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STUDYING THE EFFECT OF REPLACEMENT OF DIFFERENT LEVELS OF WASTE RESTAURANT RICE WITH DIET BARLEY ON BLOOD PARAMETERS AND LIVER ENZYMES IN LORI FATTENING LAMBS

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ABSTRACT

Aims:*Lab coats are known to act as vectors in transmitting the potentially pathogenic multi-drug In order to evaluate the effect of replacement of different levels of rice waste of restaurant with diet barley on blood parameters and liver enzymes in fattening Lur lambs, 40 Lur male lambs with an average weight of 25 kg that were randomly divided into 5 groups were used. Experimental diets were set according to CNCPS tables of food requirements in accordance with 80% concentrate and 20% forage. Energy and protein contents all diets were equal, and waste restaurant rice with the ratios of zero, 25 percent, 50 percent, 75 percent and 100 percent replaced barley in diet of lambs. Feed and water were fed to livestock freely. Lambs adaptation period to the experimental diets is considered 15 days and fattening period is considered 75 days. To determine blood parameters and liver enzymes, on 90 day of the experiment, samples of the lambs were taken through the jugular vein in the neck and hematological parameters include Glucose, cholesterol, triglycerides, HDL, LDL, VLDL and liver enzymes include alanine aminotransferase, aspartate aminotransferase, and alkaline phosphatase that were measured. The results showed that the concentration of triglycerides, and VLDL Tri-blood serum and liver enzymes aspartate aminotransferase and alanine aminotransferase are under the significant effect of different treatments (P<0.05). However, treatments did not have a significant impact on the concentration of HDL, LDL, glucose and blood serum cholesterol and liver enzyme alkaline phosphatase in fattening lambs (P>0.05). Generally, the results showed that waste rice restaurant could be used in fattening lamb without detrimental effects on animal health.*

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KEY WORDS

rice waste
hematological parameters
liver enzymes
fattening lambs

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INTRODUCTION

Due to population growth, protein need of society increase. This is while, based on the recommendations of the World Health Organization, at least one third of the protein intake should be provided from animal protein sources. The cost of food in a fattening period is one of the highest costs, 65 to 70 percent of the costs related to the breeding and keeping of livestock is in relation to nutritional issues. Therefore, identifying new sources of affordable food, as well as the proper use of these resources is a key priority for the industry. In this regard, the use of waste products of agriculture and processing industry has long been considered before. In many countries, food waste that does not fit for human consumption has been successfully used in livestock rations. The availability of waste in livestock rations is dependent on factors such as the amount of nutrients and anti-nutritional factors in it. The waste produced per person is equivalent to 72.6 kg. Nutrients available in 5 to 7 tons of household waste are roughly equivalent to 1 ton of barley, which can be used in the production of animal feed [1]. Buddha (1990) reported that waste generally has a dry matter of 31.6%, organic matter of 92.1% ash 7.9%, crude protein 17.6%, fat 20.1%, crude fiber 3.6%, raw energy of 87.8 MJ per kg, and 23.9 of MJ digestible energy per kg. Saki et al (2006) studied nutritional value of kitchen waste and reported that this material contains 4,300 kilocalories per kilogram raw energy and 1999 kilocalories per kilogram of metabolizable energy for broiler chickens[2]These materials have no negative effect on the broiler diet. The researchers also used 0, 10, 20, and 30% levels of kitchen waste in broiler diet and expressed that no significant differences were seen in weight gain and feed conversion ratio between the different treatments and finally offered that 10% of these materials have no negative effect on the broiler diet. Hosseinkhani et al (2013) in a study examined the effect of different levels of barley replaced with restaurant waste in the diet of fattening lambs[3]. Diets contained three levels of barley replacement with restaurant waste levels (0, 50, and 100 percent),

the survey results showed no significant differences in the use of restaurant waste levels in the diet of fattening lambs. Moradi et al (2013) reported that replacement of barley grain at 50% and 100% levels with restaurant waste reduced price per unit increase in body weight compared to the control diet 24 and 37.7% respectively[4].

