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Artigo

Comparative performance and digestibility of nutrients in Afshari and Ghezel ram lambs

Desempenho comparativo e digestibilidade de nutrientes em cordeiros de carneiro Afshari e Ghezel

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Abstract: This study was investigated to comparative performance and digestibility of nutrients in Afshari and Ghezel ram lambs. In the first trial 30 animals at the age of 5 month (15 Afshari (AF) and 15 Ghezel (GH) ram lambs were randomly allocated to individual pen, in order to determined fattening performance for a period of 90 days. In the second trial 10 animals at the age of 10 month from each ecotype were randomly allocated in individual metabolic cages to determine the *in vivo* digestibility for 8 days after adaptation period. Data were analyzed in a complete randomized design using the GLM of SAS and the means were compared with Duncan's multiple range test. The results showed that there were no significant effect in initial body weight, daily gain, feed conversion ratio and feed efficiency between treatments. Ghezel ram lambs had lower feed intake compared to Afshari ram lambs. The study showed that there were no significant differences for digestibility of DM, protein, EE, ADF, NDF and P, Ca, Mg, Fe and Cu between treatments. In conclusion the results showed that GH had no significance effect on feed digestibility and fattening characteristics of cross breed lambs.

Key words: Ram lambs, Afshari, Ghezel, Fattening Performance, Digestibility.

Resumo: Este estudo foi investigado quanto ao desempenho e digestibilidade comparativos de nutrientes em cordeiros de carneiro Afshari e Ghezel. No primeiro experimento, 30 animais com 5 meses de idade (15 cordeiros de carneiro Afshari (AF) e 15 de Ghezel (GH)) foram aleatoriamente alocados em currais individuais, a fim de determinar o desempenho de engorda por um período de 90 dias. 10 animais com 10 meses de cada ecótipo foram alocados aleatoriamente em gaiolas metabólicas individuais para determinar a digestibilidade in vivo por 8 dias após o período de adaptação.Os dados foram analisados em um delineamento inteiramente casualizado usando o GLM do SAS e as médias comparadas com Os resultados mostraram que não houve efeito significativo no peso corporal inicial, ganho diário, taxa de conversão alimentar e eficiência alimentar entre os tratamentos.Os cordeiros Ghezel tiveram menor consumo de ração do que os cordeiros Afshari. não houve diferenças significativas na digestibilidade de MS, proteínas, EE, FDA, FDN e P, Ca, Mg, Fe e Cu entre os tratamentos. Concluindo, os resultados mostraram que o GH não teve efeito significante sobre a digestibilidade e características de engorda de cordeiros de raças cruzadas.

Palavras-chave: Carneiro, Afshari, Ghezel, Desempenho de Engorda, Digestibilidade.

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Introduction

There are high variations among different Iranian sheep breeds in terms of carcass yield and prolificacy. Twin births are frequent in some breeds though infertility is rarely observed in these flocks. The Ghezel sheep originated in northwestern Iran and northeastern Turkey. This region in Iran is known as Azarbayjan and is typlified by dry, cold mountain weather .The fleece of this sheep is red and have sections of black red or light red. The Ghezel are used for both meat and wool in this region (TAVAKKOLIAN, 2000). The productivity of livestock affected by genetic and environmental factor such as diet. The higher productivity breed usually followed by higher nutrient requirement such as protein which is needed for tissue deposition (YULISTIANI et al.,2015, NETO et al., 2014). Therefore the objective of this study was to evaluate comparative performance and digestibility of nutrients in Afshari and Ghezel ram lambs.

Materials and methods

In order to determination of fattening performance the data of 30 Afshari and Ghezel lambs which born between 2016 and 2017 were used. *In vivo* feed digestibility was assigned with 6 Afshari and Ghezel ram lambs respectively. The research carried out in research flock at Shooli sheep breeding station in Shahrekord. The flock was generally kept from March to June at the station.

