is similar to that was obtained in bull (Mann, 1964) and in local goats (Hussian, 1994), In contrast to albumin the globulins concentration in the present study was higher ($P < 0.01$; Table 5) in summer during the present study. Increased globulin during summer contrast to albumin probably provides transport ion, lipid and steroid to the organs (Gaong, 1993).

The activities of AST was higher in the seminal plasma of different seasons are show in Table (5). The activity of AST was higher ($P < 0.01$) in winter rather than summer, Graham and Pace (1970) suggested that the increase AST activity in seminal plasma may be considered as an index of sperm damage leading to increased sperm membrane permeability to AST. Regarding specific months among seasons the January was attained highest ($P < 0.01$) AST activity (Table 6). The value of alanine transaminase (ALT) activity in seminal plasma of different seasons is present in (Table 5). Hussain (1994) reported an increase concentration and activity of AST in local goats in winter, while Juma (2000) reported increased activity of the mentioned enzyme in the seminal plasma in summer. The highest ($p < 0.01$) activity of ALT was attained in spring, while the lowest ($P < 0.01$) concentration of ALT activity was found in November. There are several reports correlating between the activity of AST and ALT in the seminal plasma and its concentration (Flipse, 1960)

There was increase AST concentration in seminal plasma in the winter in local goat (Hussian, 1994), and in Friesian bull in summer (Juma, 2000).

The increase of AST activity in seminal plasma as an index of degree of sperm damage leading to increase sperm membrane permeability to AST (Graham and Pace, 1970).

Concerning the other enzyme Alkaline phosphates(ALP) which was known to be involved in several cellular activity in the male reproductive system, our result reflect a marked increase significantly ($P<0.01$) in the activity of ALP during summer and winter (Table 5). Highest ($P<0.01$) monthly was recorded in January and August (Table 6) .

The present study agrees with reported other researchers (Chahal *et al.*, 1979 and Chanal *et al.*, 1985). The increase in ALP activity in summer and winter may be due to increase secretion adrenocorticotrophic hormone (ACTH) due to environmental stress. (Litwack, 1972) .

Total cholesterol concentration was higher ($P<0.01$) during winter (Table 5) and declined during summer. Highest ($P<0.01$) concentration of total cholesterol was obtained in February (Table 6). Value for total cholesterol was declined during sexual activity that total cholesterol precursor for steroid hormones including androgens (Mukkadan, 1980).

The season changes obtained in present study indicate that local Hamdani rams under local environment conditions prevail in Iraq are capable of breeding throughout the year . However there are seasons of increase sexual activity reflected in tem of increased sexual desire decreased sperms abnormalities and percentage of dead sperms, increased ejaculate volume ,motility sperm/ejaculate. Also increased ALP enzyme activity total protein, decreased in AST, ALT enzymes activities especially during summer . These results indicate that local Hamdani rams are adapted to high environmental temperature. . Cold environment (winter) seem to have certain amount of deterioration effect on the parameters studied.

The other environment seasonal factor is photoperiodism, which seems to play little or no effect in this experiment since maximal reproductive ability was observed in summer (long day).

تأثير التغيرات الفصلية في الصفات الفزيائية والبايوكيميائية للسائل المنوي للأكباش الحمدانية في أربيل
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الخلاصة

استخدمت في هذه الدراسة خمسة أكباش بالغة جنسيا بوزن ٥٦-٦٤ كغم بلغت مجموع القذفات خلال الدراسة ١٢٠ قذفة وتمت دراسة الصفات الفيزيائية، الحجم، الحركة الجماعية والحركة الفردية، ونسبة المنوية للحيامن الحية والميتة والتشوهات فضلاً عن تركيز الحيامن/ملمتر كذلك قياس الأس الهيدروجيني (pH). أما الصفات البايوكيميائية للبلازما المنوية فقد شملت تراكيز الأنزيمات الناقلة للأمين (AST, ALT) وأنزيم الفوسفاتيز القاعدي (ALP) فضلاً عن تركيز البروتين الكلي، الألبومين، الكلوبيولينات والكوالمسترول الكلي. أظهرت النتائج أن للفصل تأثير معنوي ($P<0.01$) في الصفات الفزيائية والبايوكيميائية، إذ تضمنت نتائج الصفات الفزيائية زيادة حجم السائل المنوي وتغير لونه الى الكريمي كذلك زيادة حركة الحيامين الجماعية والفردية خلال فصل الصيف بينما ارتفعت النسبة المنوية لتشوهات الحيامين في فصلي الشتاء والصيف و سجلت أعلى نسبة منوية للحيامين الميتة خلال فصل الشتاء وأزدادت نسبة تركيز الحيامين في المليتر خلال فصلي الصيف والربيع، أما الأس الهيدروجيني فقد انخفض خلال فصلي الصيف و الربيع . أظهرت نتائج التغيرات البايوكيميائية ارتفاعاً معنوياً ($P<0.01$) في تركيز أنزيم AST خلال فصل

ولم يكن للفصل تأثير معنوي في تركيز أنزيم ALT. أزداد معنويا ($P < 0.01$) كل من تراكيز أنزيم ALP , البروتين الكلي والكلوبيولينات خلال فصل الصيف, وأرتفع تركيز الألبومين معنويا ($P < 0.01$) الخريف والشتاء بينما أنخفض تركيز الكوليسترول الكلي معنويا ($P < 0.01$) خلال فصل الصيف. يتبين من النتائج أن فصل التناسل الذي يظهر فيه صفات السائل المنوي الجيدة من الناحية الفزيائية والبايوكيميائية هو فصل الصيف الذي يعتبر الأفضل عن بقية فصول السنة في الأكباش الحمدانية.

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