Studying the factors affecting the metabolism of lipids, including the construction of Tri-glycerides or neutral fats in animal husbandry is of particular economic importance. Neutral lipids in animal husbandry are important from two perspectives. First, the ratio of production efficiency is crucial in animal products and, secondly, these compounds have close ties to many metabolic side effects [5]. Although the impact of dietary lipids in cardiovascular disease of fattening lambs is not important due to short economic life, because of the impact that blood lipids have on the product quality that it is ultimately used for human consumption, they are important. In this regard, it has been reported that reduction in blood levels of very low-density lipoprotein reduces abdominal fat and total abdominal fat in poultry [5]. Neutral fats or triglycerides after absorption to digestion system in the stomach by two mechanisms, either directly or through the bloodstream enters the blood by special proteins called lipoproteins transferred to the tissues [6]. Triglycerides in the food and fat manufactured by the liver should be stored or transferred to help blood flow to tissues and organs. However, since lipids are insoluble in water their transmission by blood plasma is not possible, so non-polar neutral fats and cholesterol esters and phospholipids and free cholesterol associated with proteins called apoprotein and lipoprotein complexes formed there lipoprotein, miscible with water and can be transmitted by plasma [7]. The concentration of non–esterifid fatty acid and triglyceride very low-density lipoprotein concentrations in plasma are important criteria for the synthesis of triglycerides in non-liver tissues. Moreover, any change in concentration of very low-density lipoproteins can be an effective tool for improving efficiencies in livestock production. For example, by reducing very low-density lipoprotein concentrations, carcass fat content can be reduced and thus increase production efficiency [8]. Thus, the aim of this study is to evaluate the effect replacement of different levels of rice waste of restaurant with barley diet on blood parameter and liver enzymes in Lur male lambs.

MATERIALS AND METHODS

For the study, 40 male Lur lambs, with an average weight of 25± 1.5 were used. The lambs were randomly divided into 5 groups of 8 and kept and fed in individual pens and a 15-day adaptation period was considered. After the period of adaptation, they were fattened for 75 days of the trial period. After calculating the amount of waste rice required for the project, the waste was collected from the restaurants in Khorramabad.
After collecting, the waste was spread on the bed netting, and dried under the light and heat of the sun and then used for animal consumption. After grinding with a one-millimeter sieve, samples were analyzed to determine the crude protein (CP), crude fat (EE) and ash (Ash) (1990AOAC,). Measurement of acid detergent fiber (ADF) was performed by method of Van Sousse and colleagues (1991) **[Table- 1]**.

Table: 1. Analysis of the chemical composition of rice waste (based on dry matter)

Nutritional matter	Crude ash (percent)	Ether extract (percent)	Crude protein (percent)	Metabolizable energy	Insoluble fiber in acid detergent (percent)
	2.9	6.5	11.9	2.86	1.5

The diets used in this experimental were according to nutritional requirements tables Sheep CNCPS (2007) and by 80% concentrate and 20% alfalfa **[Table -2]**. In the experimental diets, restaurant waste rice was replaced barley, as a source of dietary starch, at 0, 25, 50, 75, and 100 percent. Diets were completely mixed and given to the animals. Food and water were freely available to livestock.

Table :2. The composition of the experimental diets (based on dry matter)

Food item (percent)	Experimental diets (% of replacement of waste rice with barley)				
	0%	25%	50%	75%	100%
Alfalfa	23.32	23.31	23.29	23.31	23.31
Barley	33.12	24.86	16.59	8.26	0
Rice waste	0	8.26	16.59	24.86	33.12
Corn	19.52	19.52	19.50	19.52	19.52
Soybean Meal	9.52	9.52	9.51	9.52	9.52
Sugar beet pulp	9.71	9.71	9.70	9.71	9.71

Bran	1.65	1.65	1.65	1.65	1.65
Limestone	1.07	1.07	1.07	1.07	1.07
Di-calcium phosphate,	0.10	0.10	0.10	0.10	0.10
Sodium Bicarbonate	1.00	1.00	1.00	1.00	1.00
Salt	0.50	0.50	0.50	0.50	0.50
Mineral supplements and vitamins	0.50	0.50	0.50	0.50	0.50
Total	100	100	100	100	100
Nutrients (calculated)					
Metabolizable energy	2.57	2.65	2.58	2.58	2.58
(Megacalories kg dry matter)	15.3	15.0	14.6	14.2	14.0
Crude Protein (percent)	26.4	26.3	26.1	25.9	25.7
Neutral detergent fiber (percent)	50.6	51.0	51.5	51.9	52.3
Non-fiber carbohydrates (percent)	0.79	0.79	0.80	0.80	0.80
Calcium (percent)	0.35	0.35	0.35	0.35	0.35
P (percent)	9651	9106	8555	8003	7458

