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EFFECT OF DIFFERENT SOURCES OF PROTEIN ON THE UTILIZATION OF DIETS CONTAINING WATER HYACINTH FIBROUS RESIDUES

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Six males Barki sheep with an average body weight of 45 kg were used in this study for feed evaluation and three female Barki sheep fitted with a permanent rumen fistulae were used to study the rumen activity. The animals were fed four mixed diets supplemented with soybean meal (SBM),linseed meal (LSM),undecorticated cotton seed cake (UDCSC), and urea as protein and NPN sources .Meat and bone meal (MBM) was added to all diets. Ratio of roughage to concentrate was 1:1.Data could be summarized as follow:
1-The highest dry matter intake ranged between 1005.98±76.34for urea diet and 1392.03±10.89 (g/day) for SBM diet with a significant difference ($p< 0.05$).
2- The total digestible nutrients (TDN%) ranged between 61.56±0.95 for urea diet and 63.61±0.21 for SBM diet without any significant difference, while the digestible crude protein (DCP%) ranged between 9.54±0.13 for urea diet and 11.09±0.14 for SBM diet wiht a significant difference ($p< 0.05$).
3-Nitrogen balance (N.B g/day) ranged between 1.88±0.30 for urea diet and 4.64±0.03 for SBM wiht a significant difference ($p< 0.05$).
4-Ammonia –N concentration (mg-N/100ml R.L.) ranged between 9.56±0.64 for urea diet 6.85±0.64 for UDCSC diet with significant difference .The rates of ammonia production(mg-N/100ml R.L./hr) ranged between 1.66±0.08 for UDCSC and 2.29±0.15 for LSM diet wit a significant difference ($p< 0.05$).
5-Volatile fatty acids (VFA's) concentration(m.eq/100ml R.L.) ranged between 7.19±0.26 and 8.63±0.37 for urea and LSM diets respectively with a significant difference ($p<0.05$)Th rates of VFA's production (m.eq/100 ml R.L./hr) ranged between 1.95±0.11 and 2.40±0.06 for urea and LSM diets respectively with a significant difference ($p< 0.05$).
6- Rumen volume (L) showed the lowest value with the urea diet while the highest value was recorded with the LSM diet 3.21±0.19 and 4.60±0.10 (L) respectively with a significant difference ($p< 0.05$).
7- The microbial protein synthesis recorded the lowest value with the urea diet 33.26 and the highest value with the LSM diet 62.45 (g/day).
Keywords: SBM,LSM, UDCSC,UREA,MBM,TDN,DCP, Ammonia nitrogen VFA's, microbial protein.

