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RESEARCH ARTICLE

EFFECT OF DIFFERENT LEVELS OF DRIED RUMEN CONTENT ON NUTRIENT INTAKE, DIGESTIBILITY AND GROWTH PERFORMANCE OF AWASSI LAMBS.

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Abstract

This study was conducted to investigate the effect of feeding dry rumen content (DRC) at different levels on nutrient intake, digestibility and growth performance of Awassi lambs. Twelve Awassi lambs (22.27±0.25 kg body weight and 4 months old) were randomly allotted into four diets for 65 days. The DRC was included in the diets at 0 % (DRC0), 10% (DRC10), 20% (DRC20), 30% (DRC30) to replace parts of the barley grain and soybean meal in the concentrate diet. On the day 60 of the experimental period, all lambs were fitted with fecal collection bags to evaluate the nutrient digestibility. Intake of dry matter (DM), organic matter (OM) and Metabolizable energy (ME) were not affected (P>0.05) in lambs fed DRC10 and DRC20 diets compared to those fed DRC0 (control) diet but decreased (P<0.05) in lambs fed DRC30 diet. Intake of CP (g/day) was higher (P<0.05) in lambs fed DRC10 and DRC20 diet than those fed DRC30 diet, but not significant difference (P>0.05) than those fed control one (DRC0) while, intake of CP (g/kg $W^{0.75}$) did not differ (P>0.05) among diets. Intakes of neutral detergent fiber (NDF) and acid detergent fiber (ADF) were highest (P<0.01) for lambs fed the DRC30 diet followed by the DRC20 and DRC10 than those fed DRC0. No significant different in DM, OM, CP, NDF and ADF digestibility. Total gain and average daily gain (ADG) in lambs fed DRC10 and DRC 20 diets were not significant (P>0.05) different as compared with lambs fed DRC0 (control) diet but they were decreased (P<0.05) when lambs fed DRC30 diet. Lambs fedDRC10 diet was higher(P<0.05) in feed efficiency than those fed DRC30, but no significant (P>0.05) difference than those fed DRC0 and DRC20 diets. It could be concluded that feeding Awassi lambs diets containing DRC up to 10% improved growth performance without any adverse effect on nutrient digestibility or animal health.

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Introduction:-

In Iraq, using agricultural and industrial by-products in feeding livestock has increased tremendously (Hassan *et al*., 2013; Hassan and Abass, 2014) due to the shortage of conventional feedstuffs such as barley grain and soybean meal. They are the major components of concentrate diet locally used. Recently, the prices of cereal and traditional protein concentrate have risen steadily, leading to increase the cost of animal feeding and production. Therefore, extensive research interests have been carried on to investigate for cheaper non-conventional feed ingredients (Khattab *et al.,* 2011; Nasser *et al.,* 2012). One of such is from slaughterhouse by-product comprising rumen contents. Rumen contents are abundantly available as slaughterhouse by-product and mainly considered as waste material creating environmental pollution (Abouheif *et al.*, 1999; Cherdthong and Wanapat, 2013). Usually, rumen contents are cheap to purchase from slaughterhouse with drying and shipping are the most important added costs when used in livestock feeding (Khan *et al.*, 2014). Rumen contents are rich in microbial cell, crude protein and contain digested plant material at various stages of fermentation, saliva, amino acids, vitamins, and end products of rumen fermentation as reported in previous studies (Rao and Fontenot, 1987; El-Yassin *et al.,* 1991; Abouheif *et al.*, 1999; Olafadehan *et al.*, 2014, Cherdthong *et al.*, 2015). In addition, it's rich in minerals (Elfaki and Abdelatti, 2015). The use of DRC is not the new concept and not routinely used in feeding livestock due to low palatability and the moderate level of crude protein and some parts of indigestible fiber (Khattab *et al*., 2011; Talib *et al*., 2016). In addition, to high moisture content (Abouheif *et al*., 1999). Several methods are used to overcome this limitation such as oven drying, sun drying, mixed with blood, barley grain and molasses (El-Yassin *et al.*, 1991; Abouheif *et al*., 1999, Khan *et al*., 2014), ensiled with crop residue with urea and molasses(Khan *et al*., 2014;Talib *et al*., 2016) and adding exogenous fibrolytic enzymes (Khattab *et al*., 2011), but the effective and cheapest methods was sun drying (Khattab *et al*., 1996;Osman and Abass, 2015). Moreover, Cherdthong and Wanapat (2013) revealed that supplementation of DRC in concentrate diets resulted in improved *in vitro*dry matter and organic matter digestibility in buffalo rumen fluid. This study is one of few studies were done on the use of DRC in Awassi lambs. Therefore, the objective of this study was to investigate the effects of replacement parts of barley grain and soybean meal with dried rumen content (DRC) on, nutrients intake, digestibility and growth performance of Awassi lambs.

