Plant Archives Volume 20 No. 2, 2020 pp. 7111-7119 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFECT OF PROTECTING PROTEINS FROM DEGRADATION IN THE RUMEN AND REPLACEMENT RATIOS ON INTAKE ON THE BASIS OF METABOLIC BODY WEIGHT OF AL AWASSI LAMBS

Ibrahim S. Jasim

Animal Production Department, Faculty of Agricultural Engineering Sciences, University of Baghdad, Iraq.
Address for Correspondence: Prime Minister Advisory Commission, Baghdad, Iraq.

Abstract

The present experiment was carried out to investigate the effect of different percentages (50 and 100%) of dried whey powder and sun flower meal treated with blood or formaldehyde and different percentages (50 and 100%) of dried whey powder and sun flower meal treated with formaldehyde on intake on the basis of metabolic body weight in lambs fattening diets. The results showed insignificant effect for different nutrients DM, OM, CP, E.E, CF, NFE, NDF, ADF, cellulose, hemicellulose and ME for alfalfa intake on the basis of metabolic body weight of dried whey powder treated with blood or formaldehyde compared sun flower meal treated with blood or formaldehyde and insignificant effect for different nutrients DM, OM, CP, E.E, NFE, NDF, ADF, hemicellulose and ME While there was Significant difference ($P < 0.05$) for CF and cellulose of concentrate intake on the basis of metabolic body weight and insignificant effect for different nutrients DM, CP, E.E, CF, NDF, ADF, cellulose and hemicellulose while there was Significant difference ($P < 0.05$) for OM, NFE and ME of total feed intake on the basis of metabolic body weight. While there was insignificant effect for different nutrients of DM, OM, CP, E.E, CF, NFE, NDF, ADF, cellulose, hemicellulose and ME for alfalfa, concentrate and total feed intake on the basis of metabolic body weight of dried whey powder treated with formaldehyde with percentages (100%) compared sun flower meal treated with formaldehyde with percentages (100%),and insignificant effect for DM, OM, CP, E.E, CF, NFE, NDF, ADF, cellulose, hemicellulose and ME for alfalfa and concentrate intake on the basis of metabolic body weight of dried whey powder treated with formaldehyde with percentages (50%) compared sun flower meal treated with formaldehyde with percentages (50%) and Significant difference ($P < 0.05$) for E.E, NFE and ME for total feed intake on the basis of metabolic body weight of dried whey powder treated with formaldehyde with percentages (50%) compared sun flower meal treated with formaldehyde with percentages (50%).

Key words: dried whey powder, sun flower meal, blood, formaldehyde, intake.

Introduction

The requirements for metabolized protein are met from two sources, the digestible microbial protein and the undegradable dietary protein in the rumen NRC (2001), The most important factors affecting protein degradation in the rumen are the type of protein, interactions with other nutrients (mainly carbohydrates within the same feed and within the contents of the rumen), the prevalent microbial strains, the type of feed provided, the rate of passage from the rumen and the pH of the rumen (Bach *et al.,* 2005). The proteins, peptides and amino acids that pass the fermentation in the rumen and pass into the later part of the digestive system are the proteins that are undegradable in the rumen, as many studies have confirmed the increase in the dry matter intake by including it in the diet (Hassan & Muhamad, 2009;Ériton *et al.,* 2014; Jolazadeh *et al.,* 2015; Lays *et al.,* 2018), While other studies did not record the effect of undegradable rumen proteins on the intake of dry matter or organic matter (Hélio *et al.,* 2013), ruminants require two types: the first is a protein that is degradable in the rumen that is used by the microorganisms to produce the microbial protein and the second is the protein that escapes from degradation in the rumen that is digested in the small intestine and used by the animals (Kamalak *et al.,* 2005; Huhtanen *et al.,* 2011; Bahrami *et al.,* 2014).

Protecting high-quality dietary protein sources from

rumen fermentation positively affects animal performance (Eghbali *et al.,* 2014; Díaz-Royón *et al.,* 2016), Several studies have stated that the arrival of dietary protein to the small intestine and its digestion enzymatically and then the absorption of amino acids aims to increase the utilization of the sources of dietary protein by increasing the quantity and quality in comparison with its decomposition and reconstruction by rumen microorganisms. Therefore, treatments were used to protect the protein from degradation in the rumen of ruminants (Hassan *et al.,*2001; Sanjay *et al.,* 2014).

The increased need for animal production prompted researchers to use oilseed grains to feed ruminants as protein sources such as Helianthus annuus, an important oil crop characterized by high protein content with high sulfuric acid content (Daghir *et al.,* 1980). The third largest source of protein used for ruminants feed after soybean and canola seedling (USDA-FAS, 2017). The protein of the sun flower is characterized by its solubility and high decomposition compared to the other protein sources. Therefore, there are obstacles to meet the needs of highyielding dairy cows, calves and fast-growing sheep because the protein is rapid decomposition in the rumen, producing peptides, amino acids and ammonia, which reduces the degree of utilization and loss of amino acidsand low digestibility (Lusus, 1982).