To investigate the effects of diets on blood parameters livestock, blood samples were taken on 90 days of the experiment. For this purpose, four hours after eating the morning meal, blood samples were taken from jugular vein by sterilized syringes, immediately transported to the laboratory, and plasma was separated by using a centrifuge. The plasma was then transferred to a freezer and stored at -20 °.

Finally, blood parameters such as glucose, triglycerides, cholesterol, HDL, LDL and VLDL were determined by using spectrophotometer and test kits of pars Co. Measurement of liver enzymes including alkaline phosphatase, alanine amino-transferase enzyme was determined by coding method of Keiding et al. (1974) and Bergmeyer et al. [9].

The experiment were performed using a completely randomized design with 5 treatments. SAS version 9.1 software was used for data analysis. Data on blood parameters and liver enzymes were analyzed using GLM procedures. Least-squares multiple range comparison was done using Fisher least significant difference test. For all comparisons, significance was considered at the level of $P<0.05$.

RESULTS AND DISCUSSION

Results of substitution effect of different levels of waste rice of restaurants on hematological parameters are given in **[Table -3]**. The results showed that the treatments had no significant effects on serum glucose, cholesterol, HDL and LDL blood serum did not fattening lambs ($P>0.05$). Abedini et al (2012) studied the effect of replacement of different levels of dried citrus pulp instead of barley at 0, 33, 66 and 100 percent levels[10].The researchers expressed that the experimental diets resulted in significant changes in blood glucose levels and blood serum glucose concentration in the treated animals and in 100 percent, treatment was lower than other treatments. These result contrasts with those results. Nikkhah et al (2008) reported increased blood glucose in line with increasing levels of concentrate in the diet due to high production rate and absorption in the rumen propionate and subsequently increased hepatic gluconeogenesis[11].Since the amount and ratio of concentrate to forage was similar in all groups, and difference was in the components of the concentrate, it was expected to affect blood glucose levels, but as was said barley replacement with waste rice of restaurants did not cause significant changes in blood glucose levels of the lambs. Raisi et al (2012) studied the effect of feeding four levels (0, 7, 14 and 21%) of germinated barley on blood metabolites of Kerman male lambs and reported that none of the metabolites such as cholesterol were affected by diets[12].

Their results are consistent with the present study results. Very low-density lipoproteins are responsible for transmission of cholesterol made in the liver to peripheral tissues [13]. Very low-density lipoproteins are atherogenic lipoprotein, and their increase in serum is the most important risk factor for coronary heart disease.Low density lipoprotein, unlike chylomicrons and very low density lipoprotein that are for only a few hours in the bloodstream, remain stable in the bloodstream nearly 3 days. Then by oxidation of the fat inside it are swallowed by macrophages and transform into foam cells and deposit in the lining of the arteries and cause atherosclerosis plaques that clog arteries [14]. In this experiment, consumer of 75% of replaced rice had the least low-density lipoprotein.

However, serum triglycerides and VLDL in groups receiving different level of waste rice showed a statistically significant difference (P<0.05). The least (16.39 mg per deciliter) and the highest (25.45 mg per deciliter) blood serum triglyceride concentrations are respectively related to control (0% of waste rice) and treatment 2 (25% rice waste).Moreover, the lowest (3.27 microns per liter) and the highest (5.09 microns per liter) concentration of very low Density Lipoprotein (VLDL) are respectively related to the control and treatment groups with 25% of restaurant waste rice instead of barley diet. VLDL in ruminants is similar to the micro Shiloh rich in triglycerides (50%), whose function is to transfer triacylglycerol made in the liver to other organs of the body. The combination of very low density lipoprotein triglycerides, fatty acids, fatty acid composition of the diet of ruminants, such as chylomicrons severely affect infants, but in adult ruminants are not affected. The reason for this difference could be severe hydrogenation of fatty acids by microorganisms in the rumen diet [15].