Materials and Methods:-

Preparation of dried rumen content (DRC):-

Bovine rumen contents were obtained from local the slaughterhouse (mainly cattle). Slaughtered cattle were examined before slaughtered by the veterinary to ensure not transmitted of infectious diseases. Rumen contents materials were collected from the visceral of cattle was opened without contamination of blood and separated over a concrete surface and allowed to sun air-dry for 5 days to reduce the moisture content then milled using hammer mill to produce finely ground dried rumen content (DRC) and mixing with other dietary ingredients.

Diets, experimental animal and their management:-

Twelve Awassi male lambs with initial body weight (BW) 22.27±0.25 kg and 4 months old were obtained from the sheep flock maintained at the Animal field, Faculty of Agriculture, University of Kufa, Najaf, Iraq (31°7′N, 43°48′ E). All Lambs were vaccinated against internal and external parasites before the experiment started. Lambs were randomly distributed into four treatment groups (3 lambs each) using a completely randomized design and housed in the semi-shaded individual pens (1.5 m×1.5 m) and fed once daily at 8.00 am. The experiment lasted 60 days during which the animal allowed adapting the individual pens and the experimental diets. Animals had free access to fresh water throughout the experiment. The diets consisted of four concentrate diets replacement levels of concentrate (barley grain and soybean meal) by DRC at 0, 10, 20 and 30% on DM basis. All diets were formulated to be similar in crude protein content. The concentrate diets were offered at 3% of BW while alfalfa hay was offered *ad libitum*. Daily feed intake and refusal feed from each lamb were recorded before morning feeding to determine the voluntary feed intake. Lambs were weighed at the beginning of the experiment and every 14 days to determine changes in live weight. The last week of the experimental period was used for digestibility trail, using same lambs with same dietary treatments. Lambs were fitted with facial collection bags (locally manufacture) for 2 days as an adaptation period followed by 5 days for feces collection. Daily fecal output was collected, weighed, and recorded. Representative samples (10%) of feces were collected over conclusive days, stored at -18ºC. On the last day of the collection period, the composite feces samples were thawed and thoroughly mixed and subsamples were dried at 55ºC in a forced- air oven for 48h and ground to pass through 1-mm screen and kept for chemical analysis. Samples of feed offered and feed refused were also collected every day and sub-sampled and ground (1 mm screen) and kept for analysis.

Chemical Analysis:-
Samples of feed, DRC and alfalfa hay were ground passing a 1 mm screen and analyzed in triplicate for dry matter (DM method 930.15), ash (method 924.05), crude protein (CP, Kjeldahl N × 6.25, method 984.13), ether extract (EE, method 920.39) and, crude fiber (CF method 973.18) by the procedures of AOAC (1995). Nitrogen-free extract (NFE) were calculated by difference. Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) was determined according to the procedure described by Van Soest *et al.* (1991) with sodium sulfite but not alpha amylase for NDF determination. Both NDF and ADF expressed were inclusive of residual ash.

Statistical analysis:-
All data were subjected to statistical analysis of variance using SAS software (SAS, 2004) with the following model: $Y_{ij}=\mu+T_i+e_{ij}$, where Y_{ij}: observed variation, μ: population means, T_i: effect of replacement levels $_i$ the diets and e_{ij}: error term. Significant differences among treatment means were tested by Duncan's multiple range test (Duncan, 1955) using the same software.