Whey was considered a non-conventional, fast degradable protein source, it is a by product of cheese making process of milk, containing 7% solid materials consisting of 4.9% lactose, 0.6% ash, low amounts of fat acid and protein (15-20%) and most whey is eliminated as a neglected product, so the challenge for nutritionists is to find the best way to benefit from it (El-shewy, 2016). In the low-protein feed, substituting the urea substitutes for improved urea performance compared with the soybean meal with urea, which resulted in less improvement in animal performance. The addition of shark also increased the production of microbial protein and improved feed utilization (Stock *et al.,* 1986). Research in livestock feed in many countries has shown that straw as a byproduct of cheese production can be used to feed large ruminants without any negative effects. There are also studies on determining optimal levels of addition, taking into account the benefits that will be achieved by limiting use of concentrates and disposal as an accidental product for dairy manufacturers and environmental pollution prevention (Salem *et al.,* 2007).

Objectives of the study

Study of the effect of replacing the dried whey powder treated with blood or formaldehyde, sun flower meal treated with blood or formaldehyde and effect of replacing different percentages (50 and 100%) of dried whey powder and sun flower meal treated with formaldehyde in the fattening diets on alfalfa, concentrate and total feed intake on the basis of metabolic body weight of Al Awassi lam.

Materials and Methods

This study was conducted in the animal field of the Animal Production Department, Faculty of Agricultural Engineering Sciences, University of Baghdad. The experiment lasted for 60 days preceded by a preliminary period of 14 days for the period from 2 of December 2017 to 13 of February 2018.

Preparation of feed materials

All raw materials, such as barley, wheat bran, dried whey powder, sun flower and dried whey powder, were purchased from the local markets. Random samples were taken for the purpose of conducting chemical analyzes and using the green alfalfa from the fields of the Faculty of Agricultural Engineering Sciences, University of Baghdad and conducting chemical analyzes table 1.

Treatment of the sun flower meal with fresh blood

Blood was collected from ruminants that were slaughtered in the Karkh massacre in containers containing citrate of sodium (6.8 g/L blood). The blood was then added to the sun flower by using an equal weight of blood and weight (1: 1) and then mixed by hand and dried in a fan oven at 60°C for 24 hours, after that, the sun flower was manually broken and packed in bags until it was used (Matsumoto *et al.,* 1995).

Treatment of sun flower meal with formaldehyde

The sun flower was treated with 5% formaldehyde solution and 1 liter solution/10 kg dry matter from the sun flower by sprinkler after brushing the sun flower over a piece of nylon on the ground in a closed chamber with constant flipping to ensure that the solution reaches all parts of the sunflower to obtain a homogeneous level of treatment. The formaldehyde sun flower was kept in tightly sealed nylon bags and left for 72 hours for interaction between formaldehyde and sunflower meal. The bags and their contents were then emptied onto a nylon piece inside a well-ventilated hall for 48 hours to allow for the volatilization of the unformed formaldehyde solution, then the sunflower was put in bags until it was used (Hassan *et al.,* 1990).

Treatment of dried whey powder with fresh blood

Blood was collected from the ruminants that were slaughtered in the Karkh massacre in containers

Table 1: Chemical composition of raw materials in the installation of concentrates and fresh grit based on dry matter (%).

Feeding materials Chemical Composition %	Barley	Wheat barn	Sunflower treated with blood	Sunflower treated with formaldehyde	Whey treated with blood	Whey treated with formaldehyde	Fresh alfalfa
Dry matter	90.12	89.87	94.77	93.30	97.59	95.86	27.22
Organic matter	93.58	91.59	89.31	85.78	96.13	94.68	91.13
Crude protein	12.22	14.72	21.37	21.67	21.08	19.11	18.21
Crude fiber	5.72	10.11	15.35	15.55	——	——	27.15
Ether Extract	3.15	4.63	9.79	10.05	7.39	8.17	3.03
Ash	6.42	8.41	8.00	8.04	6.39	6.02	8.87
Nitrogen free extract	72.49	62.13	42.42	42.44	64.32	65.82	42.74
Acid detergent fiber	27.13	48.45	38.44	37.88	——	——	45.75
Neutral detergent fiber	6.27	14.24	26.92	27.50	——	——	33.91
Lignin	1.35	2.88	9.88	10.50	——	——	8.77
Cellulose	4.92	11.36	17.04	17.00	——	——	25.14
Hemicellulose	20.86	34.21	11.52	10.38	——	——	11.84
Metabolic energy (Mica Gul/kg)	12.7	12.3	12.7	12.7	14.1	14.2	10.2

Metabolic energy (Mg / kg of material as is) = 0.012 × crude protein + 0.031 x ether extract + 0.005 × raw fiber + 0.014 × nitrogen-free extract (Maff, 1975).

containing citrate of sodium (6.8 g/L blood). The blood was then added to the dried whey powder using an equal weight of blood and dried whey powder by 1: 1 and then mix it byhand and dry it in a fan oven at 60°C for 24 hours. Then it was manually broken and packed in bags for use. (Matsumoto *et al.,* 1995).