تأثير مصادر البروتين على استخدام العلاءق المحتوية على تفل ورد النيل

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هدفت هذة الدراسة الى التوصل الى اقصى استفادة ممكنة من العلائق المحتوية على تفل ورد النيل كعلف غير تقليدى للحيوانات المجترة من خلال استبدال جزء من بروتين العليقة التكميلى ذو الاصل النباتى بنظيرة ذو الاصل الحيوانى منخفض التحلل فى الكرش.
تم استخدام اربع علائق مختلفة فى المصدر البروتينى و قد كان كسب فول الصويا , كسب الكتان, كسب القطن الغير مقشور و اليوريا و دعمت كل العلائق بمسحوق اللحم و العظم و قد كانت نسبة المادة المركزة الى المادة المالئة ١:١.
تم استخدام عدد٦ اناث اغنام برقى لدراسة تقييم العلائق و ثلاث من ذكور اغنام البرقى المزودة بفتحات مستديمة فى الكرش لدراسة نشاط الكرش.
و قد اظهرت التجارب النتائج التالية:
١- كانت هناك فروق معنوية بين العلائق فى الكميات المأكولة من المادة الجافة حيث تتراوحت القيم بين ١٠٠٥,٩٨ و١٣٩٢,٠٣ جم / يوم لعليقتى اليوريا و كسي فول الصويا على التوالى , و لم تظهر فروقا معنوية (مستوى ٠,٠٥) للقيمة الغذائية معبرا عنها كمجمع مواد غذائية مهضومة و قد تتراوحت القيم بين ٦١,٥٦% و ٦٣,٢١% لكل من عليقتى اليوريا و كسب فول الصويا على التوالى.
٢- اعلى قيمة للبروتين الخام المهضوم (١١,٠٩%) سجلت لعليقة كسب فول الصويا , بفارق معنوى , عند مقارنتها بالعلائق الاخرى.
٣- سجل الاتزان الازوتى فروقا معنوية بين العلائق, فقد كانت اعلى قيمة (٤,٦٤ جم/ يوم) لعليقة كسب فول الصويا و اقل قيمة (١,٨٨ جم/يوم) لعليقة اليوريا.
٤- تركيزات الامونيا فى الكرش تتراوحت بين ٦,٨٥ و ٩,٥٦ (مجم امونيا نيتروجين/١٠٠ مل سائل كرش) لعليقة كسب الكتان و اليوريا على التوالى, بفروق معنوية بينما اعلى معدل انتاج للامونيا سجل مع عليقة اليوريا ٢,٢٢ (مجم امونيا نيتروجين /١٠٠ مل سائل كرش/ ساعة) وا قل قيمة كانت مع عليقة كسب القطن الغير مقشور ١,٦٦ (مجم امونيا نيتروجين /١٠٠ مل سائل كرش/ ساعة) بفروق معنوية عن باقى العلائق الاخرى.
٥- تتراوحت تركيزات الاحماض الدهنية الطيارة بين ٧,١٩ و ٤,٦٣ (مليمكافىء/ ١٠٠ مل سائل كرش) لعليقة اليوريا و كسب الكتان على التوالى, و كلنت الفروق معنوية عند مستوى (٠,٠٥) و قد لوحظ نفس الاتجاة لمعدل انتاج الاحماض الدهنية الطيارة فى الكرش.
٦- قيم حجم الكرش تتراوحت بين (٤,٦٠) لتر لعليقة كسب الكتان و اقلها لعليقة اليوريا (٣,٢١) لتر بفروق معنوية.
٧- معدل بناء لبروتين الميكروبى فى الكرش تتراوح بين ٣٣,١٧ و ٦٢,٤٥ جم/يوم فى عليقتى اليوريا و كسب الكتان على التوالى بفروق معنوية بين العلائق المستخدمة.

INTRODUCTION

Livestock is one of the most important sectors in most developing countries, which may play an important role in the economy of these countries.

Feeds cost represents about 70% of total production cost and could be reduced by including locally, regionally growing crops and by-products crops into animal diets. Also feed shortage could be covered by the use of different unconventional sources such as water hyacinth (Borhami and El-Shazly. 1984 and Borhami and El-Shazly 1989), which showed satisfactory and promising results. The supplement should increase the efficiency of utilization of nutrients which may lead to increase animal production (Jayasuriya, 1985).

The present work aimed to study the effect of protein sources such as soybean meal (SBM), linseed meal (LSM), undecorticated cottonseed cake (UDCSC) or urea on the utilization of mixed diets containing water hyacinth fibrous residues (WHFR) supplemented with MBM, and to study their effect on feed evaluation and ruminal fermentation.

MATERIALS AND METHODS

Animals and Diets

Nine barki sheep with a mean body weight of 45 kg were used in this work. Six males were used for digestibility trials, and three females were fitted with rumen permanent canulae and used in rumen activity study. Animals were offered four mixed diets basically contained water hyacinth fibrous residues (WHFR, 35%) as the most efficient percentages as described by Borhami and El-Shazly (1984), and corn stalks (15%) as roughage was used to make the concentrate to roughage ratio 1:1. Each diets contained different experimental protein sources namely soybean meal (SBM), linseed meal (LSM), undecorticated cottonseed cake (UDCSC) or urea. All diets were supplemented by 5% meat and bone meal (MBM). Animals were fed twice daily at 8 a.m. and 16 p.m., and water was offered freely before each meal. The preparation of water hyacinth fibrous residues was conducted as described by Borhami and El-Shazly (1984). The mixed diets were formulated to be isonitrogenous and isocaloric, and each animal was fed *ad lib.* Formulation of the four experimental diets and their chemical composition are presented in Table (1).

Digestibility trials

The digestibility trials lasted three weeks as a preliminary period followed by one week as a collection period. The digestibility trials were conducted as described by El-Shazly (1958). Feed and feces analyses were carried out according to the methods of A.O.A.C (1970).

