Influence of feeding different types feed blocks as supplementary feed on the reproductive performance of Awassi ewes grazing cereal stubble

A. D. Salman* Hadeel K. Ibrahim**
D. A. Ali** R. A. Ibrahim*
*State Board of Agricultural Research, Ministry of Agriculture.
**Dept. of Public Health. College of Veterinary Medicine, Baghdad University.

Summary

This study was conducted to investigate the Influence of feeding different types feed blocks as supplementary feed on the reproductive performance of Awassi ewes grazing cereal stubble. These types were feed blocks enriched with cottonseed meal (CSM) or Brewers' grain (BG) as sources undegradable protein (UDP). Ninety-six Awassi ewes (mean live weight 42.2 Kg), aged 3-4 years were allocated into three groups according to ewes live weight and body condition score.

Group (C): Control (No Supplement) stubble grazing only.
Group (FBC): FB enriched with CSM supplement plus stubble grazing.
Group (FBB): FB enriched with BG supplement plus stubble grazing.

All ewes were run as one flock during cereal stubble grazing. The feed blocks were fed to animals (supplementary groups) after their return from grazing wheat and barley stubble (28 days prior to mating and 54 days after introduction of rams). Rams run with the flock during the mating period. The results showed that feeding feed blocks enriched with CSM and BG as supplementary feed resulted considerable improvement in weight gain ($P<0.05$), body condition score ($P<0.05$), conception rate (13-16), lambing percentage (25-33%), twinning percentage (13-18%) and decreased the proportion of barren ewes (19 vs. 6 and 3%). Inclusion of small amount of high moisture brewers grain by-product (9%) as sources of undegradable protein in the feed blocks formula as replacement for costly cottonseed meal resulted a dramatic effects on the reproductive performance of Awassi ewes especially twinning rates and lambing rate.

تأثير تغذية أنواع مختلفة من البلوكات العلفية كعلف تكميلي في الأداء التناسلي للنعاج العواسية التي تعتمد في تغذيتها على مخلفات الحصاد للحبوب

*علاء داود سلمان **هديل خليل إبراهيم
**ضياء عبد الأمير علي *رائد عبد الحي إبراهيم
*الهيئة العامة للبحوث الزراعية- وزارة الزراعة
**فرع الصحة العامة- كلية الطب البيطري- جامعة بغداد

الخلاصة

أجريت هذه الدراسة بهدف تقيم تأثير تغذية أنواع مختلفة من البلوكات العلفية كعلف تكميلي في الأداء التناسلي للنعاج العواسية التي تعتمد في تغذيتها على مخلفات الحصاد للحبوب. استخدم في التجربة 90 نعجة عواسية و بعمر 3-4 سنوات و معدل وزن ابتدائي 42.2 كغم وقسمت حسب أوزانها ودرجة حالة جسمها إلى أربعة مجاميع متساوية.

المجموعة (C): التغذية التقليدية (رعي مخلفات الحصاد فقط).
المجموعة (FBC): بلوكات علفية مدعمة بكسبة بذور القطن+ رعي مخلفات الحصاد.
المجموعة (FBB) بلوكات علفية مدعمة ببثل البيرة+ رعي مخلفات الحصاد.

أن جميع النعاج كانت ترعى بالمرعى كقطيع واحد على مخلفات الحصاد لحبوب القمح و الشعير. تم تقديم البلوكات العلفية كإضافات علفية للمجموعتين (FBC, FBB) بعد عودة الحيوانات من المرعى في المساء و لمدة 28 يوم قبل التسفيد و54 يوم بعد إطلاق الكباش خلال فترة التسفيد. أظهرت النتائج أن استخدام البلوكات العلفية المدعمة بكسبة بذور القطن أو بثل البيرة الرطبة يؤدي الى تحسن معنوي ($P<0.05$) في الزيادة الوزنية، ودرجة حالة الجسم وكذلك تحسن في نسبة الحمل (13-16%)، نسبة الولادات (25-33%)، نسبة التوائم (13-18%) و تقصير موسم التناسل. أن إدخال كمية قليلة من بثل البيرة الرطبة (9%) في تركيبة البلوكات العلفية كمصدر للبروتين غير المتحلل في الكرش بديل لكسبة بذور القطن المكلفة قد أدى الى تحسن معنوي واسع في الأداء التناسلي للنعاج العواسية التي تعتمد في تغذيتها على رعي مخلفات الحصاد للحبوب وخاصة نسبة التوائم والولادات.

Introduction

Sheep in Iraq are heavily dependent on cereal (wheat and barley) stubble grazing as their sole source of feed from June to October, a period which coincides with mating season (1,2). Farmer practices that no supplement is given during this time. However, in the early days of grazing in June and July the quality of stubble is high due to shattered grains and spikes which could be adequate to support the animals (3). Stubble quality later becomes poor and inadequate for animal maintenance with regard to protein and minerals requirements (1, 3).

