

Effect of Licorice Extract on Semen Quality and Libido in Awassi Rams

Azhr Al-Haboby¹, A. H. A. H. Hamra² and A. K. Mabdi³

Summary

This study was conducted to evaluate the effect of licorice extract on semen quality and libido in Awassi rams. Eleven Awassi rams (2-2.5 years old and 66.0 0.5 kg in weight). Nine animals were distributed randomly into 3 groups and treated orally with 100 (T₁), 200 (T₂) and 400 (T₃) mg/kg body weight of licorice extract for 12 weeks. The other two rams were served as a control group (T₄). Results showed that treatment with licorice extract increased significantly ($p < .01$) the ejaculate volume, mass activity as well as individual motility of sperms. Number of sperms per ejaculate was higher ($p < .01$) in T₁ (84%), T₂ (200%) and T₃ (110%) groups than control group. Life and normal sperms content were greater ($p < .01$) by 112, 276 and 146% in T₁, T₂ and T₃ groups, respectively than control group. Results of libido test showed that the time from rams introduction to collection was shorter ($p < .01$) in T₁ (22.0 4.9), T₂ (13 1.2) and T₃ (18.0 1.0) seconds in comparison to control group (114.0 23.0) seconds.

In conclusion, treatment with licorice extract improved semen quality and sexual activity of rams. Results were encouraging to apply such treatment for improvement of sheep fertility.

Key words: Licorice extract; Semen quality; Libido; Awassi rams; Iraq.

Introduction

A great progress has been made during the last 30 years through better management for improvement of reproductive performance of animals. Nutritional management is one of the recent aspects that has been used to improve animals fertility (Bearden and Fuquay, 1997).

Previous studies suggested that nutritional supplements such as vitamins (Gamic and Mesaros, 1982) cotton seeds (Mohane all Homnode, 1983) or lupine (Martin and Walkden-Brown, 1995) improved reproductive performance of sheep.

Licorice (*Glycyrrhiza glabra* Linn.) is one of the plants that have many important nutritional components (Grieve, 1995). It has been used since the year 2100 before Christ for disease treatment (Trease and Evans, 1992). Licorice extract has many phytochemical compounds (Craig, 1997). It was used in Japan for treatment against sterility in women (Yaginuma *et al.*, 1982). Therefore, all the above reasons were encouraging to test this product in male reproduction.

All previous studies dealt with the effect of licorice on human. To our knowledge references lacked information that deal with the effect of licorice on reproductive performance of rams. Therefore, this study was conducted to evaluate the effect of feeding licorice extract on semen quality and sexual activity in Awassi rams.

Materials and Methods

This study was conducted in IPA Animals Breeding Station, from Sept. 1999 to March, 2000. Eleven awassi rams, 2-2.5 years old with average weight of 66.0 0.5kg were used. Animals were divided randomly into four groups (T₁, T₂, T₃ and T₄). Rams in T₁ group (n=3), T₂ group (n=3) and T₃ group (n=3) were treated with 100, 200, 400 mg/kg body wt/week of licorice extract respectively. Rams

in T₄ group (n=2) were served as a control group. Licorice extract was dissolved in ratio gm/5m of distal water. Licorice extract treatments were given orally. Treatment lasted for twelve weeks. Semen was collected once a week by artificial vagina. Semen quality was evaluated weekly until the end of experimental period. Semen physical properties included semen volume, mass activity, individual motility, sperm concentration, percent of abnormal and dead sperms were calculated.

Libido test using pen libid test was performed at the end of the experiment. Method of Kilgour and Whale (1980) was used. Reaction time for the first mount, reaction time for the first service and mount to service ratio were determined.

Statistical analysis using General Linear Model Procedures (GLM) for SAS (1992) were used. Duncan multiple range test (Duncan, 1955) was used to test the significant differences between means.

Results

Treatment with licorice extract decreased significantly ($p < .01$) the time between rams introduction and semen collection. This was obvious at the eighth week of treatment. The mean time was 22.0±4.9, 13.3±1.2, 18.0±1.0 and 114.0±23.0 seconds for rams in groups T₁, T₂, T₃ and T₄, respectively.

Results showed a significant ($p < .01$) improvement in semen volume (Fig. 1). Semen volume was 1.30 0.06 ml in rams treated with 200mg/kg/week licorice extract whereas, it was 1.00±0.05ml in rams treated with 100 or 400 mg/kg/week licorice extract. Differences were started at the eighth week of treatment.

