



Effect of Biotin and Human Chorionic Gonadotropin on Reproductive Performance in Ewes

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THE study was conducted to know the effect of Biotin and hCG on the reproductive performance of local Iraqi ewes. Twenty ewes of 2-3 years old and weighted 34-48 kg were used during the period from August 2022 to February 2023. The first group (C) serve as control, while T₁, T₂ and T₃ serve as treatments group, T₁ were given hCG- COX 100 I.U./ewe injection, T₂ biotin 10 mg/ ewe/ daily oral (30 days) and T₃ biotin 10 mg/ ewe/ daily oral (30 days) + hCG- COX 100 I.U./ ewe injection. The estrus rate was equal in all treatments, as all ewes showed Estrus. Pregnant ewes and lambs born increased in the (T₃), with it equal. The percentage of C, T₁, and T₂ (Fertility rate, Conception rate, Pregnancy rate and Lambs rate) was equal (80%), with the superiority of T₃ with 100%. Gestation period for C, T₁, T₂ and T₃ were (151.5 ± 4.5, 152.5 ± 6.2, 153 ± 5.2 and 153.8 ± 10.2 days) respectively. Litter size is equal in all experimental groups. Barrenness rate increased in all treatments except for the T₃, when it was low. It was concluded from the current study that effect of biotin and hCG was beneficial on reproductive performance.

Keywords: Biotin, hCG, Reproductive performance, Ewes.

Introduction

Many exogenous hormones have been used to stimulate pituitary gonadotropin secretion, regulate gametogenesis, sex steroid secretion, induce estrus, ovulation, increase fertility, etc. For example: Gonadotropin-Releasing Hormone (GnRH), Pregnant Mare Serum Gonadotropin (PMSG), Equine Chorionic Gonadotropin (eCG), Human Chorionic Gonadotropins (hCG), Prostaglandin F_{2α} (PGF_{2α}), Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) as a extract or synthetic form [1,2]. Biotin is a water-soluble B group vitamin, and formerly known as vitamin H or coenzyme R, Synthesis by the symbiotic gut bacteria in all animal species. Biotin is sensitive to degradation under oxidative, strongly acidic or alkaline conditions. Sources of biotin are plants (barley and wheat),

bacteria, fungi, liver, milk, egg yolk, dried yeast, oilseeds, alfalfa, and vegetables but not by animal cells [3, 4]. There are no studies on the effect of biotin on reproductive performance in either male or female sheep. Therefore the present study was conducted to evaluate the effects of biotin and hCG on reproductive performance in local Iraqi ewes.

Material and Methods

Twenty local Iraqi ewes aged between 2-3 years with body weight between 34-48 kg were used in the current study. All animals were raised in an animal field belonging to the Fallujah in the Saqlawiyah area during the period between August 2022 to February 2023. The animals were isolated for 45 days before the study began and were examined by the ultrasonography apparatus to ensure that it was not pregnant. The animals

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were divided randomly into 4 equal groups. It was fed naturally on one diet. First group © serve as control, the second group (T1) was given hCG- COX 100 I.U./ ewe injection, the third group (T2) was given biotin 10 mg/ ewe/ daily oral (30 days) and the fourth group (T3) was given biotin 10 mg/ ewe/ daily oral (30 days) + hCG- COX 100 I.U./ ewe injection. Vaginal sponge were used for estrus synchronization for all groups. Reproductive performance (Estrus rate, Fertility rate, Conception rate, Pregnancy rate, lambing rate, Litter size and Barrenness rate) were calculated according to [5]. Data were analyzed using paired t-test in SPSS (Version 25). The differences were set at ($p < 0.05$) according to [6].

Results and Discussion

The results showed that all ewes in all groups were come to the estrus. Pregnant ewes and lambs born increased in the (T₃). The percentage of (fertility rate, conception rate, pregnancy rate and lambs rate) was (80%) in the C, T₁ and T₂, with the superiority of the T₄, where the percentage was 100%. Gestation period for C, T₁, T₂ and T₃ were (151.5 ± 4.5 , 152.5 ± 6.2 , 153 ± 5.2 and 153.8 ± 10.2 days) respectively. While Litter size is equal in all experimental treatments. Barrenness rate increased in all treatments except for the T₃, when it was low (**Table 1**).

The current study disagreed with Habeeb & Gad (2019), as they noticed that when 10 mg biotin/ daily was given, the gestation length was (150.1) day, while in our study it was (153) day. The difference may be due to the effect of species and breed.