Sheep fertility may be affected by fluctuation of nutrient intake and the deficiency of protein and minerals sources (1, 3, 4). Earlier studies have shown that using ordinary feed blocks as supplementary feed improved the weight gain, conception rates and shortening the mating season of Awassi ewes grazing cereal stubble (5). But twinning percentage was not affected due to feed block supplementation. The importance of protein quality on the reproductive performance of sheep was well documented in the literature (6). It was found that using protein supplements riches in rumen undegradable protein improved the ewes' ovulation rate considerably (6,7). Therefore, series of on-station and on-farm experiments were conducted to investigate the effect of supplementing urea feed blocks enriched with undegradable protein (UDP) and vitamins AD_3E on the reproductive performance of Awassi ewes' (4,8,9). The results of these experiments showed that when feed blocks enriched with cotton seed meal (source of UDP) resulted in considerable improvement in conception rate, lambing percentage, twinning percentage and cycling activity as compared to the control (non-supplemented groups). However due limited the availability of conventional protein supplements (cotton seed meal and soybean meal) are limited and costly in Iraq and there is difficult to be justified economically (10). High moisture Brewers' grain is a by-product of the brewer factories in Iraq. It is top quality protein (26%) and good source of UDP (11). Therefore this study was conducted to investigate the effect of using feed blocks enriched with cottonseed meal (CSM) or Brewers' grain (BG) as sources UDP on the reproductive performance of Awassi ewes grazing cereal stubble.

Materials and Methods

Ninety-six Awassi ewes (mean live weight 42.2 Kg), aged 3-4 years were allocated into three groups according to ewes live weight and body condition score (BCS).

Group (C): Control (No Supplement).

Group (FBC): FB enriched with CSM supplement.

Group (FBB): FB enriched with BG S supplement.

All ewes were run as one flock during cereal stubble grazing. The feed blocks were fed to animals (supplementary groups) after their return from grazing wheat and barley stubble (28 days prior to mating and 54 days after introduction of rams). Twelve rams run with the flock during the mating period. Ewes and rams grazed wheat and barley stubble at Fudaliah Research Station (IPA Agriculture Research Center). The formulae of feed blocks used in this experiment and their chemical analysis are presented in Table 1. The cereal stubble was sampled at ground level prior to grazing and on days 30 for chemical analysis (Table 2). The chemical analyses were conducted for experimental diets according to (12). Ewes weight and body condition score (13) were recorded at start, mating and the end of mating. Conception, lambing, twinning rates and the percentage of barren ewes were measured. Statistical analysis was done using GLM procedure of SAS (14). Chi-Square test was used to compare fertility traits.

Table 1: The formulae of feed blocks and their chemical analysis

Ingredients (%)	Formula (FBC)	Formula (FBB)
Urea	5	5
Wheat bran	30	30
Rice bran	20	5
Date pulp	-	15
Poultry litter	12	12
Brewer grain	-	9
Cotton seed meal		-
Cereal waste	8	8
Cao	12	10
CaSO4	1	1
Salt	5	5
Chemical analysis	%	%
DM	95.32	94.68
CP	18.15	19.31
EE	1.39	1.44
CF	13.79	9.79
Ash	28.55	32.76

Results and Discussion

The nutritive value of the cereal stubble (Table 2) indicated and confirmed other studies (3, 15) to the importance of using supplementary feed for sheep during cereal stubble grazing.

Table 2: Chemical analysis of cereal stubble

	At Start (%)	At 30 Days (%)
DM	93.95	95.02
CP	6.78	4.90
Ash	13.35	14.54
GE	17.29	16.42

The results of the effect of feed block supplementation on weight changes and body condition score of Awassi ewes grazing cereal stubble are presented in Table 3. These results showed that feeding Awassi ewes feed blocks (Table 3) during cereal stubble grazing improved significantly ($P<0.5$) their weight gain as compared to control group (C). The supplemented groups (FBC and FBB) had higher mating and final weights as compared with control group (C). The present result confirmed previous studies conducted in Iraq (1, 4, 5) and elsewhere in the region (3,15). These results indicated that feed blocks improved the weight gain of ewes dependent on low quality forages as their main diet (16, 17). This improvement in ewes' weight gain is mainly because using feed blocks as supplementary feed would improve the efficiency of utilization of the crop residues by supplying the deficient nutrients (protein and minerals) and then improve the rumen ecosystem for fermentative digestion (17). Similar trends were observed on the effects of feed blocks on ewes' body condition score (Table 3). The body condition score of supplemented groups (FBC and FBB) at mating were slightly higher ($P>0.05$) than non-supplemented group. The final ewes' body condition of supplemented groups were significantly higher ($P<0.05$) than non-supplemented group. The body condition scores were 2.52, 2.87 and 2.75 for groups C, FBC, and FBB respectively. The present results are in agreement with other studies, (3,4, 8) which showed that using feed blocks or cottonseed meal as protein supplement could improve in the body condition of Awassi ewes grazing cereal stubble. Despite the two types of feed blocks were formulated to have similar protein contents (Table 2), but the intake of FBB type was slightly higher (8%). It is found recently that inclusion high moisture by-products (e.g. date pulp, brewer grains and sugar beet pulp) in feed blocks manufacturing gave top quality feed blocks regarding compactness and hardness and also improve palatability of feed blocks (1,8).