Rumen fermentation

Rumen samples were withdrawn from the fistulated animals before feeding, 1, 3 and 6 hrs after feeding for *in vitro* incubation using the zero rate technique (Carrol and Hungate, 1954). Ammonia-N determination was carried out using MgO and the Markham microdistillation apparatus (Markham, 1942). Total volatile fatty acids (VFA's) were determined as described by Warner (1964). Rumen volume was determined before feeding, 3 and 6 hr for each animal on each of the experimental mixed diet as described by El-Shazly *et al*. (1976). Microbial protein synthesis values were calculated according to the method of Borhami *et al.* (1992).

Table (1): Ingredients and chemical composition of mixed diets fed to sheep (% on dry matter basis).

Ingredients	SBM	LSM	UDCSC	Urea
WHFR*	35	35	35	35
Corn Stalks	15	15	15	15
Yellow corn	29	29	20	37.5
MBM**	5	5	5	5
SBM***	10	-	-	-
LSM****	-	10	-	-
UDCSC*****	-	-	19	-
Urea	-	-	-	1.5
Molasses	3	3	3	3
Limestone	2	2	2	2
Common salt	1	1	1	1
Chemical composition on DM basis				
OM	87.06	87.64	88.28	87.55
CP	15.65	14.60	15.12	14.81
CF	18.79	18.96	19.89	19.59
EE	3.49	3.49	3.85	3.23
NFE	49.13	50.59	49.42	49.92
Ash	12.94	12.36	11.72	12.45

***   Water hyacinth fibrous residues**
****   Meat and bone meal**
***** Soybean meal**
****** Linseed meal**
****** Undecortictaed cottonseed cake**

Statistical analysis

Analyses of variance of the results were obtained from least squares mean, SAS (1988).

RESULTS

Digestibility trials

The mean daily feed intake expressed as grams of dry matter (DMI), total digestible nutrients (TDN) and digestible crude protein (DCP) values are presented in Table (2). The DMI ranged from 1006 to 1392 g/head/day. The highest DMI value was obtained with sheep fed diet-containing SBM, however, the lowest value was obtained with the diet containing urea with a significant difference ($P< 0.05$). The TDN (%) values ranged from 61.56 to 63.61% with no significant differences were found among diets. Lower DCP (%) values were recorded for the diets containing urea, LSM or UDCSC, respectively (Table 2). Higher DCP (%) value was obtained with diet containing SBM 11.09% with a significant difference than other diets.The digestible crude protein intake ranged from 95.97 to 154.38 (g/h/d), the highest value was recorded with the diet containing SBM, while the lowest value was obtained with the urea diet, with a significance difference ($P< 0.05$).

Table (2): Dry matter intake (DMI) and nutritive value (total digestible nutrients, TDN; and digestible crude protein, DCP) of the experimental diets (mean ± S.E.)

Diets	DMI (g/day)	%TDN	%DCP	TDNI (g/day)	DCPI (g/day)
SBM	1392.03 ±10.89^{a}	63.61± 0.77	11.09± 0.14^{a}	885.5± 7.07^{a}	154.4± 1.39 ^{a}
LSM	1231.10 ±41.88^{ab}	63.51± 0.21	9.88± 0.09^{ab}	781.9± 29.1 ^{a}	121.6± 3.32 ^{b}
UDCSC	1261.73± 29.69^{b}	63.32± 1.67	9.95± 0.30^{b}	798.9± 35.6 ^{a}	125.5± 6.21 ^{b}
Urea	1005.98± 76.34^{c}	61.56± 0.95	9.54± 0.13^{b}	620.2± 56.6^{b}	95.97± 8.49^{c}
			Digestibility coefficients(%)		
	DM	**CP**	**CF**	**EE**	**NFE**
SBM	67.81±0.81^{a}	70.85±0.87 ^{a}	62.87±0.97	78.12±1.68	70.40±0.76^{ab}
LSM	67.02±1.26^{ab}	67.74±0.62 ^{ab}	61.52±1.07	76.45±0.73	71.08±0.41^{a}
UDCSC	65.60±1.69^{b}	65.83±2.01^{b}	61.32±2.29	77.46±1.83	69.74±1.32^{ab}
Urea	63.51±0.53^{c}	64.43±0.90^{b}	63.92±1.35	78.75±0.65	67.66±1.01^{b}

a, b and c means in the same column with different superscript differ significantly ($P< 0.05$).

