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EFFECT OF PROTECTING PROTEINS FROM DEGRADATION IN THE RUMEN ON FEED CONVERSION RATIO OF AL AWASSI 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 on Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP), in lambs fattening diets. The results showed insignificant effect in FCRT, FCRC, and, FCRP for dried whey powder treated with blood or formaldehyde compared sun flower meal treated with blood or formaldehyde and for dried whey powder treated with blood in percentages 100% compared sun flower meal treated with blood in percentages 100%, While There was Improved significantly ($P < 0.05$) for Conversion Ratio of Total Feed Intake (FCRT) and Feed Conversion Ratio of protein feed Intake (FCRP) and insignificant effect for Feed Conversion Ratio of concentrate feed Intake (FCRC) for dried whey powder treated with blood in percentages 50% compared sun flower meal treated with blood in percentages 50%, and There was insignificant effect in FCRT, FCRC, and, FCRP for dried whey powder treated formaldehyde in percentages 100% compared sun flower meal treated with formaldehyde in percentages 100%, While There was Improved significantly ($P < 0.05$) for Feed Conversion Ratio of concentrate feed Intake (FCRC) and insignificant effect for Total Feed Intake (FCRT) and protein feed Intake (FCRP) for sun flower meal treated with formaldehyde in percentages 50% compared dried whey powder treated with formaldehyde in percentages 50% .

Keywords **:** Dried whey powder, sun flower meal, blood, formaldehyde, Feed Conversion Ratio.

Introduction

The degradable protein in the rumen supplies the rumen microorganism with NH3-N, amino acids and peptides, and a decrease in the RDP level will lead to a decrease in the animal's performance (Hassan & Saeed, 2013), 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, also 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) (Lintzenich *et al.* 1995; Cooper *et al.*, 2002). Several studies have confirmed that adding UDN to the diets increased dry matter intake DMI, ADG and FCR as in treatment with formaldehyde or fresh blood (Mir *et al.,* 1984. Tomlinson *et al.,* 1997; Khan *et al.*, 2000; 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 and feed conversion ratio (FCR) (Davis *et al.*, 1999; Yörük *et al.*, 2006; Salih, 2007; Hélio *et al.*, 2013).

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 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 or formaldehyde in the fattening diets on Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP), of Al-Awassi Lambs.

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 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).

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).

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 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.

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

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)

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

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 & 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 matter.

Crude 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 during the experiment period.

Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on Feed Conversion Ratio

Table 7 showed that there were no significant effect on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP), for diets dried whey powder treated with blood or formaldehyde compared diets sun flower meal treated with blood or formaldehyde. The reason for this may be what Meissner *et al.* (1996) mentioned about an improvement in the Feed Conversion Ratio due to the increase in protein reaching the small intestine. sunflower meal and dried whey powder treatment with blood or formaldehyde have a similar effect with regard to protein reaching the small intestine, these results did not agree with (Abdullah & Awawdeh, 2004; Ali *et al.,* 2005). Fig. 1 shows the effect of the type of protein treatment with (blood or formaldehyde) on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP).

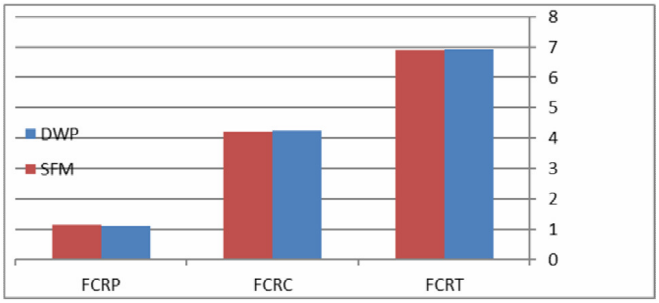

Fig. 1 : Effect of the type of protein treatment with (blood or formaldehyde) on the Feed Conversion Ratio.

Table 7 : Effect type of protein (sunflower meal, dried whey powder) treatment with blood or formaldehyde on Feed Conversion Ratio

Studied traits	Dried whey powder	Standard error	Sun flower meal	Standard error	Effect significance
FCRT	6.917	0.039±	6.880	0.060±	N.S
FCRC	4.238	0.058±	4.229	0.086±	N.S
FCRP	1.123	0.009±	1.134	0.010±	N.S

N.S Non significant.

