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EFFECT OF TYPE OF PROTEIN (SUNFLOWER MEAL, DRIED WHEY POWDER) TREATMENT WITH BLOOD OR FORMALDEHYDE ON INTAKE OF ALAWASSI LAMBS

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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 or fresh blood and different percentages (50 and 100%) of dried whey powder and sun flower meal treated with blood on intake in lambs fattening diets. The results showed significant increase (P <0.05) in DM, OM, CP, E.E, CF, NFE, NDF, ADF, cellulose, hemicellulose and insignificant increase in ME for alfalfa intake of dried whey powder treated with blood or formaldehyde compared sun flower meal treated with blood or formaldehyde and insignificant effect for different nutrients of concentrate and total feed intake. While significant increase (P <0.05) in DM, OM, CP, E.E, CF, NFE, NDF, ADF, cellulose, hemicellulose and insignificant increase in ME for alfalfa intake of dried whey powder treated with blood with percentages (100%) compared sun flower meal treated with blood with percentages (100%) and insignificant effect for different nutrients of concentrate and total feed intake. And significant increase (P <0.05) in DM, OM, CP, E.E, CF, NFE, NDF, ADF, cellulose, hemicellulose and ME for alfalfa intake of dried whey powder treated with blood with percentages (50%) compared sun flower meal treated with blood with percentages (50%) and insignificant effect for different nutrients of concentrate and total feed intake.

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

Introduction

Ruminants require two types of digestible protein: Rumen Degradable Nitrogen (RDN), which is used by microorganisms to produce microbial protein and the second type is the protein from rumen undegradable nitrogen (UDN), which is digested in the small intestine to be used by same animals (Kamalak *et al.*, 2005). The rapid degradation of protein sources in the rumen reduces the efficiency of utilization. Therefore, many studies have been conducted to obtain the best and fastest growth of calves and lambs, as well as higher production of milk by increasing the amount of protein reaching the small intestine of ruminants by reducing the speed of protein degradation in animal rumen by different ways such as treatment with formaldehyde (Hassan *et al.*, 1990; Kassem *et al.*, 2007) and heat (Chekhli, 1998), roasting (Demjanec *et al.*, 1995) and blood (Matsumoto *et al.*, 1995). The protection of rapidly degradable proteins either by heat or formaldehyde or blood increases the benefit from proteins or amino acids available to the host animal (Hassan *et al.*, 2001; Niven Mc *et al.*, 2002; Kamalak *et al.*, 2005; Dosky, 2007).

Lintzenich et al., (1995) reported that RDN was the feed component selected for the use of low-quality coarse feed, which encourages increased consumption of coarse feed and nutrient flow to the small intestine. Cooper *et al.,* (2002) reported that RDN provides rumen microbes with NH3- N, amino acids and peptides. Therefore, the lack of RDN leads to a decrease in ruminant performance while the increase in the RDN level in the diets resulted in an increase in feed conversion ratio (FCR) and the average daily gain (ADG). Lundquist *et al.,* (1986) indicated that proteins, peptides, and amino acids that pass fermentation in the rumen at least partially intact, in the next part of the digestive system are non-decomposed proteins (UDN). Several studies have confirmed that adding UDN to the diets increased dry matter intake DMI, ADG and FCR as in soybean meal (SBM) treatment with formaldehyde or fish meal (FM) (Hassan and Muhamad, 2009).

The increased need for animal production prompted

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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 high yielding 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 acids and low digestibility (Lusus, 1982).

Whey was considered a non-conventional, fast degradable protein source, it is a byproduct 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 blood in the fattening diets on alfalfa, concentrate and total feed intake 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

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 with treated 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).

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 (Mutsumoto *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 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 by hand and dry it in a fan oven at 60°C for 24 hours. Then it was manually broken and packed in bags for use. (Mutsumoto *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 $2\times2m^2$ 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

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.

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 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 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

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).

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 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 o^2e.

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

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 during the experiment period.