Sperm concentration increased significantly ($p < .01$) in animals treated with licorice extract. Sperm concentrations were higher in T₂ group (5.50±0.34) and T₃ group (4.71±0.41 $m \times 10^9$) in comparison to T₁ group (4.36±0.41 $m \times 10^9$) and T₄ group (3.26±0.72 $m \times 10^9$) in the last week of treatment.

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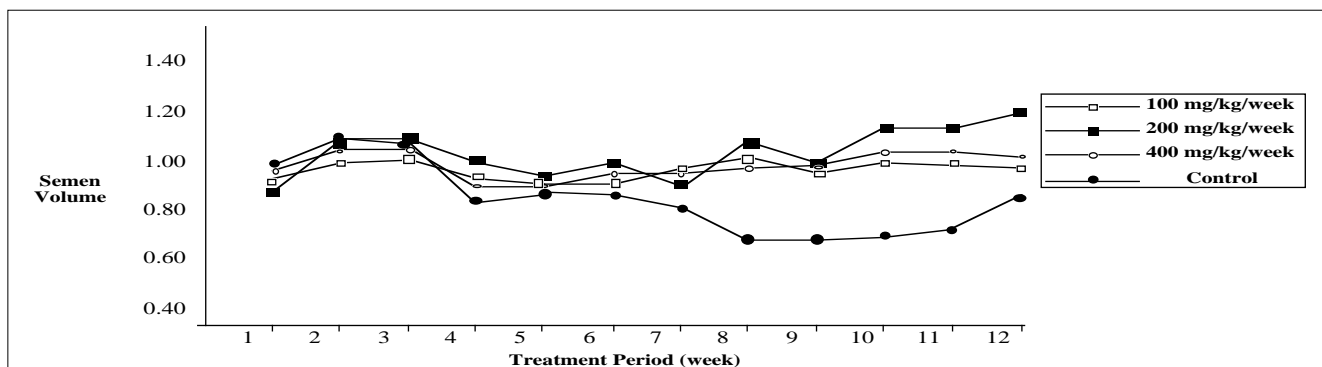


Fig. 1. Effect of licorice extract on semen volume of different treatment groups.

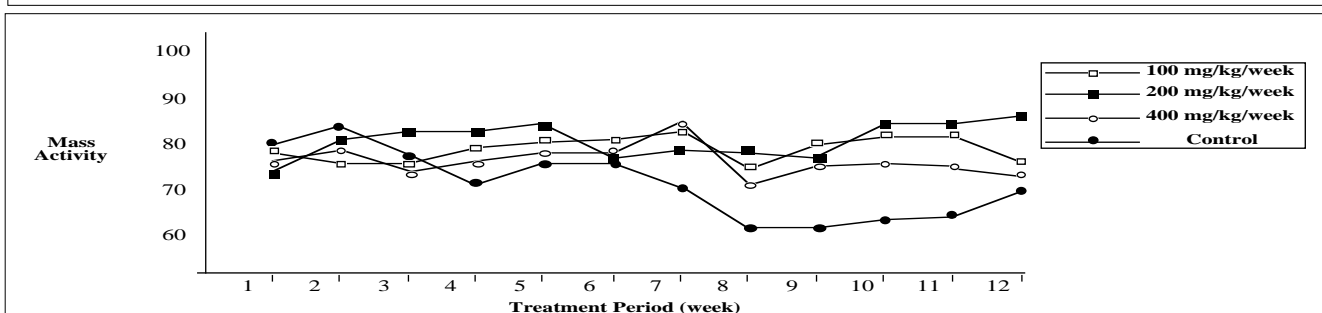


Fig. 2. Effect of licorice extract on mass activity of sperms at different treatment groups.