The nitrogen utilization values are presented in Table (3). Nitrogen intake (NI) ranged from 23.84 to 34.63 (g/h/d). The highest value was obtained with the diet containing SBM and the lowest value was observed with the diet containing urea. However diets showed intermediate values ($P< 0.05$). Higher nitrogen absorbed was recorded with the diet containing SBM (24.05 g/d), while UDCSC and the diet containing urea showed lower values (16.68 and 15.38 g/d), respectively. The differences were significant ($P< 0.05$). All diets showed a positive nitrogen balance (NB) which ranged from 1.88 g/d for the diet containing urea to 4.64 g/d for the diet containing SBM. It was observed that that higher NB as percentage of NI was obtained for the diets containing SBM, LSM and UDCSC (13.40, 12.46 and 12.50% respectively), while significantly lower value was found with the diet containing urea (7.88%). However, NB as a percentage of NA was the highest for the diet containing UDCSC (22.90%) and the lowest value was recorded with the diet containing urea (12.15%). Differences between all diets were significant ($P< 0.05$).

Table (3): Nitrogen utilization in sheep fed experimental diets (mean±SE).

Diets	Nitrogen intake (NI, g/day)	Nitrogen absorbed (NA, g/day)	Nitrogen balance (NB g/day)	NB as % NI	NB as % NA
SBM	34.63± 0.40^{a}	24.05± 0.47^{a}	4.64± 030^{a}	13.40± 0.67^{a}	19.29± 0.41^{b}
LSM	28.76± 0.97^{b}	20.65± 0.82^{b}	3.58± 0.12^{b}	12.46± 0.14^{a}	17.36± 0.20^{c}
UDCSC	30.53± 0.75^{b}	16.68± 0.34^{c}	3.82± 0.08^{b}	12.50± 0.06^{a}	22.90± 0.09^{d}
Urea	23.84± 1.81^{c}	15.38± 1.38^{c}	1.88± 0.30^{c}	7.88± 0.66^{b}	12.15± 0.85^{d}

a , b, c , and d means in the same column with different superscript differ significantly ($p < 0.05$)

Rumen fermentation

Results of ruminal ammonia nitrogen concentrations and rates of production in sheep fed experimental diets are presented in Table (4). The values of NH_3-N ranged from 6.85 to 9.56 (mg/100 ml R.L.) for the diet containing UDCSC and the diet containing urea, respectively. Significant differences (P<0.05) in ruminal ammonia–N concentrations have been detected between all diets.

Table (4): Concentrations and rates of production of ammonia-N in the rumen of sheep fed the experimental diets (mean ± SE).

Diets	Concentrations (mg-N / 100 ml R.L)	Production Rates of (mg-N / 100 ml R.L/hr)
SBM	8.29± 0.48^{b}	2.19 ± 0.11^{a}
LSM	7.51± 0.5 1^{c}	2.29 ± 0.15^{a}
UDCSC	6.85 ± 0.64^{d}	1.66 ± 0.08^{b}
Urea	9.56 ± 0.64^{a}	2.22 ± 0.11^{a}

a,b,c and d means in the same column with different superscripts are differ significantly (P< 0.05).

The mean values for ammonia –N production ranged from 1.66 to 2.29 (mg-N/100 ml R.L. /h) for the diet containing UDCSC and the diet containing LSM, respectively. The mean values of volatile fatty acids (VFA's) concentration and rates of production are presented Table (5). The values for the concentration ranged from 7.19 to 8.63 (m.eq /100 ml R.L) for the diet containing urea and the diet containing LSM, respectively, with significant differences (P< 0.05). The (VFA's) rates of production ranged from 1.95 to 2.40 (m.eq /100 ml R.L. /h) for the same two diets respectively, with significant differences (P< 0.05).

Table (5): Concentrations and rates of production of volatile fatty acids in the rumen of sheep fed the experimental diets (mean ± SE).