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

Table 7 showed that there was a significant increase ($P < 0.05$) on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose. while there was an insignificant increase in Metabolic energy

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

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	^{a}483.838	±1.849	^{b}472.283	±0.875	*
OMIR	^{a}440.924	±1.685	^{b}430.386	±0.798	*
CPIR	^{a}88.107	±0.336	^{b}86.001	±0.159	*
EEIR	^{a}14.660	±0.056	^{b}14.310	±0.026	*
CFIR	^{a}131.362	±0.502	^{b}128.230	±0.238	*
NFEIR	^{a}206.831	±0.787	^{b}201.851	±0.374	*
NDFIR	^{a}221.371	±0.851	^{b}216.066	±0.401	*
ADFIR	^{a}164.070	±0.627	^{b}160.149	±0.297	*
CellIR	^{a}121.637	±0.464	^{b}118.742	±0.220	*
HemiIR	^{a}57.286	±0.218	^{b}55.917	±0.103	*
MEIR	5.212	±0.019	5.064	±0.265	N.S

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

(ME) for 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 type of protein on Microbial protein synthesis as it depends on the type of energy in Concentrated feed, The structural composition of proteins in diets that determines their degradation in rumen, And the extent of its actual contribution to the provision of nitrogen to microorganism (Rodríguez & Yeni¡ 2007), The low efficiency of microbial protein synthesis affects the performance of ruminants (Broderick *et al.*, 2008; Galyean & Tedeschi 2014), the laboratory digestion for sun flower treated with blood for dry and organic matter was (0.41 ± 48.17 & 0.80 ± 50.61 (Respectively It is less than the laboratory digestion for of dried whey powder treated with blood for dry and organic matter (1.73 ± 59.81 and 1.12 ± 60.08) Respectively and the laboratory digestion for sun flower treated with formaldehyde for dry and organic matter was (0.54 ± 47.88, 0.73±53.40) Respectively It is less than the laboratory digestion for of dried whey powder treated with formaldehyde for dry and organic matter) 1.16±60.50 & 1.86±65.09) Respectively (Jasim; 2019), The more degradable protein in the rumen is necessary for the overall digestion of roughage feed and fiber (Khampa *et al*, 2003; Greg, 2017) Studies have shown that adding whey to diets increased microbial protein production and improved utilization of roughage feed (Stock, R. *et al.*, 1986; Zobell *et al.*, 2002; Efstathia *et al.*, 2005; Posada *et al.*, 2005), The whey also contains 70% lactose sugar, which is a fast soluble sugar (El-Shewy, 2016), As the most important factor in microbial protein synthesis is the energy released in the rumen by fermenting carbohydrates (Febel & Fekete, 1996; Pathak, 2006).

Table 8 showed that there was no significant effect on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and 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. This may be due to 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; Khalifa, (2014). However, the present results were not consistent with (Haddad *et al.*, 2005; Milad *et al.*, 2010).

Table 9 showed that there was no significant effect on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose and Metabolic energy (ME). 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

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

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	776.87	±28.966	767.86	±34.377	N.S
OMIR	725.03	±26.975	710.52	±31.891	N.S
CPIR	116.497	±4.351	118.395	±5.306	N.S
EEIR	39.964	±1.547	37.492	±1.915	N.S
CFIR	65.395	±2.474	70.438	±3.419	N.S
NFEIR	503.48	±18.870	484.04	±21.788	N.S
NDFIR	276.77	±10.374	274.90	±12.427	N.S
ADFIR	102.430	±3.856	99.481	±4.439	N.S
CellIR	84.224	±3.171	78.229	±3.490	N.S
HemiIR	174.34	±6.568	175.08	±8.014	N.S
MEIR	10.012	±0.372	9.711	±8.014	N.S

N.S Non significant.

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

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	1260.71	±29.462	1240.14	±34.308	N.S
OMIR	1165.95	±27.387	1140.90	±31.805	N.S
CPIR	204.604	±4.398	204.396	±5.292	N.S
EEIR	54.624	±1.546	51.802	±1.908	N.S
CFIR	196.757	±2.563	198.669	±3.438	N.S
NFEIR	710.31	±19.115	685.89	±21.743	N.S
NDFIR	498.14	±10.622	490.97	±12.392	N.S
ADFIR	266.500	±4.079	259.630	±4.432	N.S
CellIR	205.862	±3.337	196.971	±3.486	N.S
HemiIR	231.63	±6.625	231.00	±8.000	N.S
MEIR	15.076	±0.377	14.658	±14.658	N.S

N.S Non significant.

blood or formaldehyde. This may be due to 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 and green alfalfa 18,21% table 1, 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 (Tamimi, 2009), who detected that feeding the lambs on three levels of decomposed nitrogen in the rumen (1.0, 1.3 and 1.6 g/mica joule metabolic energy) did not have a significant effect on the intake, also these results were agreed with (Hassan *et al.*, 2010 Saeed, 2011; Khalifa, (2014). However, the present results were not consistent with (Nisa *et al.*, 2008).