Treatment of dried whey powder with formaldehyde

Dried whey powder was treated with 5% formaldehyde solution and 1 liter solution/10 kg dry matter of dried whey powder by sprinkler after brushing the whey powder over a piece of nylon on the ground in a closed chamber with continuous stirring to ensure that the solution reached all parts of the whey powder to obtain a homogeneous level of treatment. The dried whey powder was stored in sealed nylon bags were left for 72 hours for interaction between formaldehyde and whey powder. The bags and their contents were then emptied onto a nylon piece inside a well-ventilated hall for 48 hours to allow the volatilization of the Non-reacting formaldehyde and then dried whey powder was packed in bags until it was used (Hassan *et al.,* 1990).

Growth Experiment

Animals and experiment design

Two experiments were done use 16 lambs (Al Awassi strain) were purchased from the local markets. The average age of the lambs was 5-6 months and the average weight was 23.87± 0.56 kg. The lambs were randomly divided into 4 treatments and 4 lambs per treatment. The experimental treatments involved treatment T1 and T2 treated with blood (dried whey powder, sun flower meal) with substitution ratios 50 and 100% while T3 and T4 treated with formaldehyde blood (dried whey powder, sun flower meal) with substitution ratios 50 and 100% To compare the significant differences between the averages with a test (T). The lambs were distributed in single pens with an area of 2 × 2m^2 for each treatment and numbered according to their own treatment.

Experimental diets

The animals were fed on the experimental diets and according to the treatments shown in Table 2, 3. The dried whey powder treated with Whole blood 50% instead of the untreated sunflower in diet of (T1) and all the other components of the diet remain constant, The dried whey powder treated with Whole blood 100% instead of

Table 2: Percentage of the primary components involved in the composition of concentrates of first experiment (%).

Type of treatment	Treatment with blood		Treatment with formaldehyde	
Replacement ratio %	50	100	50	100
Treatments	T1	T2	T3	T4
Feeding materials				
Barley	45	45	45	45
Wheat bran	40	40	40	40
Sunflower meal	6.5	0	6.5	0
dried whey powder treated with blood	6.5	13	0	0
dried whey powder treated with formaldehyde	0	0	6.5	13
*Mix minerals and vitamins	2	2	2	2

*Mix minerals and vitamins table 6

Table 3: Percentage of the primary components involved in the composition of concentrates of second experiment (%).

Type of treatment	Treatment with blood		Treatment with formaldehyde	
Replacement ratio %	50	100	50	100
Treatments	T1	T2	T3	T4
Feeding materials				
Barley	45	45	45	45
Wheat bran	40	40	40	40
Sunflower meal	6.5	0	6.5	0
Sunflower treated with blood	6.5	13	0	0
Sunflower treated with formaldehyde	0	0	6.5	13
*Mix minerals and vitamins	2	2	2	2

*Mix minerals and vitamins table 6

the untreated sunflower in diet of (T2) and all the other components of the diet remain constant, in diet of (T3) the dried whey powder treated with formaldehyde 50% instead of the untreated sunflower and all the other components of the diet remain constant, in diet of (T4) the dried whey powder treated with formaldehyde 100% instead of the untreated sunflower and all the other components of the diet remain constant, In the first experiment. In the second experiment The sunflower treated with Whole blood 50% instead of the untreated sunflower in diet of (T1) and all the other components of the diet remain constant, The sunflower treated with Whole blood 100% instead of the untreated sunflower in diet of (T2) and all the other components of the diet remain constant, in diet of (T3) the sunflower treated with formaldehyde 50% instead of the untreated sunflower and all the other components of the diet remain constant, in diet of (T4) the sunflower treated with formaldehyde 100% instead of the untreated sunflower and all the other components of the diet remain constant. The lambs were fed gradually for 14 days before the start of the experiment, the concentrated diet was served once daily at 8:00 am and by 3% of the body weight in addition the alfalfa was provided freely and separated from the concentrated feed while the amounts of concentrated feed based on the new body weight for each lamb were adjusted weekly. The lambs were weighed at the beginning of the experiment in a In a special scale to determine the primary weight and then the process of weighing on a weekly basis and before the morning ration to calculate the rate of daily weight increase and then the weight of lambs at the end of the experiment to determine the final weight, the remaining feed was collected from concentrated diet and alfalfa every morning and before morning ration to calculate the daily feed intake on the basis of metabolic body weight as well, clean water was provided continuously in special metal containers that are cleaned daily, the lambs were vaccinated against the internal and external parasites as the animals were vaccinated against hepatic worms and bariatric with the continued control of the confidentiality throughout the duration of the experiment.

Chemical analysis

The chemical analyzes of the feed samples were carried out, such as the untreated sunflower, the sunflower treated with blood, the sunflower treated with formaldehyde, dried whey powder treated with blood, the dried whey powder treated with formaldehyde and the chemical analysis of the primary components of the experimental animals table 1, 4 and 5. These analyzes were carried out at the Central Laboratory of Graduate Studies, Nutrition Laboratory, Animal Production Department at the Faculty of Agricultural Engineering Sciences, University of Baghdad.

Dry matter DM : The dry matter of feed samples was estimated according to A.O.A.C. (2005).