Results and Discussion:-

Chemical composition:-
The chemical composition of experimental diets and dried rumen contents (DRC) are presented in Table 1. Dry matter (DM), crude protein (CP) and ether extract (EE) contents were similar among experimental diets, while the neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), crude fiber (CF) and ash contents were increased as level of DRC increased. This may be due that DRC contains more fiber fraction such as lignin than barley grain and soybean meal. DRC contain semi-fermented feed ingredient in the rumen of slaughtered animal. These results are in the line of reported by several authors (Rios-Rincon *et al*.,2010; Cherdthong *et al.*, 2014; Olafadehan *et al.*, 2014) when incorporated DRC in the diets of steers and sheep. The DRC used in the current study contained (14.22 % CP). This value is within the range 13.3-16.4% in rumen content from cattle reported by Abouheif *et al.*(1999). Similar results were reported by many investigators (Rezakhani *et al.*, 2008; Rios-Rincon *et al.*, 2010; Nasser *et al.*, 2012; Olafadehan *et al.*, 2014; Talib *et al.* 2016), but lower than reported by several authors (Agbabiaka *et al.*, 2012; Cherdthong and Wanapat, 2013; Cherdthong *et al.*, 2014; Elfaki and Abdelatti, 2015). They reported that CP content in DRC from cattle ranged from 16.4-19.56%. These variation in chemical composition of DRC may be due to several factors such as pre-slaughter feeding regimen, length of holding period between feeding and slaughter (Abouheif *et al.*,1999; Rios-Rincon *et al*.,2010; Cherdthong and Wanapat, 2013; Cherdthong *et al.* 2014), season of the year (Rezakhani *et al.*, 2008). Moreover, it may be related type of feed resources diversity and selectivity of pasture by different ruminants in the different locations (Agbabiaka *et al.*, 2012; Elfaki and Abdelatti, 2015). Chemical composition could be varying by species of ruminants (Abouheif *et al.*, 1999; Agbabiaka *et al.*, 2012; Elfaki and Abdelatti, 2015). In this sense, the rumen contents used in the current study were obtained from slaughtered cattle without contamination of blood that may influence the CP value in DRC.

Table 1:-The ingredients and chemical composition of the dietary treatments and dried ruminal content fed to Awassi lambs.

Item	Diet				DRC[1]
	DRC0	DRC10	DRC20	DRC30	
Ingredient (% DM)					
Alfalfa hay	30	30	30	30	
Barley grain	43.9	34.9	25.9	16.9	
Soybean meal	14	13	12	11	
Dried rumen content (DRC)	0	10	20	30	
Wheat bran	10	10	10	10	
Salt and limestone	2	2	2	2	
Premix[2]	0.1	0.1	0.1	0.1	
Chemical composition (% DM)					
DM	89.53	89.79	90.05	90.31	91.60
OM	93.05	91.81	90.75	89.6	85.5
Ash	6.95	8.19	9.25	10.40	14.5
CP	16.57	16.61	16.64	16.68	14.22
CF	12.34	14.68	17.01	19.34	29.10
NFE	60.8	57.06	53.51	49.86	38.89

EE	2.34	2.46	2.59	2.72	3.29
NDF	33.49	36.67	39.85	43.02	53.00
ADF	16.42	19.00	21.57	24.14	32.88
ADL	4.15	5.24	6.33	7.43	10.45
ME(MJ/kg DM)[3]	11.96	11.60	11.26	10.91	9.63

1. Dried rumen content (DRC) included in the diets at 0 (DRC0), 10 (DRC10), 20 (DRC20), and 30% (DRC30)
2. Composition per 1kg contained: vitamin A, 500,000 IU; vitamin D3, 100,000 IU; vitamin E, 250mg; Fe, 5.0 g; Cu, 1.0 g; Co,10.0 mg; Se, 10.0 mg, Mn, 5.0g, Mg 15.0g; Zn5.0g plus antioxidant.
3. Metabolizable energy was calculated ME (MJ/kg DM) = 0.012CP +0.031EE+0.005CF+0.014NFE (MAFF, 1975).

DM= dry matter; OM= organic matter; CP= crude protein; EE= ether extract; NDF= neutral detergent fiber; ADF= acid detergent fiber; ADL= acid detergent lignin; CF= crude fiber, NFE= nitrogen free extract.

Nutrient intake, apparent digestibility and nutritive value:-.

All lambs readily consumed concentrate diets and finish the experiment period, no health problem was detected. Similar results were reported in lambs (Salinas-Chavira *et al.*, 2007; Fajemisin *et al.*, 2010; Olafadehan *et al.*, 2014; Osman and Abass, 2015) and in cattle (Cherdthong *et al.*, 2014) when incorporation DRC in the diet. Mondal *et al.* (2013) observed that feeding DRC did not show any undesirable effect on goat's health.