Reproductive performance in terms of fertility, litter size and lambs rate are considered the major components of overall efficiency in ewes productivity. While fertility of Iraqi local ewes is moderate to high depending on management practices and feeding; however litter size is low effective genetic estimates of these traits are rather low and reflect small genetic variation in these performance, the Ewes are produce in a broad range of production system and climatic condition and possess great genetic diversity in reproductive potential. Various mutation influencing litter size and ovulation rate in ewes provide additional opportunities to rapidly adjust

genetic potential but required careful breeding management [7, 8].

Nutrition influences various physiological pathways in the animal many studies have shown that the hypothalamus, pituitary gland, and gonads are all three levels of the body that can be affected by changes in energy balance which is the difference between the pool of available energy and the pool of energy used given that the reproductive axis is sensitive to the nutrition of metabolic reserves and the sufficiency of stores; It is clear that the availability of energy plays a critical role in reproductive performance [9, 10].

Gestation length is also influenced by the age, genotype, litter size, and nutrition of the ewes[11].

The HCG affects ovulation by binds to the LHCGR receptor and has a marked luteotropic activity, thus, when there is treatment with hCG there is a greater P4 secretion. It also increases pregnancy rates [12, 13].

Biotin is one of the vitamins that acts as an antioxidant; which increases the efficiency of the reproductive performance of the animal through ovulation and increasing the pregnancy rates and fertilization etc... [14].

The reason for the superiority of T₄ treatment is due to the synergistic action of Biotin with hCG which improves the concentration of FSH and LH while improving reproductive performance and pregnancy sustainability.

Conclusions

The result of this study indicates improved reproductive performance of local Iraqi ewes following administration of Biotin and hCG.

Acknowledgment

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Authors contribution

These authors each contributed equally

Conflicts of interest

Authors state no conflict of interest found in this study.

TABLE 1. Effect of Biotin and hCG on reproductive performance in ewes.

Reproductive parameters	Experimental Group			
	C	T ₁	T ₂	T ₃
No. estrus ewes	5	5	5	5
Estrus rate (%)	100%	100%	100%	100%
No. Pregnant ewes	4	4	4	5
Fertility rate (%)	80%	80%	80%	100%
Conception rate (%)	80%	80%	80%	100%
Pregnancy rate (%)	80%	80%	80%	100%
Gestation length (days)	151.5 ± 4.5c	152.5 ± 6.2b	153 ± 5.2a	153.8 ± 10.2a
No. of lambs born	4	4	4	5
Lambs rate (%)	80%	80%	80%	100%
Litter size	1	1	1	1
Barrenness rate (%)	20%	20%	20%	0%

*Different letters within same row means there were significant differences at P≤0.05.

References

- Silva, A. R., Pereira, A. F., Lima, G. L., Peixoto, G. C. X. and Souza, A. L. P. *Assisted reproductive techniques on South American wild mammals*. In: Insights from animal reproduction. Carreira, R. P., Chapter 2, InTech, Open Science, pp. 44 (2016). DOI:10.5772/62427
- Jaafar, M. S. and Al-Mutar, H. A. H. Induction Estrus in Local Anestrum Bitches by using GnRH, PMSG and hCG Combination. *Egyptian Journal of Veterinary Sciences*, **55** (4), 1047- 1053 (2024). DOI: 10.21608/EJVS.2023.250119.1674
- Wu, G. Nutritional requirements for maintenance and production. In: Principles of animal nutrition. Chapter 11, CRC Press, Taylor & Francis group, pp. 649 (2018).
- Saha, S. K. and Pathak, N. N. *Vitamins*. In: Fundamentals of animal nutrition. Chapter 10, Springer. pp. 166- 167 (2021). DOI:10.1007/978-981-15-9125-9
- Tekin, T. C. and Köse, A. M. Investigation of the effectiveness of ultrasonography in determining pregnancy and the number of fetuses on the 35th day of pregnancy in Awassi sheep. *Journal of Advances in VetBio Science and Techniques*, **7**(2), 143-152 (2022). DOI:10.31797/vetbio.1091526
- Steel, R. G. D. and Torrie, J. H. *Principles and procedures of statistics*. 2nd ed., McGraw Hill, New York (1980).
- Notter, D. R. Genetic improvement of reproductive efficiency of sheep and goats. *Animal Reproduction Science*, **130**, 147- 151 (2012). DOI:10.1016/j.anireprosci.2012.01.008
- Alkass, J. E., Hermiz, H. N. and Baper, M. I. Some aspects of reproductive efficiency in Awassi ewes: A review. *Iraqi Journal of Agricultural Sciences*, **52**(1), 20-27 (2021). DOI: 10.36103/ijas.v52i1.1232
- Menatian, S., Nemati, M., Rashnavadi, M., Salimi, A., Taheri, M. R. and Yasemi, F. Relationship between pre-pubertal nutrition plane with reproduction performance and milk quality in Kurdish female kids. *Asian Pacific Journal of Reproduction*, **6** (4), 172-175 (2017). DOI: 10.12980/apjr.6.20170405
- Kadhim, Q. and Hussain, S. O. Assessing the Influence of Administration of Kisspeptin-10 on LH Release and Reproductive performance in estrus synchronized ewes. *Egyptian Journal of Veterinary Sciences*, **55** (2), 499- 505 (2024). DOI: 10.21608/EJVS.2023.239749.1632