Organic material (OM) : Organic matter was calculated by subtracting the amount of ash from dry

Table 4: Chemical analysis of experimental treatments for first experiment based on dry matter.

Type of treatment	Treatment with blood		Treatment with formaldehyde	
Replacement ratio %	50	100	50	100
Treatments	T1	T2	T3	T4
Chemical composition				
Dry matter	98.41	98.45	98.14	97.03
Organic matter	92.74	93.52	93.85	93.66
Crude protein	14.53	15.04	15.28	15.44
Crude fiber	8.53	7.44	8.29	8.81
Ether Extract	5.09	4.52	5.10	5.56
Ash	7.26	6.48	6.14	6.34
Nitrogen free extract	64.69	66.52	65.18	63.85
Acid detergent fiber	36.01	35.25	35.20	35.61
Neutral detergent fiber	13.50	12.66	13.29	12.81
Lignin	2.41	2.12	2.50	2.18
Cellulose	11.09	10.54	10.79	10.63
Hemicellulose	22.51	22.59	21.91	22.80
Metabolic energy (Mica Gul/kg)	12.7	12.9	12.9	12.8

Metabolic energy (Mg / kg of material as is) = 0.012 × crude protein + 0.031 x ether extract + 0.005 × raw fiber + 0.014 × nitrogen-free extract (Maff, 1975).

Table 5: Chemical analysis of experimental treatments for Second experiment based on dry matter.

Type of treatment	Treatment with blood		Treatment with formaldehyde	
Replacement ratio %	50	100	50	100
Treatments	T1	T2	T3	T4
Chemical composition				
Dry matter	97.33	98.18	96.30	95.21
Organic matter	91.58	92.88	92.09	93.58
Crude protein	15.36	15.18	15.50	15.63
Crude fiber	9.55	10.04	8.87	8.32
Ether Extract	4.28	4.52	5.28	5.45
Ash	8.42	7.12	7.90	6.42
Nitrogen free extract	62.38	63.14	62.44	64.18
Acid detergent fiber	35.80	36.03	35.14	36.05
Neutral detergent fiber	12.94	13.02	13.22	12.65
Lignin	2.82	2.77	2.73	2.75
Cellulose	10.12	10.25	10.49	9.90
Hemicellulose	22.86	23.01	21.92	23.40
Metabolic energy (Mica Gul/kg)	12.3	12.5	12.6	12.8

Metabolic energy (Mg / kg of material as is) = 0.012 × crude protein + 0.031 x ether extract + 0.005 × raw fiber + 0.014 × nitrogen-free extract (Maff, 1975).

matter.

Raw protein CP : Crude protein was estimated using the Kjeldahl for fodder forms and according to A.O.A.C. (2005).

Crude fiber CF : Raw fiber was estimated for fodder models as indicated in A.O.A.C. (2005).

Ether Extract : The Ether extract for fodder samples was estimated according to A.O.A.C. (2005).

Carbohydrates dissolved in NFE : The dissolved carbohydrates were calculated according to the following equation: NFE = OM – (CP + CF + EE).

Neutral fiber extract : The NDF fiber extract was estimated according to Goering and Van Soest (1970).

Acid Fiber Extract : The acid fiber extract was estimated according to Goering and Van Soest (1970).

Acid fiber extract : The ADL extract was estimated according to Goering and Van Soest (1970).

Cellulose : Cellulose was calculated according to the following equation: Cellulose = ADF – ADL.

Hemicellulose : Hemicellulose was calculated according to the following equation: Hemicellulose = NDF– ADF.

Statistical analysis

The Statistical Analysis System (SAS) (2012) was used in data analysis to study Comparing the two experiences in the studied traits according to (Completely Randomized Design-CRD), The differences between the averages were compared with Test (T).

The mathematical model

$Yij = \mu + Ei + eij$

Yij= the value of the transaction j return to the transaction i.

μ = The general mean of the studied character.

Ei= It represents two experiences i.

eij= Random error distributed by a normal distribution with an average of 0 and a variance of $\sigma^2 e$.

Results and Discussion

There were no digestive disorders in the animals during and after the experiment period. All the animals were in a good health. The objective of the experiment was achieved by providing concentrated diets containing the ratio of sunflower treated with blood or formaldehyde, dried whey powder treated with blood or formaldehyde instead untreated sunflower with levels of (50, 100%), while the green alfalfa was provided freely and the intake of concentrated feed, green alfalfa and total feed intake were calculated on the basis of metabolic body weight during the experiment period.

Table 6: Components of vitamins and minerals mix.