Diets	Concentrations (m.eq/100 ml R.L)	Production rates (m.eq/100 ml R.L /hr)
SBM	8.48± 0.26^{ab}	2.39 ± 0.17^{a}
LSM	8.63 ± 0.37^{a}	2.40 ± 0.06^{a}
UDCSC	8.20 ± 0.17^{b}	2.30 ± 0.07^{b}
Urea	7.19 ± 0.26^{c}	1.95 ± 0.11^{c}

a,b,c and d means in the same column with different superscripts are differ significantly (P< 0.05).

Rumen volume values are presented in Table (6), with a range from 3.21 to 4.60 (L) for the diet containing urea and the diet containing LSM, respectively, with significant differences (P < 0.05). The values of the rates of outflow of the liquid phase through the rumen are presented in Table (6). Values ranged from 10.66 to 12.38 (% /h) for the diet containing UDCSC and the diet containing SBM respectively with a significant difference (P< 0.05). The lowest value of microbial protein synthesis (g/day) was obtained with urea diet (33.26 g/day), while the highest value was obtained with the diet containing LSM (62.45 g/day). Values were significantly different (Table 7).

Table (6): Rumen volume values and Rates of out flow of sheep fed the experimental diets (mean ± SE).

Diets	Rumen volume (L)	Rates of out flow (% hr)
SBM	4.33 ± 0.13^{b}	12.38 ± 0.31^{a}
LSM	4.60± 0.10^{a}	10.93 ± 0.56^{b}
UDCSC	3.72 ± 0.16^{c}	10.66 ± 0.30^{b}
Urea	3.21 ± 0.19^{d}	11.13 ± 0.23^{b}

a,b,c and d means in the same column with different superscripts are differ significantly (P< 0.05).

Table (7): The mean of VFA rates of production and microbial protein synthesis in the of sheep fed the experimental diets.

Diets	VFA production (mole / day)	Microbial protein synthesis (g / day)
SBM	3.27±0.03^{b}	57.85 ± 0.38^{b}
LSM	3.53 ± 0.01^{a}	62.45 ± 0.18^{a}
UDCSC	2.69 ± 0.05^{c}	47.60± 0.87^{c}
Urea	1.87± 0.04^{c}	33.08± 0.62^{d}

a,b,c and d means in the same column with different superscripts are differ significantly (P< 0.05).

DISCUSSION

In ruminant nutrition, dietary energy and protein seem to be the most limiting factors (Owens and Zin, 1986). The animal consumes crude protein and energy to supply the nutrients for maintenance, microbial growth and productive performance. Dietary protein nature affects microbial protein synthesis and bypass protein.

The microbial activity in the rumen depends on effective rumen degraded dietary protein (ERDP) supply and also the intake of fermentable energy (Yan *et al*., 1996). In the present study, feed intake was higher for SBM containing diet compared with other diets. This may be due to the higher rate of outflow and dietary CP digestibility of this diet. Nitrogen balance was higher with SBM diet followed by UDCSC diet and the lowest with urea diet. This may be due to the highest nitrogen intake of SBM and UDCSC diets compared with the other diets. DCP (g) had the same trend as the nitrogen balance. A complementary effect might exist between animal protein (MBM) as low rumen degradable protein and SBM as high rumen degradable protein sources in the same diet to enhance the microbial protein synthesis and bypass protein to post ruminal tract.

Ruminal fermentation is a function of rumen activity . Proteins entering the rumen are fermented by rumen microbial population giving peptides, amino acids and ammonia. Simultaneously, with the breakdown of protein there is a synthesis of microbial protein using ammonia, amino acids or peptides compounds in the rumen. In the present study, rumen ammonia-N concentration values were directly depending on protein degradability so higher ammonia-N concentration for the diets containing SBM or urea (8.29 and 9.56 mg/ 100 ml R.L., respectively), were observed . Ruminal ammonia-N concentrations in this study were higher than those reported by Satter and Slyter (1974), while it agreed with those reported by Hume (1970). These values were considered sufficient for maximal microbial growth as suggested by Russell and Strobel (1987).