Chemical Composition:

In Table 1, Ingredients of diets were analyzed according to AOAC (2000) methods. Dry matter (DM) with putting feed in 100°C for 24 h., method 967.03, ash by incineration in 550°C for 8 h; method 942 and crud protein (CP) by Kjeldahl procedure. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were

analyzed according to two stage procedures described by (STERN et al., 1997; VAN SOEST et al., 1994). The experimental diet is shown on Table 1.

Table 1: Ingredients (DM basis %) and chemical composition of the experimental rations

Ingredients	Dry mater basis %
Alfalfa hay[1]	61
Corn	4.85
Barely	13.60
Wheat bran	9.30
Fish meal	0.78
Soybean meal	2.88
Canola Meal	2.33
Beet pulp	1.94
Edible Salt	1.94
Calcium bicarbonate	0.27
Baking soda	0.39
Magnesium Oxide	016
Sodium-Bentonite	0.39
Mineral and vitamin per mix[2]	0.17
Chemical Composition	
Crude protein	16
Metabolizable Energy (Mcal/kg DM)[3]	2.5
Ash	8.6
Neutral detergent fiber (NDF)	43.4
Acid detergent fiber (ADF)	21.7
Ca	1.9
P	0.4

[1]Chopped to 2-3 cm length,[2]Supplies per kg of feed: 4.9 mg of Zn, 4.05 mg of Mn,0.45 mg of Cu, 0.075 mg of I, 0.1 mg of Se, 2.500 IU Vitamin A,400 mg of Vitamin D, 2.5 IU2Vitamin E,[3]Calculated metabolized energy.

First study:

At the first study 30 ram lambs at the age of 10 month (15 Afshari and 15 Ghezel ram lambs) were randomly allocated to the experimental design for 90 days period to study fattening performance in a same condition. The aim of the study was to evaluate the performance of Afshari and Ghezel ram lambs. In current study the lambs were fed by 3 times per day in the 24 individual pens. In this study the initial weight (IW), final weight (FW), feed intake dry matter (FI), average daily gain (ADG), feed conversion ratio (FCR) and feed efficiency (FE) were investigated

Second study:

At the second study for investigation the *In vivo* digestibility of feed ingredients, 10 adult animals (5 Afshari and 5 Ghezel ram lambs) with initial weight 52± 5 kg and average age of 300 days were randomly allocated to the individual metabolic cages for 2 weeks. They also fed by maintenance requirement with total mixed ration (TMR) contained 60 % alfalfa hay and 40% feedlot concentrate at level, 0.87 ± 0.05 kg day^{-1} (ENSMINGER, 1986). The ingredients and chemical composition of the experimental rations are shown in Table 2.

Table 2- The comparative performance in Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SEM
NO	12	12	-
Initial live weight (kg)	36.10	39.10	1.47
Final live weight (kg)	60.24	59.67	1.34
Final body weight gain (kg)	22.63	22.06	1.34
Average daily gain (gr)	251	245	14.9
Feed intake /day (kg)	2.10^{a*}	2.04^{b}	0.02
Feed Conversation Ratio	8.30	8.50	0.46
Feed efficiency (%)	12.01	12.06	0.72

*ab: Means within columns with differing letters differ (P≤ 0.05).

The diets were fed seven days for adaptation and seven days for experimental period. Also due the trial plan their feed intake, residual feed and feces were collected and digestibility of diets and nutrients were investigated (GIVENS et al., 2000).

Statistical Analysis

The model used in this study was as a : $Y_{ij} = \mu + T_i + e_{ij}^*$

*Where Y_{ij} is the individual observation, μ is the overall mean, T_i is the effect of treatment and e_{ij} is the remainder effect.

Data were analyzed in a completely randomized design using the GLM of (SAS, 2001), the means were compared with Duncan's multiple range test.

Result

Data showed that although initial live weight for AF was higher than GH. Data showed that final body weight gain and average daily gain for AF lambs were higher than GH lambs too.

There was a significant difference for feed intake among treatments and feed conversation ratio was better for AF lambs. There is no significant difference between experimental lambs about feed efficiency Table 3. As data observed from Table 3, average nutrients consumption such as total feed intake, dry matter intake and protein intake were higher for Afshari ram lambs and the intake of ether extract, Neutral detergent fiber (NDF) and acid detergent fiber (ADF) were higher for Ghezel ram lambs. But there were no significant differences between treatments.