Effect type of protein (sunflower meal, dried whey powder) treatment with blood in 100 % on alfalfa and concentrate and Total intake

Table 10 showed that there was a significant increase ($P < 0.05$) on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose. while there was an insignificant increase in Metabolic energy (ME) for alfalfa intake of diets dried whey powder treated with blood in 100% compared alfalfa intake of diets sun flower meal treated with blood in 100%. This may be due to the effect of the type of protein, sun flower meal as a source of protein as it contained the sun flower meal treatment with blood crude fiber CF (0.26±15.35), Phenolic compounds (0.14±11.08) compared dried whey powder table 1 (Jasim, 2019), as their content of crude fiber and Phenolic compounds may affect the level of protection resulting from the treatments (Daiber & Taylor 1982; Moller, 1983).

Table 11 showed that there was no significant effect on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose and Metabolic energy (ME). for Concentrated feed intake of diets dried whey powder treated with blood in 100% compared Concentrated feed intake of diets sun flower meal treated with blood in 100%. This may be due to 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.

Table 12 showed that there was no significant effect on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose and Metabolic energy (ME). for Total feed intake of diets dried whey powder treated with blood in 100% compared Total feed intake of diets sun flower meal treated with blood in 100%.

Table 10: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of alfalfa.

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	[a]493.544	±1.259	[b]471.156	±0.643	*
OMIR	[a]449.767	±1.148	[b]429.360	±0.583	*
CPIR	[a]89.874	±0.229	[b]85.796	±0.116	*
EEIR	[a]14.954	±0.038	[b]14.275	±0.019	*
CFIR	[a]133.997	±0.342	[b]127.947	±0.196	*
NFEIR	[a]210.940	±0.538	[b]201.370	±0.273	*
NDFIR	[a]225.855	±0.583	[b]215.551	±0.292	*
ADFIR	[a]167.360	±0.427	[b]159.767	±0.216	*
CellIR	[a]124.077	±0.316	[b]118.447	±0.160	*
HemiIR	[a]58.435	±0.149	[b]55.784	±0.075	*
MEIR	5.16	±0.013	5.00	±0650.	N.S

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

Table 11: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of concentrate.

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	788.862	±76.159	755.001	±99.768	N.S
OMIR	733.544	±70.901	701.239	±92.664	N.S
CPIR	116.261	±11.244	114.608	±15.144	N.S
EEIR	38.133	±3.676	34.126	±4.509	N.S
CFIR	63.448	±6.113	75.801	±10.016	N.S
NFEIR	516.071	±49.907	476.704	±62.993	N.S
NDFIR	281.112	±27.157	272.024	±35.946	N.S
ADFIR	103.475	±9.986	98.300	±12.989	N.S
CellIR	85.480	±8.252	77.387	±10.226	N.S
HemiIR	177.650	±17.170	173.724	±22.956	N.S
MEIR	10.119	±0.978	9.486	±1.253	N.S

N.S Non significant.

Table 12: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of Total.

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	1281.530	±76.132	1226.150	±100.045	N.S
OMIR	1183.220	±70.876	1130.600	±92.914	N.S
CPIR	206.130	±11.239	200.404	±15.194	N.S
EEIR	53.087	±3.675	48.402	±4.517	N.S
CFIR	197.435	±6.113	203.750	±10.116	N.S
NFEIR	727.008	±49.894	678.074	±63.110	N.S
NDFIR	506.968	±27.094	487.576	±36.071	N.S
ADFIR	270.826	±9.982	258.067	±13.083	N.S
CellIR	209.557	±8.249	195.834	±10.295	N.S
HemiIR	236.082	±17.167	229.508	±22.988	N.S
MEIR	15.284	±0.978	14.427	±1.255	N.S

N.S Non significant.

these results were agreed with (Tamimi, 2009 ºHassan *et al.*, 2010 Saeed, 2011; Khalifa, (2014).

Effect type of protein (sunflower meal, dried whey powder) treatment with blood in 50 % on alfalfa and concentrate and Total intake

Table 13 showed that there was a significant increase (P <0.05) on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose, Metabolic energy (ME) for alfalfa intake of diets dried whey powder treated with blood in 50% compared alfalfa intake of diets sun flower meal treated with blood in 50%.