Vitamins	Concentration	Minerals	Concentration
Vitamin A	200 000 IU/kg	200 000 IU/kg	mg/kg 2000
Vitamin D3	100 000 IU/kg	100 000 IU/kg	mg/kg 2500
Vitamin E	515 mg/kg	515 mg/kg	mg/kg 1000
Vitamin B1	125 mg/kg	125 mg/kg	mg/kg 25
Vitamin B2	500 mg/kg	500 mg/kg	mg/kg 30
Vitamin B3	1000 mg/kg	1000 mg/kg	mg/kg 1200
Vitamin B6	35 mg/kg	35 mg/kg	mg/kg 1000
Vitamin B12	10 mg/kg	10 mg/kg	mg/kg qsp
		200 000 IU/kg	mg/kg 1500
		100 000 IU/kg	mg/kg 2000

Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on alfalfa and concentrate and Total intake on the basis of metabolic body weight

Table 7 showed that there was insignificant effects on the intake on the basis of metabolic body weight of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract NFE, Neutral fiber extract NDF, acid fiber extract ADF, cellulose, hemicellulose and Metabolic energy ME for

Table 7: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of alfalfa (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	39.849	±1.383	38.708	±1.683	N.S
OMIR	36.314	±1.260	35.274	±1.534	N.S
CPIR	7.256	±0.251	7.048	±0.306	N.S
EEIR	1.2074	±0.041	1.1728	±0.051	N.S
CFIR	10.819	±0.375	10.509	±0.456	N.S
NFEIR	17.035	±0.590	16.543	±0.719	N.S
NDFIR	18.232	±0.634	17.708	±0.770	N.S
ADFIR	13.512	±0.469	13.125	±0.570	N.S
CellIR	10.018	±0.347	9.731	±0.423	N.S
HemiIR	4.718	±0.163	4.582	±0.199	N.S
MEIR	0.417	±0.014	0.405	±0.017	N.S

N.S Non significant.

alfalfa intake of diets dried whey powder treated with blood or formaldehyde compared alfalfa intake of diets sun flower meal treated with blood or formaldehyde. This may be due to the effect of the level of concentrated diets available to the animals (3% of the body weight), which may prevent the effects of variation in the level of RDN from being a phenomenon (saeed, 2011) and the ratio of crude protein in concentrated diets which reached 14, 53–15, 44% table 4 which reduces the effect of the type of protein and level of it degradation in rumen and the level of effectiveness of protecting proteins from degradation on the level of intake of different nutrients. These results were agreed with (Hassan & Mohamed, 2009; Hassan *et al.,* 2010 saeed, 2011; Kahleefah, (2014).

Table 8: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of concentrate (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	61.578	±0.962	61.453	±1.185	N.S
OMIR	57.471	±0.892	56.864	±1.107	N.S
CPIR	9.235	±0.150	9.475	±1.107	N.S
EEIR	3.168	±0.062	3.001	±0.110	N.S
CFIR	^{b}5.183	±0.089	^{a}5.636	±0.160	*
NFEIR	39.908	±0.651	38.737	±0.761	N.S
NDFIR	21.937	±0.350	21.971	±0.428	N.S
ADFIR	8.118	±0.139	7.962	±0.157	N.S
CellIR	^{a}6.675	±0.112	^{b}6.262	±0.126	*
HemiIR	13.818	±0.222	14.009	±0.287	N.S
MEIR	0.793	±0.012	0.777	±0.015	N.S

Different characters within the same column indicate significant differences ($p < 0.05$); N.S Non significant.

Table 8 showed that there was a significant increase ($P < 0.05$) on the intake on the basis of metabolic body weight of cellulose, significant decrease ($P < 0.05$) on the intake on the basis of metabolic body weight of crude fiber CF and there was insignificant effects on the intake on the basis of metabolic body weight of dry matter DMI, organic matter OMI, crude protein CP, EE extract, Nitrogen free extract (NFE), Neutral fiber extract (NDF), acid fiber extract (ADF), hemicellulose and Metabolic energy (ME) for Concentrated feed intake of diets dried whey powder treated with blood or formaldehyde compared Concentrated feed intake of diets sun flower meal treated with blood or formaldehyde.

Table 9 showed that there was a significant increase ($P < 0.05$) on the intake on the basis of metabolic body weight of organic matter OMI, Nitrogen free extract (NFE) and Metabolic energy (ME) and there was insignificant effects on the intake on the basis of metabolic body weight of dry matter DMI, crude protein CP, EE extract, crude fiber CF, Neutral fiber extract (NDF), acid fiber extract (ADF), cellulose and hemicellulose for Total feed intake of diets dried whey powder treated with blood or formaldehyde compared Total feed intake of diets sun flower meal treated with blood or formaldehyde.

Table 9: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of Total (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	101.427	±0.494	100.160	±0.519	N.S
OMIR	^{a}93.785	±0.416	^{b}92.137	±0.462	*
CPIR	16.492	±0.124	16.523	±0.125	N.S
EEIR	4.375	±0.041	4.174	±0.089	N.S
CFIR	16.002	±0.301	16.146	±0.386	N.S
NFEIR	^{a}56.943	±0.222	^{b}55.280	±0.141	*
NDFIR	40.170	±0.322	39.680	±0.362	N.S
ADFIR	21.631	±0.345	21.088	±0.420	N.S
CellIR	16.693	±0.248	15.993	±0.305	N.S
HemiIR	18.536	±0.097	18.592	±0.128	N.S
MEIR	^{a}1.210	±0.003	^{b}1.182	±0.004	*

Different characters within the same column indicate significant differences ($p < 0.05$); N.S Non significant.