Table 3- Average nutrients consumption on Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SEM
NO	15	15	-
Total feed intake (gr)	1441	1440	22
Dry matter intake (gr)	1083	1097	16.8
Protein intake (gr)	243	239	3.7
Ether extract intake (gr)	46.9	46.3	0.7
NDF (gr)	214	211	3.3
ADF (gr)	424	419	6.5

*ab: Means within columns with differing letters differ (P≤ 0.05).

According to lambs feed consumptions, phosphorus, calcium and magnesium (4.2, 21.8 gr and 10.4 ppm) were more consumed and zinc, cooper and iron (34.1, 1.03and 218 ppm) were more consumed for Afshari and Ghezel ram lambs respectively (Table 4).

Table 4- Average consumption of some macro and micro elements on Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SEM
No	5	5	-
(P) $_{gr}$	4.2	4.1	0.06
(Ca) $_{gr}$	21.8	21.6	0.33
(Mg) $_{gr}$	10.4	10.3	0.15
(Zn) $_{ppm}$	34.1	34.5	0.52
(Cu) $_{ppm}$	1.03	1.04	0.01
(Fe) $_{ppm}$	218	215	30.3

*ab: Means within columns with differing letters differ (P≤ 0.05).

Data from this table showed that among fecal nutrient elements, fecal dry matter, protein, ethyl extract, neutral detergent fiber and acid detergent fiber were higher for AF ram lambs. These data showed that digestibility of these nutrient elements were lower on AF ram lambs (Table 5).

Table 5. The amount of nutrient excreted in feces on Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SEM
No	5	5	-
Fecal dry matter $_{(gr)}$	594	533	34.7
Fecal Protein $_{(gr)}$	53.8	46.9	3.7
Fecal ether extract $_{(gr)}$	5.5	4.7	0.33
Fecal neutral detergent fiber $_{(gr)}$	152.3	143.5	11.8
Fecal acid detergent fiber $_{(gr)}$	336.6	279	21.5

*ab: Means within columns with differing letters differ (P≤ 0.05).

Fecal phosphorus, calcium, magnesium, zinc, cooper and iron (1.9 gr, 10.6 gr and 4.9 ppm, 28.7ppm, 14.7ppm,124.5ppm) were higher in LB compared to R ×LB lambs (1.7 gr, 9.7 gr and 4.3 ppm, 24.9ppm, 11.9ppm,109.1ppm) respectively (Table 6).

Table 6. The least square means and standard errors of the mean of some mineral excreted in feces on Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SEM
No	5	5	-
(P) $_{gr}$	1.9	1.7	0.10
(Ca) $_{gr}$	10.6	9.7	0.60
(Mg) $_{gr}$	4.9	4.3	0.29
(Zn) $_{ppm}$	28.7	24.9	1.70
(Cu) $_{ppm}$	14.7	11.9	1.40
(Fe) $_{ppm}$	124.5	109.1	7.90

*ab: Means within columns with differing letters differ (P≤ 0.05).

The means of *in vivo* digestibility coefficients of nutrients on AF and GH ram lambs are shown in Table 7. Although there were no significant differences about nutrients digestibility between breeds but also nutrients digestibility were higher on GH lambs. These data showed that acid detergent fiber digestibility with *in vivo* method was higher for AF groups.

Table 7. The least square means and standard errors of the nutrients digestibility with (*in vivo*) on Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SE
No	3	3	-
Dry matter $_{(gr)}$	45.8	50.8	34.7
Protein $_{(gr)}$	77.8	80.4	3.70
Ether extract $_{(gr)}$	88.3	89.8	0.33
NDF $_{(gr)}$	64.1	65.8	11.8
ADF $_{(gr)}$	76.8	74.2	21.5

*ab: Means within columns with differing letters differ (P≤ 0.05).

As result relevant by Table 8, the means of *in vivo* digestibility coefficients of minerals was affected none significantly by animal breeds. Data showed that digestibility of phosphorus, calcium, magnesium, zinc, cooper and iron were more on R× LB ram lamb.