11. Zebari, H. M. H. Factors that influence on reproductive efficiency in Karadi and Awassi sheep raised under traditional conditions. *Journal of University of Duhok*, **23** (2), 169- 181 (2020). DOI:1 0.26682/ajuod.2020.23.2.20
12. Dias, L. M. K., Sales, J. N. S., Viau, P., Barros, M. B. P., Nicolau, S. S., Simões, Alves, N. G., Alonso, M. A., Valentim, R. and Oliveira, C. A. Although it induces synchronized ovulation, hCG reduces the fertility of Santa Ines ewes submitted to TAI. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, **70** (1), 122-130 (2018). DOI:10.1590/1678-4162-9679
13. Bruno-Galarraga, M., Cano-Moreno, V., Lago-Cruz, B., Encinas, T., Gonzalez- Bulnes, A. and Martinez-Ros, P. The use of hCG for inducing ovulation in sheep estrus synchronization impairs ovulatory follicle growth and fertility. *Animals (Basel)*, **11**(4), 984 (2021). DOI: 10.3390/ani11040984
14. Habeeb, A. A. and Gad, A. E. Effect of Biotin supplementation to the diet of pregnant goats on productive and reproductive Traits and performance of their kids during suckling period. *Journal of Animal Sciences and Livestock Production*, **3** (1), 1- 7 (2019)

تأثير البايوتين وهرمون محفز القند البشري في الأداء التناسلي للنعاج

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أجريت هذه الدراسة لمعرفة تأثير البايوتين وهرمون محفز القند البشري في الأداء التناسلي للنعاج العراقية المحلية. تم استخدام 20 نعجة بعمر 2-3 سنوات ووزن 34-48 كغم حالياً خلال الفترة من أغسطس 2022 إلى فبراير 2023. مجموعة السيطرة، المجموعة الأولى أعطيت حقنة hCG-COX 100 I.U. / نعجة المجموعة الثانية أعطيت بيوتين 10 ملغ / نعجة / يومياً عن طريق الفم (30 يوماً) والمجموعة الرابعة أعطيت بيوتين 10 ملغ / نعجة / يومياً عن طريق الفم (30 يوماً) + مع حقن hCG-COX 100 وحدة دولية / نعجة. كانت نسبة الشبق متساوية في جميع المعاملات كما أظهرت جميع النعاج الشبق. كما زادت نسبة النعاج الحوامل والحملان المولودة في المجموعة الثالثة مع تساوي باقي المعاملات. وكانت نسبة (معدل الخصوبة، معدل الحمل، معدل الحمل، معدل الحملان) متساوية (80%) في المجموع السيطرة، والأولى والثانية، مع تفوق المجموعة الثالثة حيث بلغت النسبة 100%. تراوحت مدة الحمل بين مجموعة السيطرة، الأولى، الثانية والثالثة (151.5 ± 4.5، 152.5 ± 6.2، 153 ± 5.2 و 153.8 ± 10.2) يوماً، في حين كان حجم المواليد متساوياً في جميع المجموع. ارتفعت نسبة التفويت في جميع المجموع باستثناء المجموعة الرابعة حيث كانت منخفضة. نستنتج من الدراسة الحالية أن تأثير البايوتين وهرمون محفز القند البشري كان مفيداً على الأداء الإنجابي.

الكلمات الدالة: البايوتين، هرمون محفز القند البشري، الأداء التناسلي، النعاج.