This variation of the intake of different nutrients may be due to the variation in the level of protection of proteins from degradation in the rumen, as the ratios included 50 and 100% treatment with blood or formaldehyde and many studies have demonstrated the difference in the effect of treatment with formaldehyde compared with blood

(Daiber & Taylor 1982 ºMoller, 1983; Al-Shekhly, 1998) and this may have been reflected in the variation in the level of intake of different nutrients.

Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 100 % on alfalfa and concentrate and Total intake on the basis of metabolic body weight

Table 10, 11 and 12 showed that there was insignificant effects on the intake on the basis of metabolic body weight of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract NFE, Neutral fiber extract NDF, acid fiber extract ADF, cellulose, hemicellulose and Metabolic energy ME for alfalfa, Concentrated and Total feed intake

Table 10: Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 100 %on intake of alfalfa (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	40.545	±3.832	38.131	±3.659	N.S
OMIR	36.948	±3.492	34.749	±3.333	N.S
CPIR	7.383	±0.697	6.943	±0.666	N.S
EEIR	1.228	±0.116	1.155	±0.110	N.S
CFIR	11.008	±1.040	10.353	±0.993	N.S
NFEIR	17.329	±1.638	16.297	±1.563	N.S
NDFIR	18.549	±1.753	17.445	±1.673	N.S
ADFIR	13.749	±1.299	12.930	±1.240	N.S
CellIR	10.193	±0.963	9.586	±0.919	N.S
HemiIR	4.800	±0.453	4.514	±0.433	N.S
MEIR	0.424	±0.040	0.399	±0.038	N.S

N.S Non significant.

Table 11: Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 100 %on intake of concentrate (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	60.663	±2.645	61.644	±2.737	N.S
OMIR	56.817	±2.477	57.686	±2.561	N.S
CPIR	9.366	±0.408	9.634	±0.427	N.S
EEIR	3.372	±0.147	3.359	±0.149	N.S
CFIR	5.344	±0.233	5.080	±0.187	N.S
NFEIR	38.733	± 1.689	39.563	±1.757	N.S
NDFIR	21.602	±0.942	22.223	±0.986	N.S
ADFIR	7.770	±0.338	7.797	±0.346	N.S
CellIR	6.448	±0.281	6.102	±0.271	N.S
HemiIR	13.831	±0.603	14.424	±0.640	N.S
MEIR	0.785	±0.034	0.799	±0.035	N.S

N.S Non significant.

Table 12: Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 100 %on intake of Total (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	101.207	±1.189	99.775	±0.921	N.S
OMIR	93.765	±1.017	92.435	±0.771	N.S
CPIR	16.749	±0.289	16.578	±0.238	N.S
EEIR	4.601	±0.031	4.514	±0.038	N.S
CFIR	16.352	±0.807	15.433	±0.808	N.S
NFEIR	56.061	±0.064	55.860	±0.193	N.S
NDFIR	40.151	±0.811	39.668	±0.686	N.S
ADFIR	21.520	±0.960	20.728	±0.894	N.S
CellIR	16.641	±0.682	15.688	±0.648	N.S
HemiIR	18.939	±0.149	18.631	±0.207	N.S
MEIR	1.210	±0.005	1.198	±0.003	N.S

N.S Non significant.

of diets dried whey powder treatment with formaldehyde in 100% compared alfalfa, Concentrated and Total feed intake of diets sun flower meal treatment with formaldehyde in 100%. This may be due to the effect of the level of concentrated diets available to the animals (3% of the body weight), which may prevent the effects of variation in the level of RDN from being a phenomenon (saeed, 2011) and the ratio of crude protein in concentrated diets which reached 14,53 – 15,44% table 4 which reduces the effect of the type of protein and level of it degradation in rumen and the level of effectiveness of protecting proteins from degradation on the level of intake of different nutrients. these results were agreed with (Hassan & Mohamed, 2009; Hassan

Table 13: Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 50% on intake of alfalfa (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	38.965	±2.142	37.903	±1.967	N.S
OMIR	35.509	±1.952	34.541	±1.793	N.S
CPIR	7.095	±0.390	6.902	±0.358	N.S
EEIR	1.180	±0.064	1.148	±0.059	N.S
CFIR	10.579	±0.581	10.290	±0.534	N.S
NFEIR	16.669	±0.903	16.200	±0.840	N.S
NDFIR	17.827	±0.980	17.341	±0.900	N.S
ADFIR	13.213	±0.726	12.852	±0.667	N.S
CellIR	9.795	±0.538	9.528	±0.494	N.S
HemiIR	4.613	±0.253	4.487	±0.232	N.S
MEIR	0.408	±0.022	0.396	±0.020	N.S

N.S Non significant.

et al., 2010 saeed, 2011; Kahleefah, (2014).

Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 50 % on alfalfa and concentrate and Total intake on the basis of metabolic body weight

Table 13 and 14 showed that there was insignificant effects on the intake on the basis of metabolic body weight of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract NFE, Neutral fiber extract NDF, acid fiber extract ADF, cellulose, hemicellulose and Metabolic energy ME for alfalfa and Concentrated intake of diets dried whey powder treatment with formaldehyde in 50% compared alfalfa and Concentrated intake of diets sun flower meal treatment with formaldehyde in 50%.