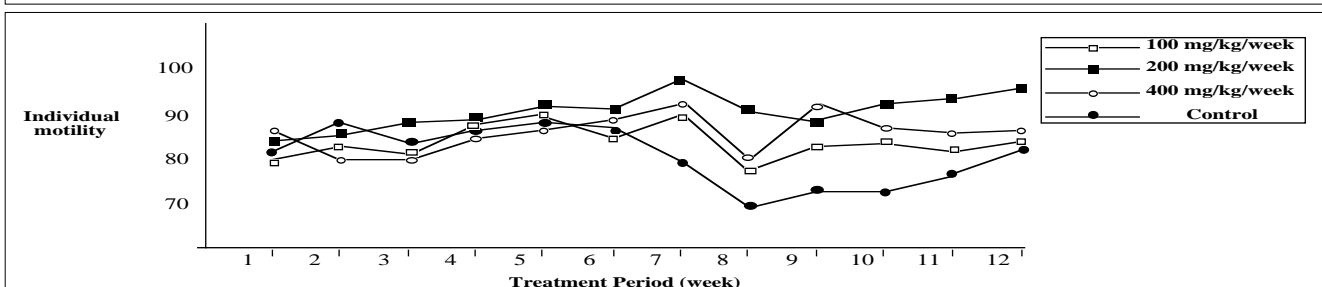


Fig. 3. Effect of licorice extract on individual motility of sperms at different treatment groups.

Treatment with licorice extract significantly affected ($p < .01$) the mass activity and individual motility (Fig. 2, 3). Motility started to increase from the eighth until the last week of treatment. Mass activity was $85.0 \pm 0.0\%$, $93 \pm 1.67\%$, $85.0 \pm 0.0\%$ in groups treated with 100, 200, 400 mg/kg/week, respectively in comparison to control group (77.0 ± 2.5) (Fig. 2).

Individual motility was the highest ($p < .01$) in T2 group ($95.0 \pm 0.0\%$) followed by T3 group (90.0 ± 0.0) then T1 group ($88.0 \pm 1.67\%$) in comparison to control group ($82.0 \pm 2.5\%$) (Fig. 3).

Percentage of dead and abnormal sperms in different treatment groups are shown in Figs. 4, 5. Percent of dead sperms decreased significantly ($p < .01$) in groups treated with licorice extract. Values were 10.0 ± 2.09 , 5.0 ± 1.32 , 9.0 ± 0.50 and $17.0 \pm 4.25\%$ in T1, T2, T3 and T4 groups respectively (Fig. 4). The same trend was found in values of abnormal sperms. Percents of abnormal sperms in T1, T2 and T3 treatment groups were 5.0 ± 0.17 , 3.0 ± 0.17 and $5.0 \pm 0.75\%$, respectively in comparison to the control group ($12.0 \pm 0.25\%$) (Fig. 5).

Data of libido test are shown in table 1. Results of pen test showed that treatment with licorice extract for 12 weeks decreased significantly ($p < .05$). The number of mounts in T2 group (23.00 ± 5.29) and T3 group (37.0 ± 4.5) in comparison to T1 group (40.0 ± 2.56) and T4 group (44.00 ± 8.00).

Discussion

Many previous studies have suggested many roles concerning the effect of licorice extract on reproduction. First, various chemical plants compounds such as glycerine are found in licorice. These compounds may compete with steroid hormones to bind with their receptors. (Tamaya *et al.*, 1986). Second, these compounds may act with enzyme that are responsible for steroid hormone metabolism (Takeuchi *et al.*, 1991). Third, licorice acts as anti-oxidant agents. It is known that supplementation of anti-oxidant agent (such as vit E) would protect and stabilize cell membrane (Brzezinska-Slebozinska *et al.*, 1998). Fourth, licorice is an appetizer agent and stimulate digestion in away lead to increase metabolic nutrients such as glucose, amino