Effect type of protein (sunflower meal, dried whey powder) treatment with blood in 100 % on Feed Conversion Ratio

Table 8 showed that there were no significant effect on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP), for diets dried whey powder treated with blood in 100 % compared diets sun flower meal treated with blood in 100 % , these results are in agreement with (Saeed, 2011; Kahleefah, 2014), Fig. 2 shows the effect of the type of protein treatment with blood in 100 % on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP).

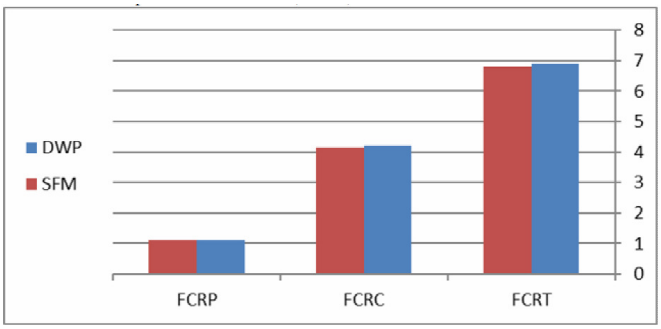

Fig. 2 : Effect of the type of protein treatment with blood in 100 % on the Feed Conversion Ratio.

Table 8 : Effect type of protein (sunflower meal, dried whey powder) treatment with blood in 100% on Feed Conversion Ratio.

Studied traits	Dried whey powder	Standard error	Sun flower meal	Standard error	Effect significance
FCRT	6.912	0.056±	6.807	0.145±	N.S
FCRC	4.218	0.152±	4.145	0.282±	N.S
FCRP	1.113	0.012±	1.113	0.020±	N.S

N.S Non significant.

Effect type of protein (sunflower meal, dried whey powder) treatment with blood in 50 % on Feed Conversion Ratio

Table 9 showed that there were Improved significantly (P <0.05) on the Feed Conversion Ratio of Total Feed Intake (FCRT) and Feed Conversion Ratio of protein feed Intake (FCRP), while there was insignificant effect on the Feed Conversion Ratio of concentrate feed Intake (FCRC) for diets dried whey powder treated with blood in 50 % compared diets sun flower meal treated with blood in 50 %, This may be due to The effect of substituting dried whey powder in place of sunflower meal, as it led to an increase in microbial protein production, improved utilization of feed and increased apparent digestibility of dry matter and organic matter (Chibisa *et al.,* 2015), The percentage of blood treatment 50%, which led to an increase in the protein reaching the intestine for dried whey powder compared with sunflower meal, which led to an improvement significantly (P <0.05) on the Feed Conversion Ratio of Total Feed Intake (FCRT) and Feed Conversion Ratio of protein feed Intake (FCRP) (Meissner *et al.,*1996). Fig. 3 shows the effect of the type of protein treatment with blood in 50% on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP).

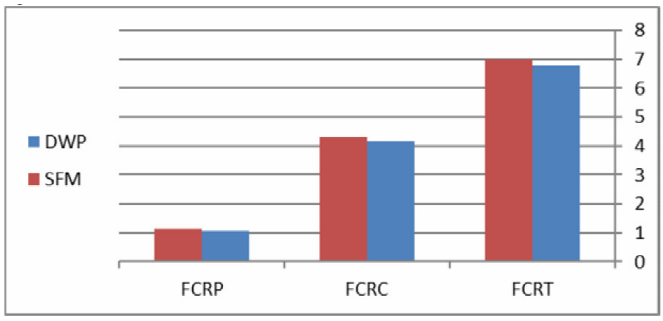

Fig. 3 : Effect of the type of protein treatment with blood in 50 % on the Feed Conversion Ratio.

Table 9 : Effect type of protein (sunflower meal, dried whey powder) treatment with blood in 50 % on Feed Conversion Ratio.

Studied traits	Dried whey powder	Standard error	Sun flower meal	Standard error	Effect significance
FCRT	^{b}6.782	0.032±	^{a}6.988	0.071 ±	*
FCRC	4.179	0.111±	4.304	0.143±	N.S
FCRP	^{b}1.081	0.005±	^{a}1.149	0.016±	*

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

Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 100 % on Feed Conversion Ratio

Table 10 showed that there were no significant effect on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP), for diets dried whey powder treated with formaldehyde in 100 % compared diets sun flower meal treated with formaldehyde in 100 % , These results were in agreement with (Saeed, 2011; Kahleefah, 2014), Fig. 4 shows the effect of the type of protein treatment with formaldehyde in 100 % on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP).