Table 14: Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 50% on intake of concentrate (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	61.500	±1.605	61.782	±1.301	N.S
OMIR	57.718	±1.506	56.895	±1.198	N.S
CPIR	9.397	±0.245	9.576	±0.201	N.S
EEIR	3.136	±0.081	3.262	±0.068	N.S
CFIR	5.098	±0.133	5.480	±0.115	N.S
NFEIR	40.086	±1.046	38.577	±0.812	N.S
NDFIR	21.648	±0.565	21.710	±0.457	N.S
ADFIR	8.173	±0.213	8.167	±0.172	N.S
CellIR	6.635	±0.173	6.480	±0.136	N.S
HemiIR	13.474	±0.351	13.542	±0.285	N.S
MEIR	0.796	±0.020	0.783	±0.016	N.S

N.S Non significant.

Table 15: Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 50% on intake of Total (G/kg metabolic body weight).

Nutri-ents	dried whey powder	stan-dard error	sun flower meal	stan-dard error	Effect signif-icance
DMIR	100.465	±0.583	99.685	±0.675	N.S
OMIR	93.226	±0.493	91.436	±0.603	N.S
CPIR	16.492	±0.149	16.478	±0.157	N.S
EEIR	^{b}4.317	±0.019	^{a}4.410	±0.010	*
CFIR	15.770	±0.450	15.677	±0.419	N.S
NFEIR	^{a}56.754	±0.192	^{b}54.776	±0.065	*
NDFIR	39.474	±0.425	39.050	±0.445	N.S
ADFIR	21.386	±0.515	21.020	±0.495	N.S
CellIR	16.431	±0.367	16.009	±0.358	N.S
HemiIR	18.088	±0.104	18.030	±0.055	N.S
MEIR	^{a}1.204	±0.003	^{b}1.180	± 0.004	*

Different characters within the same column indicate significant differences (p <0.05); N.S Non significant.

Table 15 showed that there was a significant increase (P <0.05) on the intake on the basis of metabolic body weight of, Nitrogen free extract (NFE), (EE) extract and Metabolic energy (ME) and there was insignificant effects on the intake on the basis of metabolic body weight of dry matter DMI, organic matter OMI, crude protein CP, crude fiber CF, Neutral fiber extract NDF, acid fiber extract ADF, cellulose and hemicellulose for Total feed intake of diets dried whey powder treatment with formaldehyde in 50% compared Total feed intake of diets sun flower meal treatment with formaldehyde in 50%.

References

Al-Shekhly, M.M. (1998). Improvement utilization efficiency of sunflower meal as a feed for ruminant animals. *Master Thesis*. College of Agriculture, University of Baghdad.

AOAC. (2005). *Association of official analytical chemists, official methods of analysis*. 14th end. Washington, D.C., U.S.A.

Bach, A., S. Calsamiglia and M.D. Stern (2005). Nitrogen metabolism in the rumen. *J. Dairy Sci.,* **88:** 1.

Bahrami Yekdangi H., M. Khorvash, G.R. Ghorbani, M. Alikhani, R. Jahanian and E. Kamalian (2014). Effects of decreasing metabolizable protein and rumen-undegradable protein on milk production and composition and blood metabolites of Holstein dairy cows in early lactation., *J. Dairy Sci.,* **97:** 6, 3707-3714.

Ben Salem, M. and M. Fraj (2007). The effects of feeding liquid acid whey in the diet of lactating dairy cows on milk production and composition. *Journal of Cell and Animal Biology,* **1(1):** pp. 007- 010, August 2007.

Daghir, V.J., M.A. Raz and M. Umayjan (1980). Studies on the utilization of full fat sunflower seed in broiler ration. *Poult. Sci*., **59:** 2273-2278.

Díaz-Royón F., J.M. Arroyo, M.R. Alvir, S. Sánchez, J. González (2016). Effects of protein protection with orthophosphoric or malic acids and heat on fattening lamb diets, *Small Ruminant Res.,* **134:** Pages 58-61.

Daiber, K.H. and J.R.N. Taylor (1982). Effect of formaldehyde on protein extraction and quality of high and low. Tanins sorghum. *J. Agri. Food Chem*., **30:** 70-72.

Edenio Detmanna Ériton, E.L., Valentea Erick, D. Batistaa Pekka and Huhtanen (2014). An evaluation of the performance and efficiency of nitrogen utilization in cattle fed tropical grass pastures with supplementation, *Livestock Science,* **162:** 141-153.

Eghbali, M., F. Kafilzadeh, F. Hozhabri, S. Afshar and M. Kazemi-Bonchenari (2014). Treating canola meal changes in situ degradation, nutrient apparent digestibility and protein

fractions in sheep, *Small Ruminant Res.,* **96(2-3):** Pages 136-139.

El-Shewy, A. (2016). Whey as a feed ingredient for lactating cattle. *Sci. Int.,* **4:** 80-85.

Goering, H.K. and P.J. Van Soest (1970). *Forage fiber analysis*, *U.S. Department of Agriculture, Handbook,* **379:** 1-20.