Table 13: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of alfalfa.

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	[a]486.825	±0.621	[b]474.958	±2.484	*
OMIR	[a]443.644	±0.566	[b]432.809	±2.280	*
CPIR	[a]88.650	±0.113	[b]86.485	±0.455	*
EEIR	[a]14.750	±0.018	[b]14.390	±0.075	*
CFIR	[a]132.173	±0.168	[b]128.945	±0.679	*
NFEIR	[a]208.069	±0.265	[b]202.988	±1.069	*
NDFIR	[a]222.723	±0.284	[b]217.283	±1.144	*
ADFIR	[a]165.082	±0.210	[b]161.050	±0.848	*
CellIR	[a]122.387	±0.156	[b]119.446	±0.610	*
HemiIR	[a]57.640	±0.073	[b]56.232	±0.296	*
MEIR	[a]5.095	±0.006	[b]4.970	±0.026	*

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

it appears that the treatment of dried whey powder with blood in 50% made it more soluble in the rumen compared to the treatment it with blood treatment with blood in 100%. The more degradable protein in the rumen is necessary for the overall digestion of roughage feed and fiber (Khampa *et al.*, 2003; Greg, 2017), Resulting that intake of the Metabolic energy (ME) of diets dried whey powder treated with blood in 50% was a significant increase (P<0.05) compared of diets sun flower meal treated with blood in 50%. The whey also contains 70% lactose sugar, which is a fast soluble sugar (El-Shewy¡ 2016), As the most important factor in microbial protein synthesis is the energy released in the rumen by fermenting carbohydrates (Febel and Fekete, 1996; Pathak, 2006).

Table 14 showed that there was no significant effect on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose and Metabolic energy (ME). for Concentrated feed intake of diets dried whey powder treated with blood in 50% compared Concentrated feed intake of diets sun flower meal treated with blood in 50%. This may be due to 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

Table 14: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of concentrate.

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	787.709	±49.755	778.776	±76.442	N.S
OMIR	730.525	±46.144	713.203	±70.006	N.S
CPIR	114.454	±7.229	119.620	±11.741	N.S
EEIR	40.095	±2.532	33.332	±3.271	N.S
CFIR	67.192	±4.244	74.373	±7.300	N.S
NFEIR	509.572	±32.188	485.800	±47.684	N.S
NDFIR	283.655	±17.917	280.168	±27.680	N.S
ADFIR	106.341	±6.717	100.773	±9.891	N.S
CellIR	87.357	±5.518	78.812	±7.735	N.S
HemiIR	177.31	±11.200	178.028	±17.474	N.S
MEIR	10.086	±0.637	9.642	±0.946	N.S

N.S Non significant.

Table 15: Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on intake of Total.

Nutri-ents	dried whey powder	standard error	sun flower meal	standard error	Effect signif-icance
DMIR	1274.530	±50.264	1253.730	±76.238	N.S
OMIR	1174.170	±46.608	1146.010	±69.823	N.S
CPIR	203.105	±7.322	206.105	±11.706	N.S
EEIR	54.845	±2.548	47.722	±3.265	N.S
CFIR	199.365	±4.383	203.318	±7.266	N.S
NFEIR	717.641	±32.405	688.788	±47.594	N.S
NDFIR	506.378	±18.150	497.451	±27.607	N.S
ADFIR	271.423	±6.890	261.824	±9.846	N.S
CellIR	209.745	±5.646	198.258	±7.703	N.S
HemiIR	234.954	±11.260	234.260	±17.448	N.S
MEIR	15.182	±0.642	14.612	±0.944	N.S

N.S Non significant.

nutrients. These results were agreed with (Hassan *et al.*, 2010 Saeed, 2011; Khalifa, (2014).

Table 15 showed that there was no significant effect on the intake of dry matter DMI, organic matter OMI, crude protein CP, EE extract, crude fiber CF, Nitrogen free extract (NFE), Neutral fiber (NDF), acid fiber extract (ADF), cellulose and hemicellulose and Metabolic energy (ME). for Total feed intake of diets dried whey powder treated with blood in 100% compared Total feed intake of diets sun flower meal treated with blood in 100%. these results were agreed with (Tamimi, 2009; Hassan *et al.*, 2010 Saeed, 2011; Khalifa, (2014).

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