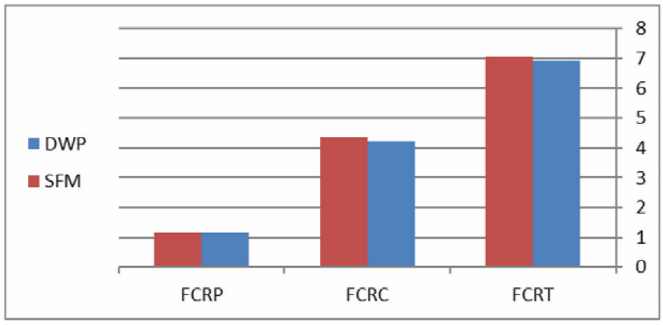

Fig. 4: Effect of the type of protein treatment with formaldehyde in 100 % on the Feed Conversion Ratio.

Table 10 : Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 100 % on Feed Conversion Ratio.

Studied traits	Dried whey powder	Standard error	Sun flower meal	Standard error	Effect significance
FCRT	6.930	0.073±	7.051	0.057±	N.S
FCRC	4.228	0.163±	4.367	0.182±	N.S
FCRP	1.144	0.015±	1.171	0.009±	N.S

N.S Non significant.

Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 50 % on Feed Conversion Ratio

Table 11 showed that there were Improved significantly (P <0.05) on Feed Conversion Ratio of concentrate feed Intake (FCRC),while there was insignificant effect on the Feed Conversion Ratio of Total Feed Intake (FCRT) and Feed Conversion Ratio of protein feed Intake (FCRP) for diets dried whey powder treated with formaldehyde in 50 % compared diets sun flower meal treated with formaldehyde in 50 %, Fig. 5 shows the effect of the type of protein treatment with formaldehyde in 50 % on the Feed Conversion Ratio of Total Feed Intake (FCRT), Feed Conversion Ratio of

concentrate feed Intake (FCRC) and Feed Conversion Ratio of protein feed Intake (FCRP).

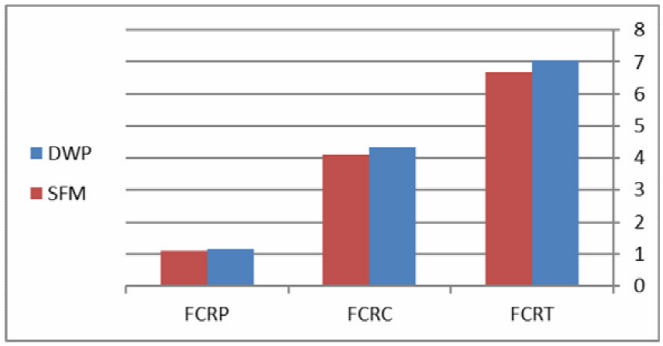

Fig. 4: Effect of the type of protein treatment with formaldehyde in 100 % on the Feed Conversion Ratio.

The results of protecting protein from degradation in ruminant rumen may be conflicting due to the low level of protection in some cases and in other cases due to excessive protection as the protein becomes indigestible (Mir *et al,*1984). Many studies have shown that a diet containing higher amounts of The non-dissolving proteins in the rumen or the amino acids protected from degradation in the rumen led to significant effects, while other studies showed little or no response, and the lack of response to the undegradable protein in the rumen is often due to one of the following reasons: 1- The undegradable proteins may be The rumen is bypassed the rumen at the expense of the rumen microbial protein synthesis. 2- The proteins that are undegradable in the rumen may be poorly digested after the rumen. 3- undegradable proteins in the rumen may be deficient in the amino acid content that limits production (Schingoethe, 1996).

Table 11 : Effect type of protein (sunflower meal, dried whey powder) treatment with formaldehyde in 50 % on Feed Conversion Ratio.

Studied traits	Dried whey powder	Standard error	Sun flower meal	Standard error	Effect significance
FCRT	7.045	0.099±	6.675	0.118±	N.S
FCRC	[a]4.327	0.041±	[b]4.099	0.016±	*
FCRP	1.156	0.019±	1.104	0.022±	N.S

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

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