Hassan, S.A., A.A. Al-Sultan and M.M. Al-Shekhly (2001). Improvement utilization efficiency of sunflower meal as a feed for ruminant animals. *Derasat, Agric. Sci.,* **28:** 227-240.

Hassan, S.A., K.M. Hassan and A. Al-Rubeii (2010). Carcass characteristics of Karadi lambs as affect by different levels of dietary supplement of rumen degradable nitrogen fed with *Nigella sativa*. *Afri. J. of Biotech*., **9(27):** 4295-4299.

Hassan, S.A. and S.M.N. Muhamad (2009). Responses of Karadi lambs to urea-treated and non-treated barley straw with two levels of rumen undegradable nitrogen. *Jordan. J. Agric. Sci.,* **5:** 98-110.

Hassan, S.A., A.N. Al-Ani, R.A.M. Al-Jassim and N.S. Abdullah (1990). Effects of roughage to concentrate rations and rumen undegrable protein supplementation on growth of lambs. *Small Ruminant Research,* **3:** 317-324.

Haddad, S.G., R.T. Kridli and D.M. Al-Wali (2005). Influence of varying levels of dietary undegradable intake protein on nutrient intake, body weight change and reproductive parameters in postpartum Awassi Ewes. *Asian-Aust. J. Anim. Sci*., **18:** 637-642.

Hélio Henrique, Araújo Costa, Marcos Cláudio, Pinheiro Rogério, James P. Muir, Arnaud Azevedo Alves, Diego Barcelos Galvani, Roberto Cláudio, Fernandes Franco Pompeu, Aline VieiraLandim, Maria Socorro, de Souza Carneiro, Warley Éfrem Campos. 2013.

Huhtanen, P., M. Hetta and C. Swensson (2011). Evaluation of canola meal as a protein supplement for dairy cows: A review and a meta-analysis. *Can. J. A. S.,* **91:** 529-543.

Jolazadeh, A.R., M. Dehghan-banadaky and K. Rezayazdi (2015). Effects of soybean meal treated with tannins extracted from pistachio hulls on performance, ruminal fermentation, blood metabolites and nutrient digestion of Holstein bulls, *Animal Feed Science and Technology,* **203:** 33-40.

Kamalak, A., O. Canbolat, Y. Gürbüz and O. Özay (2005). Protected protein and amino acids in ruminant nutrition. *J. Sci. and Eng.,* **8:** 84- 88.

Kahleefah, M.M. (2014). Effect of feeding Undegradable protein and bakery byproduct on Awassi lambs Performance. *Master Thesis*. College of Agriculture – University of Baghdad.

Lays, D.S.M., M.A. Paloma de, C.V.F. Sebastião de, A.S. Stefanie and P.F. Antonio (2018). Dietary protein reduction on microbial protein, amino acids digestibility and body retention in beef cattle. I. Digestibility sites and ruminal synthesis estimated by purine bases and 15N as markers, J. A.S. 96(6).

Lusus, E.W.C (1982). Sunflower meals and food protein in sunflower Handbook National Sunflower Assn. Bismark, N.D. pp 26-36.

Matsumoto, M., T. Kobayashi, H. ltabashi and E.R. Ørskov (1995). Investegation of protection of soybean meal and amino acid from rumen degradation with whole blood treatment. *Anim. Feed Sci. Techn*., **56:** 37-43.

MAFF. (1975). Ministry of Agric., Fisheries and Food Dept., of Agric. And Fisheries for Scotland Energy allowances and Feed systems for ruminants, *Technical Bulletin,* **33:** First published.

Milad, S., C. Rymer and R.W. Radley (2010). Effect of ammonia treatment and undegradable protein supplementation on nutrient digestion of sheep fed on wheat straw based diets. *Archiva Zootechnica,* **13(1):** 39-46.

Moller, J. (1983). Treating feeds with formaldehyde to protect protein. *Feedstuffs,* **55:** 12-13.

NRC. (2001). Nutrient Requirements of Dairy Cattle. 7th rev. ed. Natl. Acad. Sci.,Washington, D.C.

SAS. (2012). Statistical Analysis System, User's Guide. Statistical. Version 9.1th ed. SAS. Inst. Inc. Cary. N.C. USA.

Saeed, A.A. (2011). Effect of level and degradability of dietary protein fed with or without bakers yeast (*Saccharomyces cervisia*) on Turkish awassi lambs performance. *Ph.D* litter university of Baghdad, College of Agriculture.

Sanjay kumar, Rajni Kumari, Kaushalendra Kumar and T.K. Wall (2014). Roasting and formaldehyde method to make bypass protein for ruminants and its importance: A review, *Indian J. Anim. Sci.,* **85(3):** 223-230.

Stock, R., T. Klopfenstein, D. Brink, R. Britton and D. Harmon (1986). Whey as a source of rumen degradable protein. II. For Growing Ruminants production. *J. Anirn. Sci.,* **63:** 1574.

USDA-FAS (2017). *Oilseeds: World Markets and Trade*. Available at:https://apps.fas.usda.gov/psdonline/circulars/oilseeds.pdf. *Accessed Aug.,* **24:** 2017.