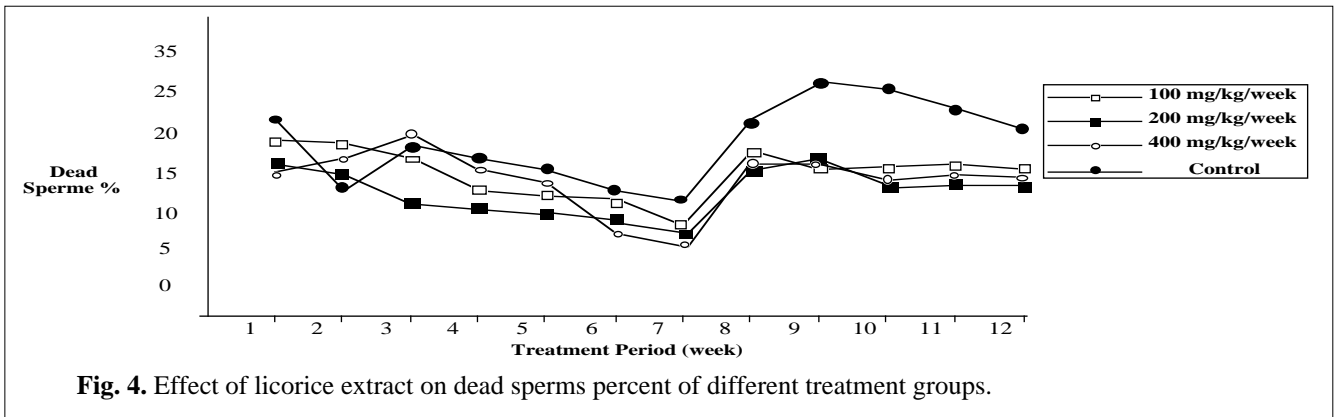


Fig. 4. Effect of licorice extract on dead sperms percent of different treatment groups.

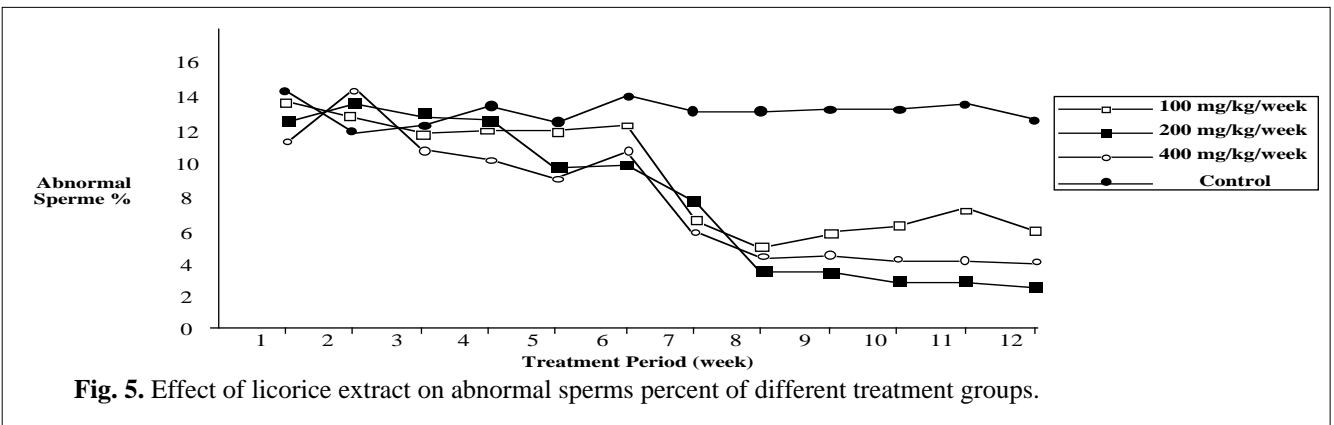


Fig. 5. Effect of licorice extract on abnormal sperms percent of different treatment groups.

Table 1. Effect of Licorice extract on sexual activity (mean+S.E) of rams.

Group	Parameter	Time of first mount (min)	Time of first service (min)	No. of mounts	No. of service	Mount to service
T1	100mg/kg/week	0.25±0.10 (a)	0.25±1.29 (a)	40.0±2.65 (b)	1.0±0.58 (a)	49.0±21.38 (a)
T2	200mg/kg/week	0.15±0.0 (a)	1.06±0.31 (a)	23.0±5.29 (a)	1.66±0.33 (a)	17.0±8.05 (a)
T3	400mg/kg/week	0.22±0.07 (a)	1.22±0.23 (a)	37.0±4.50 (b)	1.0±0.58 (a)	43.50±22.5 (a)
T4	Control	0.30±0.15 (a)	3.15±0.15 (a)	44.0±8.0 (a)	0.5±0.05 (a)	62±10.0 (a)

Means with different letters refer to significant differences (P<.05)

acids and fatty acids, as well as licorice is contained these metabolic nutrients. Metabolic agents have an important role in growth and reproduction (Brameld and Buttery 1998 a, b, and Breier, 1998).