Replacement parts of barley grain and soybean meal with DRC had no significant effect ($P>0.05$) on DM, OM, and ME intake in lambs fed DRC10 and DRC20 diets compared to those fed DRC0 (control) diet(Table 2).This may be due to lower replacement rate of DRC. Similar results reported by Osman *et al.* (2015) when fed Shugor desert lambs at different levels of DRC (0, 5 and 10%). Mondal *et al.* (2013) also found incorporation DRC instead of wheat bran in Bengal goat diet at level 10% did not affect DM and OM intake compared to control diet. However, intakes of DM and OM in Lambs fed DRC30 diet were lower ($P<0.05$) as compared with those fed DRC0, DRC10 and DRC20 diets when expressed as g/day while these different disappear when expressed as g/kg$W^{0.75}$ (Table 2). These results disagreed with results reported by Abouheif *et al.* (1999) who found no differences in DM intake when fattening Najdi lambs fed diets containing DRC at levels of 25 and 50% compared to lambs fed control diet. In addition, Cherdthong *et al.* (2014) reported no difference in intakes of DM and OM of Thai cattle when soybean meal was replaced by DRC at the different ratio. However, Salinas-Chavira *et al.* (2007) found that DM intake increased significantly in Pelibuy×Dorper lambs fed 4% DRC as compared with those fed control one. Osman and Abass (2015) reported that DM intake increased for Sudan desert lambs fed 20% DRC compared with lambs fed 0 and 10% DRC. In another study, when dried rumen contents were included at different levels (0, 20, 40, and 60%) in diets for Yankasa lambs, Olafadehan *et al.* (2014) observed increased DM and OM intakes up to 40% DRC. In agreement with the results obtained in the current study the higher replacement rate of DRC impacted negatively on DM and OM intake. Nasser *et al.* (2012) observed that DM intake decreased in calves fed DRC at level 16% versus calves fed lower levels of DRC (0 and 8%). Moreover, Olafadehan *et al.* (2014) observed that feed consumption was lower in Yankasa lambs fed DRC at the level of 60% than those fed the control diet. Abouheif *et al.* (1999) also observed a reduction in feed intake in Najdi lambs fed a diet contained 100% DRC. Intake of CP (g/day) was higher ($P<0.05$) in lambs fed DRC10 and DRC20 diet than those fed DRC30 diet, but not significant difference ($P>0.05$) than those fed control one (DRC0) while, intake of CP (g/kg $W^{0.75}$) did not differ ($P>0.05$) among diets. Similar results reported lambs (Abouheif *et al.*, 1999), in goats (Mondal *et al.*, 2013) with no difference in CP intake. Intake of NDF and ADF were highest ($P<0.01$) in lambs fed DRC30 and DRC20 diets followed by DRC10 and DRC0 diets (Table 2). The higher NDF and ADF intakes for DRC diets can be explained by the differences in NDF and ADF contents (Table 1). Similarly, Olafadehan *et al.* (2014) observed that NDF and ADF intakes were increased when lambs fed at 20 and 40% DRC compared to those fed free of DRC. Inconsistent, with results reported by Cherdthong *et al.* (2014) who found that intakes of NDF and ADF were not affected in Thai cattle fed different level of DRC as compared with those fed control diet. A large variation observed with very limited published data could be attributed to the considerable variation in chemical composition DRC previously discussed in chemical composition. In addition, there were variations in processing rumen content such as mixed rumen content with barley grain (Abouheif *et al.*, 1999) or mixed with blood and molasses (El-Yassin *et al.*, 1991; Fajemisin *et al.*, 2010; Khan *et al.*, 2014).