Table 8. The least square means and standard errors for minerals digestibility with (*in vivo*) in Afshari and Ghezel ram lambs

Traits	Afshari	Ghezel	SE
No	3	3	-
Phosphorus (P) $_{gr}$	54.7	58.5	0.10
Calcium (Ca) $_{gr}$	51.4	55.1	0.60
Magnesium (Mg) $_{gr}$	52	58.2	0.29
Zinc (Zn) $_{ppm}$	15.8	27.8	1.70
Cooper (Cu) $_{ppm}$	30.1	43.4	1.40
Iron (Fe) $_{ppm}$	42.8	49.3	7.90

*ab: Means within columns with differing letters differ (P≤ 0.05).

Discussion

Contrary to our finding, (el fadili et al., 2001) found a significant difference for fattening average daily gain between pure bred and cross bred lambs, in favor of cross breeds. Khaldari et al (2007) reported that there was no significant difference between final and slaughter weight of pure bred and crossbred lambs.Although overweight LB lambs according to their high feed intake, but no increase in feed efficiency lead to increasing the production costs, hence changes in the efficiency of feed utilization in LB lambs cross breeding program is highly regarded (KAZEMI BONCHENARI et al., 2014). Abdullah et al (2010) indicate that crossbreeding Awassi with exotic breeds improves growth rate and meat production. In this study, there are no significantly differences about feed conversion ratio and feed efficiency between R ×LB cross breeds and Lori Bakhtiari pure breeds. Galivan (1996) showed that the average daily gains after weaning and during the finishing period and dry matter intake in breeding programs are important.

Talebi (2012) demonstrated that with increasing feed efficiency and increased daily weight gain of fattening lambs lead to reduce the fattening period and achieve the ideal faster weight. No significant difference in feed conversion between cross breeds and pure breeds was expressed earlier (GOKDAL et al., 2004). The result of this study are in agreement with (Sayili et al., 2009) demonstrated that lower weight at the start of the fattening period could improve feed efficiency in fattening ram lambs. In the present study there were no significant differences for mineral intake and uptake on AF and GH ram lambs and it was due the lack of significant differences in their feed intake.

Esmailizadeh et al (2010) showed that dry matter intake was significantly influenced by lamb's genotype at different recording periods, except at the fourth one, and total period of the experiment (P≤0.0 5).

Manafiazar et al, (2005) and (Kiyanzad et al., 2005) conducted a feedlot trial involving three Iranian local breeds of sheep (Chaal, Zandi and Zel) and reported that lamb's genotype had no significant effect on average daily gain during a 114-day feedlot period. Although our studies on feed digestibility showed that no significant differences for dry matter, protein, fat, fiber, macro and micro elements but also the better digestibility of attributes mentioned above had shown for R ×LB cross breeds ram lambs (Table 8). It seems that R ×LB cross breed lambs have better ability to adsorption nutrients from the same diet compared to LB pure breeds.

Result of this study in agreement with (Esmailizadeh et al, 2012) that showed there were no significant differences between pure lambs and cross breeds ones about the feed conversion rate. According to the limitation of feed and natural resources and for as much as production efficiency of meat animals can be defined as the return of salable product per unit of feed input, therefore, any reduction in feed cost would have a tremendous effect on production efficiency (Sidwell et al., 1964; Timon, 1986; Lewis et al., 2010), since the Romanov × Lori Bakhtiari ram lambs had lesser feed intake and better feed efficiency there are more advantageous for farmers.

The positive effects of cross breeding for lambs on better performance of lambs had demonstrated formerly by (Donald et al., 1963).Although (Singh et al., 1967) showed that in some cases cross breeding may decrease the performance of the lambs such as the birth or weaning weight, but the better daily growth rate, better feed efficiency and lesser mortality would be desirable.

Conclusion

We may mentioned that the the existence of breed’s differences for daily dry matter intake and digestibility of dry nutrients. We could be explained some benefit acts by using Afshari breed ram lambs on performance and digestibility of nutrients and minerals. Also Further tests are needed to explore and more detail explanation.

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