Table: 3: Effects of waste rice of restaurant on hematological parameters of a fattening lamb

Parameter	Replacing level of the waste rice with barley diets					SEM	P-value
	Group 1(0) percent	Group 2 (25) percent	Group 3(50) percent	Group 4 (75) percent	Group 5 (100) percent		
Glucose [1]	58/73	51.98	60.48	54.02	69.52	3.28	0.083
Cholesterol [1]	45.48	45.81	48.48	45.23	46.52	2.99	0.856
Triglyceride [1]	16.39^{b}	25.45^{a}	24.08^{a}	20.45^{ab}	18.30^{ab}	1.86	0.005
HDL[2]	19.04	18.87	21.45	22.12	20.20	1.10	0.610
LDL[2]	23.25	22.94	21.17	19.77	23.57	2.56	0.619
VLDL[2]	3.27^{b}	5.09^{a}	4.81^{a}	4.10^{ab}	3.67^{ab}	0.373	0.006

* The numbers in each row shown with dissimilar letters are significantly different (P<0.05). [1] mg per deciliter. [2] microns per liter

Enzymes aspartate aminotransferase is one of the most important enzymes of aminotransferase that by transferring amino unitscatalyzes alpha-keto acids to amino acid. Assessing the activities of aspartate aminotransferase is a basic method for the detection and assessment of liver or muscle damage. In general, increased aspartate aminotransferase is highly correlated with the amount and intensity of cellular damage (16; 17). In this experiment, liver aminotransferase aspartate enzyme was affected by treatments (P<0.05). The lowest (145.17 unit per liter) and the highest (204.89 units per liter) levels of aspartate aminotransferase enzymes were respectively related to treatment containing 50% of waste rice of restaurants and samples with 75% of restaurant waste rice instead of barley diet **[Table -4]**. Enzymes alanine aminotransferase is one of the most important enzymes of group aminotransferase that by transferring amino units catalyzes alpha-keto acids to amino acid. Liver alanine aminotransferase of the groups receiving different levels of rice showed no significant differences (P<0.05). The lowest (20.90 units per liter) and the highest (38.37 units per liter) levels of the liver enzyme alanine aminotransferase were respectively related to treatment 3 (50% of waste rice) and group 4 (75% of waste rice). Liver enzyme alanine-aminotransferase concentrations in treatments containing 0, 25, 50, and 100 percent of waste rice have no significant difference, but they have significant difference with 75% treatment of waste rice **[Table -4]**.

Alkaline phosphatase is a hydrolytic enzyme with optimal activity in alkaline pH and has various forms in the blood. This enzyme, which is normally one of the most commonly use enzymes of the liver in the laboratory to test, has the role of a single phosphate esters catalyzed by alkaline hydrolysis of various precursors [18]. Alkaline phosphatases in the liver is the bone of dominant form of blood serum in adults and identifying the item in the differential diagnosis of diseases of the liver or bone isoenzyme of alkaline phosphatase can be helpful (19). Alkaline phosphatase concentration in fattening lambs was not different between treatments (P>0.05). But, numerically lowest and highest concentration of alkaline phosphatase were respectively in treatment 3 (50% of waste rice) with a concentration of 499.58 unit per liter and treatment 2 (25% of waste rice) at a concentration of 592.33 unit per liter **[Table -4]**.

Table: 4. The effect of different levels of waste rice of restaurants in liver enzymes in fattening lambs

Parameter	GROUP					SEM	P-Value
	Group 1control	Group 2 (25) percent	Group 3(50) percent	Group 4 (75) percent	Group 4 (100) percent		
AST (U/l)	146.25[b]	147.50[b]	145.17[b]	204.89[a]	192.17[ab]	7.40	0.0039
ALT (U/l)	24.22[b]	22.70[b]	20.90[b]	38.37[a]	23.37[b]	1.49	0.0001
ALP (U/l)	529.50	592.33	499.58	542.25	551.75	22.26	0.8135

* The numbers in each row shown with dissimilar letters are significantly different (P<0.05).
AST = aspartate aminotransferase; ALT = alanine aminotransferase; ALP = alkaline phosphatase

CONCLUSION

Generally, the results showed that as much as 50 percent of the barley in diet could be replaced with waste rice of restaurants with no negative effects on the health of fattening lambs.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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None declared.

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