Results of this study showed treatment with licorice extract improved semen quality and sexual activity. This may be due to the role of licorice as anti-oxidant agent, which might improve the stages of spermatogenesis, maintained LH receptors and increase FSH and testosterone concentrations (Aitken *et al.*, 1989 and kilgour *et al.*, 1993). The high level of above hormone would increase testis volume, sperm production (Hotzel *et al.*, 1997), maintained spermatogenesis, (Courot and Ortavant,1981), stimulate secretion of accessory sexual glands (Bearden and Fuquay, 1997).

The improvement of mass activity and individual motility and the decrease of dead and abnormal sperms in this

study may be due to the influence of testosterone on the activity of epididymis to release number of important factors that can affect metabolism of sperms which gave protection against external factors (Amann, 1989 and Amann, 1993). High level of testosterone also improves libido of treated rams (Bearden and Fuquay, 1997).

In conclusion, treatment with licorice extract improved semen quality and sexual activity. The dose of 200 mg/kg/week gave better results than 100 or 400 mg/kg/week .

Implications

Licorice is a plant found naturally in ceratch irrigated areas as well as could be planted. The positive effect of Licorice on role sexual performance could lead into assumption of similar effect an femele. Metter reproductive performance of femeles and roles (ewes and rams) rained in areas rich in Licorice could improve the flock's reproductive performance. However, this work indicates that even Licorice extract could improve fertility. Producing Licorice extract commercially then, could be an investment resuites from this work. Production of Licorice commercially may ease this application and consequently increase reproductive performance in sheep.

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تأثير المعاملة بمستخلص عرق السوس في نوعية السائل المنوي والرغبة الجنسية في كباش العواسي

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الخلاصة

أجريت هذه الدراسة في محطة التحسين التابعة لمركز إباء للأبحاث الزراعية في العراق. بهدف دراسة تأثير المعاملة بمستخلص عرق السوس في نوعية السائل المنوي والرغبة الجنسية في كباش العواسي. أُستخدِم في هذه الدراسة 11 كبشاً عواسياً بعمار 2-2.5 سنة ومعدل وزن 66.0±0.5 كغ، قُسمت الحيوانات الي اربع مجموعات بواقع 3 كبش في المجموعات الاولى، الثانية، الثالثة و2 كبش في المجموعة الرابعة. وقد عوملت المجموعة الاولى والثانية والثالثة عن طريق الفم اسبوعياً ولمدة 12 اسبوع ب100، 200، 400 ملغ/كغ من وزن الجسم بمستخلص عرق السوس المذاب في الماء المقطر فيما عوملت حيوانات المجموعة الرابعة (القياسية) بالماء المقطر فقط. جُمع السائل المنوي من الكباش اسبوعياً ودرست صفاته الفيزيائية في حين قيسَت الرغبة الجنسية في نهاية التجربة. أدت المعاملة بجرع مختلفة من مستخلص عرق السوس الى حدوث زيادة واضحة (>0.01) في كل من حجم القذف، الحركة الجماعية، الفردية للنطف لدى الكباش المعاملة مقارنة بالمجموعة القياسية. كما اوضحت النتائج أن للمعاملة تأثيرات معنوية (>0.01) في زيادة عدد النطف في القذف لدى الكباش وبنسبة 84، 200، 110% المعاملة ب100، 200، 400 ملغ/كغ من مستخلص عرق السوس علي التوالي. كما اثرت المعاملة (>0.01) في زيادة عدد النطف الحية والطبيعية في القذف وبنسبة 112، 276، 146% في الكباش المعاملة ب100، 200، 400 ملغ/كغ علي التوالي مقارنة بالمجموعة القياسية. وقد انخفض معنوياً (>0.01) معدل الوقت اللازم لجمع السائل المنوي. حيث بلغ معدل الوقت من تعريض الكبش للنسجة لحيين جمع السائل المنوي 22±4.9، 13±1.2 و18±1.0 ثانية لدى كباش المجاميع الاولى، الثانية، الثالثة على التوالي مقارنة بالمجموعة القياسية (23.0±114.0).

من كل ذلك يُستنتج أن معاملة الكباش أسبوعياً بمستخلص عرق السوس أدى إلى تحسين معنوي في الصفات الفيزيائية للسائل المنوي، كما أدى إلى زيادة الفعالية التناسلية عند اختبار الرغبة الجنسية وقد سجلت المعاملة ب200 ملغ/كغم وزن الجسم في الأسبوع افضل النتائج في جميع الصفات المدروسة.

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