Table 3: Effect of feed block supplementation on weight, weight changes and body condition score of Awassi ewes grazing cereal stubble.

Measurements	C	FBC	FBB
No. of ewes	32	32	31
Initial weight (kg)	42.10a	42.88a	42.40a
Mating weight (kg)	43.37a	45.21a	44.70a
Final weight (kg)	42.40a	45.60b	44.50ab
Weight gain (g/day/ewe)	3a	33b	26b
Initial body condition score	2.25a	2.20a	2.18a
Mating body condition score	2.42a	2.50a	2.52a
Final body condition score	2.52a	2.87b	2.75ab
Feed block intake (g/day/ewe)	-	259	280

Mean with different superscript for each trait differ significantly ($P<0.05$).

The effect of enrichment feed blocks with different sources of undegradable on the reproductive performance of Awassi ewes are presented in Table 4. These results showed that the reproductive performance of Awassi ewes grazing cereal improved considerably due feed block supplementation. The percent of ewes lambed after mating during the first and second estrus cycles were significantly higher ($P<0.05$) in supplemented groups (FBC and FBB) than non-supplemented group (C). The percent of ewes lambed in first cycle were 35%, 80% and 73% for groups C, FBC and FBB respectively. This result confirm other results which indicated that using feed blocks or cottonseed cake supplementation during mating season had resulted in higher number of Awassi ewes mated in the first and second estrous cycle (1,3,4,9). This improvement in cycling activity of supplemented groups was mainly due to pre-mating supplementation (4). These results (Table 4) also showed that when feed blocks enriched with cottonseed cake and brewer grain resulted considerable improvement in conception rate (13-16), lambing percentage (25-33%), twinning percentage (13-18%) and decreased the proportion of barren ewes (19 vs. 6 and 3%) compared with control group. The present results showed a similar trend to previous experiments, but the performance of the supplemented groups were relatively higher than the results obtained by other studies (5,9). This can be attributed to the importance of feeding undegradable protein in improving ruminants productivity, which depend on crop residues as basal diet (17). The latter study showed that a small amount of protein that is directly available to the animal (i.e. undegradable protein) stimulates both productivity and efficiency of feed utilization.

Table 4: Effect of feed block supplementation on reproductive performance of Awassi ewes grazing cereal stubble.

Treats	C	FBC	FBB	Significance
No. of ewes exposed to rams	32	32	31	
No. of ewes lambed	26	30	30	
Ewes lambed 1st cycle (%)	35	80	73	P<0.05
Ewes lambed 2nd cycle (%)	61	20	24	P<0.05
Ewes lambed 3rd cycle (%)	4	0	3	NS
Conception rate [a] (%)	81	94	97	P<0.05
Lambing[b] (%)	84	109	117	P<0.05
Twinning[c] (%)	3	16	21	NS
Barren ewes[d] (%)	19	6	3	P<0.05

[a] Number of ewes lambed/number of ewes joined.
[b] Number of lambs born/ number of ewes joined.
[c] Number of ewes giving twin/ number of ewes joined.
[d] Number of ewes not lambed/ number of ewes joined.

It can be concluded that inclusion of small amount of high moisture brewers grain by-product (9%) as sources of undegradable protein in the feed blocks formula as replacement for costly cottonseed meal resulted a drastic effects on the reproductive performance of Awassi ewes especially twinning rates and lambing rate. Also the use of UDP in feed blocks may indicate the low cost of such practice compared to other technologies such as flushing and hormonal treatment (18,19).

References

1. Salman, A. D.(1996). The role of multinutrient blocks for sheep production in integrated cereal-livestock farming system in Iraq. Second FAO Electronic Conference in Tropical Feeds, Livestock Feed Resources within Integrated Farming System. 1st Sept 1996-1st Feb 1997.
2. Al-Haboby, A. H.; Shideed, K. H. and Khatab, G. K. (1997). Sheep fertility in Iraq. Sacia-economic group meeting for the Mashreq countries in the Mashreq/Maghreb Project. March, 24-27, Amman, Jordan.
3. Treacher, T.T.; Rihawi, S. and Owen, E. (1997). Utilization of barley stubble by Awassi sheep. In: Haddad, N., Tutwiler, R., Thomson, E. (Eds.), Improvement of Crop-Livestock Integration Systems in West Asia and North Africa. Proceedings of the Regional Symposium on Integrated Crop-

Livestock Systems in Dry Areas of West Asia and North Africa Amman, Jordan. ICARDA, Aleppo, Syria, November 6-8, 1995.

