

Effects of Different Levels of Feeding of Pistachio Epicarp Silage on Wool Characteristics of Growing Afshari Lambs

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Abstract. Sixteen male lamb Afshari sheep (mean live weight 35 ± 1.21 kg, 10 month of age) were used to study the effect of different levels of silage pistachio epicarp (0, 8, 17 and 25 %) on wool characteristics. The fleece weight (FW), staple length on shoulder (STS), flank (STF), back (STB) and rump (STR), true wool fiber (TW), medullated fiber (MF), kemp fiber (KF) percentage, mean wool fiber diameter (MD) and its coefficient variation (CVMD), breaking load (BL), wool tenacity (WT) and extension (E) were measured. These data were analyzed by one-way ANOVA using SAS software package. The total mean of FW; STS, STB, STF STR; TW, MF, KF; MD, CVMD, BL, T and E of wool were 1622.2 ± 0.2 gr, 6.20 ± 0.26 , 6.80 ± 0.20 , 6.50 ± 0.20 and 6.90 ± 0.20 cm, 63.30 ± 1.6 , 8.30 ± 1.6 and 28.40 ± 2.5 percentage, 37.0 ± 0.9 mu, 47.02 ± 2.99 percentage, 7.60 ± 0.3 kgf, 3.40 ± 0.2 gf/tex and 31.1 ± 1.7 percentage respectively. Although there were significant differences among treatments about FW, MF, KF, MD, BL and T. The results showed that feeding lambs with pistachio epicarp silage 25 percentage of total dry matter intake affected wool characteristics and its effect was similar the control group.

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1. Introduction

Pistachio by-product has potentially high nutritive value but its biological effects in ruminants have not been studied extensively. Iran is one of the main pistachio producers in the world. There is about 298939 hectares of pistachio garden in Iran and annual dry pistachio production is 307036 tones. Pistachio by products usually has some anti nutritional substances such as tannin, which have different effects on animal performance (Decandia, 2000). The total phenolic substance reported is 6.4 percent by Labavitch and et al, 1982. Tannins in feeds may have positive nutritional effects, but at high level, it may inhibit microbial activity of rumen and thereby, reduces the microbial production. High level of tannin in feed (50 – 100g/kg DM) reduce DM intake and digestibility of DM, thereby the result is reduction of daily gain and wool production, but at lower level (20 -40 g) has beneficial effects for animals (Brooker and et. al, 1995, Kumar and S. Vaithyanathan, 1990). The goal of this experiment was determination of effect of feeding different levels of pistachio epicarp silage, that containing high levels of tannins, on quality and quantity characteristics of Afshari lambs wool.

2. Material and Methods

Four groups of male lambs (age 10 months, initial live weight 35.9 ± 1.21 Kg), were fed for 90 days, iso-

caloric, iso-nitrogenous diets, containing either no added pistachio epicarp silage (control) and added levels 8, 17 and 25 percentage pistachio epicarp silage (based on dry matter) in rations. Dry matter (DM), crude protein (CP) and organic matter (OM), determined by AOAC (2000) methods. Van Soest and Robertson's method was used to analyze neutral detergent fiber (NDF). Total phenolic compounds (Julkunen, 1985), total tannins (Makkar-1992) were determined. Crude protein degradability by nylon bag method (Orskov, 1979) and in vitro gas production test for samples were determined (Menke, 1988). Tilley and Terry's methods (later modified by Marten and Barnes, 1980) were used to determine in vitro dry matter digestibility (IVDMD) of silage samples. In vitro dry matter digestibility and Gas production were used to estimation metabolism energy. The staple lengths of the shoulder, back, flank and rump were determined and greasy fleece weight measured at the end of experiment. Wool samples of about 20 grams were taken just before shearing from right mid-side fleeces of each ewe. Three or four locks were randomly chosen from area throughout each sample. Locks from each sample were individually washed with hot water (45°C) water and a non-ionic detergent, rinsed in hot water, and then dipped in a commercial solvent (dichloromethane alcohol) to remove any residual grease not removed in washing. Care was taken to avoid disturbing the staple formation of the fibres and to minimize the loss of shorter fibres in the samples.

Samples were then air-dried overnight. Small amounts of wool Samples were separated as sub samples for wool fineness analyses and other sub sample for measuring the tenacity and different fiber types in carpet wool. The first sub sample was prepared for measurement with the projection microscope technique in accordance with ASTM D2130-78 short – section procedure to determine fibre diameter. Each sample was compressed and fibres were cut at mid-staple with a heavy – duty cross-section device to provide snippets 200-300 μm in length. Over one hundred fibres from each sample were measured. Mean fibre diameter and standard deviation were obtained for each sample and the CV was calculated. Visual subjective test was used to separate the various fiber types, including true wool, medullated, kemp and colored fibers. Then the samples were subjected to the benzol test.

The sub sample was paralleled in fibro liner component of Almeter. However, after that a sufficient number of fibres so that, after combing, an aligned specimen of 15 to 25 mg is available for testing. The paralleled fibres were comb the protruding end with the coarse comb to remove loose fibres and foreign material and to secure partial parallelization of the fibres. Reverse the tuft and repeat the combing on the other end. The clamped tuft were placed in the grips of tensile testing machine (Instron) and used 1 N capacity load cell with the pulling clamps moved at 25 cm /mm. after recorded the breaking load , the broken fibres weighed to the nearest 0.0001 g and Breaking tenacity calculated using Eq1 (ASTM.D-1294 and ASTM D 123 – 82a).