No significant difference (P>0.05) in digestibility coefficient of DM, OM, CP, NDF and ADF at lambs was observed in response to increase replacement parts of barley grain and soybean meal by DRC (Table 2). Similar results reported by Mondal *et al*. (2013) who found that DM, OM, CP and NDF digestibility was not affected by increasing levels of DRC in the diet of Black Bengal goats (*i.e.* 0, 5 and 10%). Similar results also reported by Cherdthong*et al.* (2014) when replaced soybean meal with DRC at different levels of DRC in thecattle diet. Kamstra *et al*. (1959) also reported that DM, CP and CF digestibilities were not affected between lambs fed control and DRC diets. In contrast, Abouheif *et al.* (1999) reported that CP digestibility was higher in Najdi lambs fed 25% of rumen content-barley meal in Najdi lambs diets as compared with those fed control one. Fajemisin *et al*. (2010) also found increased CP digestibility when fed Dwarf sheep on diet containing 25% DRC but reported decease in DM, NDF and ADF digestibility. In addition, Olafadehan *et al*. (2014) observed increase digestibility of DM, OM, CP in lambs fed 20 and 40% DRC than lambs fed 0 and 60% DRC. The same authors reported that NDF and ADF digestibility were not affected. Rios-Rincon *et al*. (2010) found decrease in ruminal and total tract digestibility of OM and ADF when used DRC instead of alfalfa hay in cattle ration. Great variation also found in digestibility of nutrient due to such factors roughage to concentrate ratio, levels of DRC, chemical composition of DRC, and diets in addition to source of rumen content and processing methods that affected nutrient digestibility (Kamstra *et al*.,1959; Agbabiaka *et al.,* 2012;Mondal *et al*., 2013; Elfaki and Abdelatti, 2015). A significant (P<0.05) reduction in ME intake was observed for lambs fed DRC30 diets compared to those fed other diets (DRC0, DRC10 and DRC20), but no significant difference among DRC0, DRC10 and DRC20 diets (Table2) may be due to higher content of fiber fraction in DRC and replacement rate. Digestible crude protein (DCP) value was not significantly different (P>0.05) among experimental diets and numerically higher in DRC10 and DRC20 diets than DRC0 and DRC30 diets. A similar trend was observed for digestible crude protein intake (Table 2). This result may be due to the not significant difference in CP digestibility in the current study. The digestible organic matter intake (DOMI) and digestible organic matter fermented in the rumen (DOMR) were not affected (P>0.05) among experimental diets. The numerical increase in DCP value, DOMI, DOMR ME intake in DRC10 diet attributed to superior nutritive value.

Table 2:-Nutrient intake, apparent digestibility and nutritive valueof Awassi lambs fed diets containing graded levels of DRC[1]

Item	Diets				SEM	Sign.
	DRC0	DRC10	DRC20	DRC30		
Nutrient intake						
DM intake (g/day)	1024.97^{a}	1033.86^{a}	1027.73^{a}	1007.80^{b}	3.38	*
(g/kgW$^{0.75}$)	87.00	87.27	87.07	86.30	0.61	NS
OM intake(g/day)	953.73^{a}	949.19^{a}	932.66^{a}	902.99^{b}	6.20	*
(g/kgW$^{0.75}$)	80.95	80.10	79.01	77.33	0.68	NS
CP intake(g/day)	169.84^{ab}	171.72^{a}	171.01^{a}	168.10^{b}	0.50	*
(g/kgW$^{0.75}$)	14.42	14.49	14.49	14.40	0.99	NS
EE intake(g/day)	23.98^{b}	25.43^{ab}	26.62^{a}	27.41^{a}	0.39	*
NDF intake(g/day)	343.26^{c}	379.12^{b}	409.55^{b}	433.55^{a}	9.22	**
ADF intake(g/day)	168.30^{c}	196.43^{c}	221.68^{b}	243.28^{a}	8.45	**
Digestibility (%)						
DM	71.09	71.83	69.48	69.29	0.98	NS
OM	73.47	74.38	73.76	71.50	0.86	NS
CP	73.41	75.13	74.08	72.98	1.43	NS
EE	73.65	74.70	74.45	71.76	0.99	NS
NDF	62.25	62.36	62.23	60.77	1.62	NS
ADF	55.47	53.40	51.43	50.05	1.08	NS
Nutritive value						
DCP (%)	12.16	12.48	12.33	11.62	0.20	NS
Digestible DM intake (g/day)	728.79	742.47	714.07	698.37	9.86	NS
Digestible OM Intake (g/day)	700.87	705.86	687.95	645.68	9.48	NS
Digestible CP Intake (g/day)	124.70	128.98	126.69	117.09	2.20	NS
DOMR(g/day)	455.57	458.21	447.17	419.69	6.82	NS
ME intake (MJ/day)	11.76^{a}	11.99^{a}	11.84^{a}	10.99^{b}	0.19	*

Diets: Dried rumen content (DRC) included in the diets at 0 (DRC0), 10 (DRC10), 20 (DRC20), and 30% (DRC30)

[a,b,c]Mean within the same row with different subscripts are differ (P<0.05);SEM= standard error of mean; NS= not significant;

*= P<0.05;**=P<0.01; DM= dry matter; OM= organic matter; CP= crude protein; EE= ether extract; NDF= neutral detergent fiber; ADF= acid detergent fiber; Digestible organic matter fermented in the rumen (DOMR) was calculated according to the equation DOMR (g/day) = digestible organic matter intake (g/day) × 0.65 (ARC, 1984).