The values obtained for VFA's concentrations were slightly lower than the range suggested by Brûggeman and Gieseckse (1976). Volatile fatty acids produced during fermentation clearly showed the interaction between nitrogen and carbohydrates metabolism which affected microbial protein synthesis. The diet containing LSM had showed higher rates of ammonia-N and VFA in the rumen of sheep fed such diet. On the other hand, ammonia-N concentration was lower, while VFA concentration was higher, this conditions could be resulted in better utilization of ammonia-N by the microorganisms in the rumen in the presence of sufficient amount of energy needed to enhance their growth. As a result of microbial protein synthesis was higher for the diet containing LSM (62.45 g/d) compared to other diets. Mehrez *et al.* (1977) reported that when VFA exist in the rumen with a reasonable amount, better utilization of ammonia-N in the rumen exists. However energy and ammonia releases are nearly synchronized and enhanced the microbial protein production.

In conclusion the present study verify the previous finding of Borhami *et al.* (1989) on the use of WHFR in feeding ruminants, in a mixed diets containing different protein sources. Meat and bone meal enhanced a better utilization of plant protein in the diets containing WHFR, this improvement was inferior with the diet containing urea and WHFR with the same energy sources.

REFERENCES

A.O.A.C. (1970). Official Methods of Analysis (11th, Ed.)., Association of Official Agriculture Chemists, Washington, DC.

Borhami, B.E. and K. El-Shazly (1989). Protein extraction and utilization of fibrous residue of water hyacinth and berseem as fed in Egypt. Proc 3rd International Conference of leaf protein research LEAF. PRO 89 Pima-Perugia. Viterbo, Italy.

Borhami, B.E. and K.El-Shazly (1984). Utilization of water hyacinth and berseem protein, fibrous residues and wheys Progress in beef protein Research (Ed. Nurenda Singh). Current trends in life Sci., XI. Today & Tommorow's Printers and Publishers, New Delhi. 110005.

Borhami, B.E.; W. G. Fahmy; S. Zahran and K. El-Shazly (1989). Effect of different sources of nitrogen on the utilization of diets containing water hyacinth fibrous residues. Alex .J. Agric. Res., 34:1

Borhami, B.E.A.; W.G.Fahmy and K.El- Shazly (1992). Rumen environment microbial protein synthesis and nitrogen balance in sheep . In :A Procceding of 'Manipulation of rumen microorgamisms "International Conference on Manipulation of rumen microorganisms to improve efficiency and ruminant production "Egypt Alexandria from 20-23 Sept.1992

Bruggeman and D.Giesecke (1976).The effect of urea on the rumen microbiology and metabolism. In 'Urea a protein supplement. M.H.Briggs Ed Pergamon Press, P 125.

Carrol, E.L. and R.E.Hungate (1954). The magnitude of the microbial fermentation in the bovine rumen. Appl. Microbial., 2: 205.

EL-Shazly,K. (1958).Some studies on the nutritive value of some common Egyptian feeding stuffs: 1-Nitrogen retention and ruminal ammonia curnes. J.Agric.Sci., 51:1

El –Shazly,K .E.I.Ahmed;M.N.Naga and B.E.Borhami (1976). A color technique using chromium ethelyne diaminetetra acetate for measuring rumen volume.J.Agric.Sci.Camb.,87:369

Hume, I.D. (1970). Synthesis of microbial protein. The effect of dietary protein .Aust.J. Agric.Res., 21:305.

Jayasuriya, M.C.N. (1985). Potential for the better utilization of crop and agro-industrial by-products in animal in the Indian sub-continent. In FAO. Animal Production and Health paper, 50:37. Rome, 1985.

Markham, R,A. (1942). Steam distillation apparatus for micro kjeldahl analysis Biochem. J., 36:790.

Mehrez , A.Z.; E.R. Rskov and I. McDonald (1977). Rates of rumen fermentation in relation to ammonia concentration . Br.J. Nutr., 38 447
Owens,W.F and R.Zinn (1986). Protein metabolism of ruminant animals. In The Ruminant Animal Digestive Physiology and Nutrition. 2nd Ed.Church D.C. Aredtonpook. Preintic Hall.Engleweed Cliffs, New Jersey.
Russell, J.B. and H.J.Strobel (1987). Concentration of ammonia acrosses cell membranes of mixed rumen bacteria . J.Dairy Sci., 67:1725
SAS (1988). SAS user's guide: Statistics, Release b.03 Edition. 1988. SAS Inst., Inc., Cary, NC.
Satter, L.D. and L.L.Slyter (1974). Effect of ammonia concentration on rumen microbial protein production in vitro. Br. J. Nutr., 32: 194
Warner, C.I. (1964). Production of volatile fatty acids in the rumen, methods of measurements. Nutr. Abst. Rev., 34: 339
Yan, T.; W. Offer and D.J.Roberts (1996). The effect of dietary nitrogen sources and levels on rumen fermentation nutrient degradation and digestion and rumen microbial activity by wether sheep given a high level of molasses . Bri. J.Anim .Nutr.,68: 123