(Eq1) Breaking tenacity, gf / Tex = (b / M) *2/54*10⁻⁵ where B = bundle breaking load in gf. IN ADDITION, M= bundle mass (g).

The following model was used for statistical analysis by one – way design and ANOVA using SAS software package (SAS / STAT User's Guide, 1987).

$$Y_{ik} = \mu + \alpha_i + \mathcal{E}_{jk}$$

Where Y_{ik} is individual records on every of traits, α_i is the effect of ith treatment and \mathcal{E}_{jkm} is the residual effects.

3. Result and discussion

Although there were high range of differences among treatments but the results showed significant differences among treatments on fleece weight, fiber diameter, medullated and kemp fibres percentage, breaking load and tenacity (table 1). Some important traits such breaking load and tenacity were improve from 6.9 kg and 3.1 gf/tex in first treatment (0 levels) to 8.5 kg and 3.7 gf/tex in high level (25 % pistachio epicarp silage level). There were not studies about effect of pistachio epicarp silage intake on fiber performances. The studied on pistachio epicarp intake has shown that, there were high range of without significant differences among treatments but fiber diameter and kemp fiber percentage were reduce in high level (32 % pistachio epicarp level) to control group (Salehi, *et al* 2009). Another research which feeding four different levels of pistachio epicarp (0, 12, 20 and 30 percent of dry matter) to goats, affected growth and cashmere production. The results showed that the highest mean fleece, finer cashmere and more strength were found for diet with 10 % of pistachio epicarp, but the lowest belong to control group. Total fleece weight at the end of experiment was similar (Seyed Momen, *et al* 2004). Effect of condensed tannins upon body weight, wool growth and rumen metabolism in sheep grazing Sulla contained 40 – 50 g condensed tannins (CT)/kg DM discussed by Terrill, et al (1992). They concluded that after chewing during eating, a lower proportion of total CT was readily extractable and greater proportions were protein – bound and fiber – bound, because the action of CT decreased rumen ammonia concentration and decreased molar proportion of bio – butyrate and iso and *n* – valerate. At highest growth of wool, CT increased wool growth rate such effect was not observed when wool growth was low. There are not any other projects about effects of feeding pistachio epicarp silage on wool characteristics, but the results of other projects showed that use of feeds containing high levels of tannins like pistachio epicarp result to low performance in fattening lambs feeding pistachio epicarp up to 30 percentage of total ration (Mahdavi. 2008), decreasing in CP degradation in rations (Fazaeli, 2007) and also feeding pistachio epicarp to dairy cattle up to 10 percentage result to decreasing in milk yield, lactose and protein (Memarizade, 2007).

Table 1. Effects of different levels of dried pistachio epicarp silage on wool characteristics of growing Afshari lambs

Traits	Treatment					SE	
	0	8	17	25			
Fleece Weight (g)	1658.3	1133.3	1116.7	1633.3	256.8	*	
Staple length (cm)	shoulder	5.90	6.36	6.20	6.80	0.5	NS
	Back	6.70	6.7	7.0	7.2	0.5	NS
	mid-side	6.5	6.7	6.2	6.8	0.6	NS
	Rump	5.8	6.0	5.7	5.8	0.4	NS
Fiber diameter (μ)	37.1	36.9	35.4	38.5	2.2	*	
CV of diameter (%)	46.7	45.5	44.6	50.6	5.2	NS	
True wool (%)	63.1	64.2	63.2	62.6	4.5	NS	
Medullated fiber (%)	8.2	4.8	15.3	5.1	3.2	*	
Kemp (%)	28.6	30.9	21.4	32.3	5.7	*	
Breaking load (kg)	6.9	7.3	7.9	8.5	0.5	*	
Tenacity (gf/tex)	3.1	3.4	3.5	3.7	0.4	*	
Extension (%)	31.6	32.1	31.5	28.7	4.4	NS	

Table 2. The average total for wool performances of Afshari lamb

Traits	Mean \pm SE	CV	Min	Max	
Fleece Weight (g)	1622.2 \pm 0.2	33.0	600	2550	
Staple Lengths (cm)	Shoulder	6.20 \pm 0.26	12.8	5	8
	Back	6.80 \pm 0.20	12.4	5.5	9
	Flank	6.50 \pm 0.20	13.7	5.0	8.5
	Rump	6.90 \pm 0.20	12.0	5.0	7.5
	Mean	6.60 \pm 0.18	13.5	5.0	9.0
Fleece Fiber Contents (%)	True wool	63.30 \pm 1.6	11.0	43.21	82.2
	Medullated	8.30 \pm 1.6	75.8	1.58	19.8
	Kemp	28.40 \pm 2.5	34.1	10.0	43.05
Mean Fiber Diameter (μ)	37.0 \pm 0.9	9.60	30.8	42.7	
CV of Fibre Diameter (%)	47.02 \pm 2.99	17.8	31.34	61.6	
Breaking load (kg)	7.60 \pm 0.3	13.7	5.9	10.0	
Tenacity (gf/tex)	3.40 \pm 0.2	20.2	2.1	4.8	
Extension (%)	31.1 \pm 1.7	21.9	15.8	41.3	

4. CONCLUSION

It was concluded that nutritional effect due to tannin need to be established using plants containing intermediate tannin concentration (10 – 20 g/kg DM). Due to high variation were observed in quality and quantity characteristic of wool (table 2), it is necessary that feeding experiments such this one do in a long term period because the effects of feeding on wool are slow and time consuming.

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6. References

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