Growth performance:-

Initial, final body weight (BW), total gain, average daily gain (ADG) and feed conversion ratio (FCR) of the lambs fed graded levels of DRC are presented in Table 3. Statistical analysis revealed that no significant different (P>0.05) in final BW of lambs among experimental diets. Total gain and average daily gain (ADG) in lambs fed DRC10 and DRC 20 diets was not significant (P>0.05) different as compared with lambs fed DRC0 (control) diet. These results are in the line reported by Mondal *et al.* (2013) and Osman *et al.* (2015) who found that inclusion of DRC in diets at 0, 5 and 10% DRC did not affect final live weight and ADG in kids and lambs. Osman and Abass (2015) also observed that feeding Sudan desert lambs on diet that contained DRC at 0, 10 and 20% did not affect final body weight, total gain and ADG. Salinas-Chavira *et al.* (2007) reported no different in ADG and feed efficiency of Pelibuy×Dorper lambs fed DRC. However, Abouheif *et al.* (1999) found that ADG was lower in Najdi lambs fed 25 and 50% dry rumen content- barley meal diets than those fed the control diet. While Olafadehan *et al.* (2014) reported that body weight gain and ADG in Yankasa lambs were increased as levels of DRC increase from 0 to 40% but decreased at 60% DRC. Fajemisin *et al.* (2010) also reported that replacement cassava peels by DRC at 25% did not affect on ADG in West African Dwarf sheep. The decrease in feed intake observed for lambs fed DRC30 diet resulted in lower (P<0.05) total weight gain and ADG compared to those fed the DRC0, DRC10 and DRC20 diet (Table3).

Regards, feed conversion ratio (FCR) or feed efficacy (DMI:ADG), Lambs fedDRC10 diet was higher (P<0.05) in feed efficiency than those fed DRC30 diet, but no significant (P>0.05) difference than those fed DRC0 and DRC20 diets. Similarly , Osman *et al*. (2015) reported that feed efficiency was higher when incorporate DRC in concentrate diet at 10% than lambs fed 0 and 5% DRC, but the different not significant. A similar trend was noted when included DRC at different levels (0, 10 and 20%) in the diet of Sudan desert lambs (Osman and Abass, 2015).In contrast with results reported by Mondal *et al*. (2013)who found that Black Bengal goats showed higher feed efficiency in control diet than those fed DRC diets(5 and 10%). Abouheif *et al*. (1999) also reported similar results in Najdi lambs fed rumen content- barley meal diet (25 and 50%). In another study, Olafadehan *et al.* (2014) observed that feed efficiency was higher in lambs fed 40%DRC than those fed 0 and 20% DRC, but decreased (P<0.05) when lambs fed 60% DRC diet. The higher feed efficiency at the lower level of DRC 10% may be due to better utilization of nutrients intakes.

Table 3:-Growth performance of Awassi lambs fed diet containing graded levels of DRC.

Item	Diets				SEM	Sign.
	DRC0	DRC10	DRC20	DRC30		
Initial BW(kg)	22.27	22.23	22.30	22.28	0.25	NS
Final BW(kg)	31.40	31.83	31.50	30.73	0.27	NS
Total weight gain (kg)	9.13[a]	9.60[a]	9.20[a]	8.45[b]	0.15	*
Average daily gain (g)	152.22[a]	159.99[a]	153.33[a]	140.84[b]	2.45	*
FCR (g DMI/ g ADG)	6.74[ab]	6.46[b]	6.71[ab]	7.17[a]	1.00	*

Diets: Dried rumen content (DRC) included in the diets at 0 (DRC0), 10 (DRC10), 20 (DRC20), and 30% (DRC30).
[a,b,c]Mean within the same row with different subscripts are differ (P<0.05); SEM= standard error of mean; NS= not significant;

*= P<0.05; BW= body weight; ADG= average daily gain; FCR= feed conversion ratio (dry matter intake/average daily gain)

This study is one of few studies that investigated the replacement part of barley grain and soybean meal with dried rumen content on the nutrient digestibility and growth performance of Awassi lambs base on the results obtained in this study it could be concluded that feeding Awassi lambs fattening on diets containing DRC up to 10% improved growth performance without any adverse effect on nutrient digestibility or animal health. The lower price of DRC compared with barley grain and soybean meal suggested that replacement the most expensive ingredient with DRC would help increase economic return and reduce pollution problems.

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