تأثير مصادر البروتين على استخدام العلاءق المحتوية على تفل ورد النيل

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هدفت هذة الدراسة الى التوصل الى اقصى استفادة ممكنة من العلائق المحتوية على تفل ورد النيل كعلف غير تقليدى للحيوانات المجترة من خلال استبدال جزء من بروتين العليقة التكميلى ذو الاصل النباتى بنظيرة ذو الاصل الحيوانى منخفض التحلل فى الكرش.
تم استخدام اربع علائق مختلفة فى المصدر البروتينى و قد كان كسب فول الصويا , كسب الكتان, كسب القطن الغير مقشور و اليوريا و دعمت كل العلائق بمسحوق اللحم و العظم و قد كانت نسبة المادة المركزة الى المادة المالئة ١:١.
تم استخدام عدد٦ اناث اغنام برقى لدراسة تقييم العلائق و ثلاث من ذكور اغنام البرقى المزودة بفتحات مستديمة فى الكرش لدراسة نشاط الكرش.
و قد اظهرت التجارب النتائج التالية:
١- كانت هناك فروق معنوية بين العلائق فى الكميات المأكولة من المادة الجافة حيث تراواحت القيم بين ١٠٠٥,٩٨ و١٣٩٢,٠٣ جم / يوم لعليقتى اليوريا و كسي فول الصويا على التوالى , و لم تظهر فروقا معنوية (مستوى ٠,٠٥) للقيمة الغذائية معبرا عنها كمجمع مواد غذائية مهضومة و قد تروا حت القيم بين ٦١,٥٦% و ٦٣,٢١% لكل من عليقتى اليوريا و كسب فول الصويا على التوالى.
٢- اعلى قيمة للبروتين الخام المهضوم (١١,٠٩%) سجلت لعليقة كسب فول الصويا , بفارق معنوى , عند مقارنتها بالعلائق الاخرى.
٣- سجل الاتزان الازوتى فروقا معنوية بين العلائق, فقد كانت اعلى قيمة (٤,٦٤ جم/ يوم) لعليقة كسب فول الصويا و اقل قيمة (١,٨٨ جم/يوم) لعليقة اليوريا.
٤- تركيزات الامونيا فى الكرش تروا حت بين ٦,٨٥ و ٩,٥٦ (مجم امونيا نيتروجين/١٠٠ مل سائل كرش) لعليقة كسب الكتان و اليوريا على التوالى, بفروق معنوية بينما اعلى معدل انتاج للامونيا سجل مع عليقة اليوريا ٢,٢٢ (مجم امونيا نيتروجين /١٠٠ مل سائل كرش/ ساعة) وا قل قيمة كانت مع عليقة كسب القطن الغير مقشور ١,٦٦ (مجم امونيا نيتروجين /١٠٠ مل سائل كرش/ ساعة) بفروق معنوية عن باقى العلائق الاخرى.
٥- تروا حت تركيزات الاحماض الدهنية الطيارة بين ٧,١٩ و ٤,٦٣ (مليمكافىء/ ١٠٠ مل سائل كرش) لعليقة اليوريا و كسب الكتان على التوالى, و كلنت الفروق معنوية عند مستوى (٠,٠٥) و قد لوحظ نفس الاتجاة لمعدل انتاج الاحماض الدهنية الطيارة فى الكرش.
٦- قيم حجم الكرش تروا حت بين (٤,٦٠) لتر لعليقة كسب الكتان و اقلها لعليقة اليوريا (٣,٢١) لتر بفروق معنوية.
٧- معدل بناء لبروتين الميكروبى فى الكرش ترواح بين ٣٣,١٧ و ٦٢,٤٥ جم/يوم فى عليقتى اليوريا و كسب الكتان على التوالى بفروق معنوية بين العلائق المستخدمة.