4. Al-Haboby, A.H., Salman, A.D. and Abdul Kareem, T.A. 1999. Influence of protein supplementation on reproductive traits of Awassi sheep grazing cereal stubble Small Ruminant Research, 34:33-40.
5. Salman, A.D. 1998. Effect of feed blocks supplementation on the reproductive performance of Awassi ewes grazing cereal stubble. International Symposium" Livestock Production in Climatic Uncertainty in the Mediterranean. ANPA, EAAP, ClHEAM and FAO. 22-24 October 1998. Agadir-Morocco.
6. Smith, J. F and Stewart, P. D (1990). Effects of nutrition on the ovulation rate of ewes. Concepts and consequences. In: Reproductive Physiology of Merino Sheep, Oldham, C. M., Martin, G. B. and Purvis, I. W. (eds). Univ. of West Australia, Perth, pp. 85-101.
7. Marshall, T.; Croker, K. P. and Lightfoot, R. J. (1979). Age of ewes and response to lupins: Effect of lupin supplementation on ovulation rate. Studies in the agriculture and food sciences. In: Sheep Breeding (Eds.G.J.Tomes, D. E. Robertson and R. J. Lightfoot.), 2nd edn. Butterworths & Co.Publ., London, UK. pp. 367-371.
8. Salman, A.D. and Mamdouh, Q. 1999. Feed blocks supplementation as a hedging strategy under drought condition. Sixth International Conference on the Development of Dry lands. Development challenges Beyond the year 2000. IDDC, ICARDA, 22-27, August 1999, Cairo, Egypt.
9. Ibrahim, H. K. 1999. The effect of supplementary feed on the reproductive performance of Awassi sheep. M. Sc. Thesis. College of Veterinary Medicin, University of Baghdad.
10. Shideed, K.H and Salman, A.D. 1997. Production utilization, Economic assessment and adoption of by-products feed blocks in Iraq. Regional consultancy report. ICARDA. Mashreq/ Maghreb project (The development of integrated crop-livestock production systems in West Asia and North Africa).
11. Hadjipanyaiotou, M., 1997.The role of crop residues and agro- industrial by-products in filling the deficit of animal feedstuffs in the Middle East. In: Haddad, N., Tutwiler, R., Thomson, E. (Eds.), Improvement of Crop-Livestock Integration Systems in West Asia and North Africa. Proceedings of the Regional Symposium on Integrated Crop-Livestock Systems in Dry Areas of West Asia and North Africa, Amman, Jordan. ICARDA, Aleppo, Syria, November 6-8, 1995.
12. Association of Official Analytical Chemists (AOAC) (1984). Official methods of analysis 14th, Ed. Association of official chemists. Washington, D. C., USA.

13. Meat and Livestock Commission (MLC). (1988). Feeding the Ewe. Sheep Improvement Service. Tech. Rep. No.2. Bletchely, Bucks. UK.
14. SAS.(1989) User's Guide: Statistics. SAS Inst. Inc. Cary, NC.
15. Guessous, F.; Luginbuhl, J. M.; Rihani, N. and Pond, K. R. (1991). Influences of supplementation on the performance of gestating ewes grazing wheat stubble pastures. Anim. Feed. Sci. and Technol. 45:95- 103.
16. Habib G., Basit Ali Shah S., Wahidullah G. and Ghuffranullah. 1991. The importance of urea-molasses blocks and by-pass protein in animal production. The situation in Pakistan. 133-145. In Isotope and Related Techniques in Animal Production and Health by International Atomic Energy. Vienna.
17. Hendratno, C., Nalan, J. V. and Leng. R. A. 1991. The importance of urea-molasses multinutrient blocks for ruminant production in Indonesia. 157-169. In Isotope and Related Techniques in Animal Production and Health by International Atomic Energy Agency. Vienna.
18. Younis, A. A., Al-Kamali, A. A. and El-Tawill, E. A. 1978. Effect of flushing on fertility of Awassi and Hamdani ewes. Wld. Rev. Anim. Prod. 14: 41-48.
19. Al-Rawi, A. A.; Al-Haboby, A. H. and Al-Salman, M. H. 1997. Small ruminants breeding and reproductive physiology research and technology transfer in Iraq. ICARDA. Mashreq/Maghreb Project (The Development of Integrated Crop-Livestock Production Systems in West Asia and North Africa).