

## Effects of *Yucca schidigera* Extract (Dk 35 Powder) on Awassi Lambs Performance

Serafettin Kaya, Mahmut Keskin and Sabri Gül  
Department of Animal Science, Agriculture Faculty,  
Mustafa Kemal University, 31034 Antakya, Hatay, Turkey

**Abstract:** This study was carried out to determine the effects of diets containing 0, 75 and 150 ppm of *Yucca schidigera* extract (YSE) on fattening performance of Awassi lambs. Sixteen male Awassi lambs were allocated into three groups having similar live weight. The lambs in all groups were fed with a diet containing 134 g CP and 2756 kcal ME per kg dry matter during 63 days of fattening period. Results showed that supplementation of YSE in different dosage to the diet did not affect statistically live weight gain, feed intake and feed conversion ratio ( $p>0.05$ ). However, total live weight gained at end of the fattening period slightly increased by feeding 150 ppm YSE and feed conversion ratio was improved compared to control group.

**Key words:** Awassi lambs, performance, *yucca schidigera*

### INTRODUCTION

Consumers and health authorities, particularly in Europe, increasingly dictate that the use of chemical feed additives, including ionophores and antibiotics, should be phased out and, where possible, only natural products should be used in animal production<sup>[1]</sup>. Dietary supplements incorporating *Yucca* plants extracts have a long history of safe use as a food material for both humans and livestock. Extracts or preparations from *Yucca* plant are used in the feed industry to promote digestion and improve production performance<sup>[2]</sup>. Its active ingredients are, mainly, steroidal saponins and glycoconponents<sup>[3]</sup>.

The glycofraction that has ammonia binding capabilities and a saponin fraction that has antiprotozoal and antibacterial effects<sup>[4]</sup>. Thus, *Yucca* is currently used as dietary supplement for livestock and companion animals, primarily for ammonia and odour control, but also to improve performance<sup>[5]</sup>.

In animal feeding trials, there have been different observations concerning fermentation and productivity. It is well known that *Yucca* extract has got increasing effect *in vitro* and ruminal digestibility of starch<sup>[5-6]</sup>, but synthesis of microbial protein<sup>[6]</sup> and passage of microbial protein to the duodenum<sup>[5-7]</sup> were not increased. Other studies by different authors have also shown improvements in growth and feed efficiency when adding between 31 and 155 ppm extracts of *Yucca* to diets for broilers, turkeys, rabbits, lambs or cattle<sup>[8-9-10-11-12]</sup>.

Dietary *yucca* extract has stimulated growth of steers<sup>[13]</sup>. However, production of milk by dairy cows has not been increased<sup>[6]</sup>. According to Hale *et al.*<sup>[8]</sup>

growth rate and feed efficiency of lamb fed with diet containing *Yucca schidigera* extract (YSE) was improved. Average daily gain by finishing steers fed high-grain diets was improved when they were supplemented with *yucca* saponins<sup>[14-11]</sup>.

This study was carried out to determine the effects of diets containing 0 ppm, 75 ppm and 150 ppm of YSE on fattening performance of Awassi lambs.

### MATERIAL AND METHODS

As animal material of the experiment, sixteen male Awassi lambs were housed for this study in the Research and Training Farm of Mustafa Kemal University in Antakya province of Turkey. Antakya is located between 36° North latitude and 36° East longitude in the Eastern Mediterranean region. The lambs assigned into three groups having similar initial live weight. Three experimental groups were fed with same basal diet with different dosage (0, 75 and 150 ppm) of YSE (DK 35 Powder- Desert King Intl.), respectively.

Fattening period was 63 days. Each animal within each group was one replicate and kept at the individual wooden cage sized 100×120×120 cm indoor condition in a semi-open animal house. The experimental basal diet (concentrate feed) was prepared from wheat, barley, corn, wheat bran, cotton seed meal, limestone and vitamin and mineral mixture. Their inclusion and the chemical analysis of concentrate are given in Table 1.

Animals were fed ad-lib in all groups. Also, daily 300 g alfalfa hay (860 DM, 1.70 Mcal ME, 154 g CP and 218 g CF kg<sup>-1</sup>) per lambs was offered in addition to concentrate.

Table 1: Composition of concentrate given to the lambs

Ingredients	%
Wheat (890 DM, 2.90 Mcal ME, 125 g CP and 30 g CF kg <sup>-1</sup> )	25
Barley (890 DM, 2.85 Mcal ME, 115 g CP and 61 g CF kg <sup>-1</sup> )	25
Corn 870 DM, 2.96 Mcal ME, 83 g CP and 29 g CF kg <sup>-1</sup> )	18
Wheat bran (890 DM, 2.52 Mcal ME, 140 g CP and 111 g CF kg <sup>-1</sup> )	22
Cotton seed meal (890 DM, 2.27 Mcal ME, 320 g CP and 200 g CF kg <sup>-1</sup> )	8
Limestone	1
Vitamin and mineral mixture	1
Composition of concentrate feed, kg <sup>1</sup> ME (Mcal) (calculated)	2756
Dry Matter (DM), g	886
Crude Protein (CP), g	134
Crude Fiber (CF), g	70

Experimental data regarding feed intake, weight gain and feed conversion ratio were analysed by using One-way ANOVA procedure of SPSS<sup>[13]</sup>

Animals were allowed to drink water freely. To determine the daily gain lambs were weighed on the same hour (08<sup>00</sup>) of the same day every week. Moreover, feed consumption was recorded at every day (07<sup>30</sup>) by 10 g sensitive balance.

## RESULTS AND DISCUSSION

Addition of different YSE dosages into the diet did not have significant ( $p>0.05$ ) effects on final live weight, total live weights gain, feed intake and feed efficiency ratio (Table 2). Initial live weight and final live weight for Awassi lambs fed with 0, 75 and 150 ppm YSE were found as 31.76 vs 45.11, 31.12 vs 44.98 and 30.52 vs 45.25 kg ( $p>0.05$ ), respectively. Although total live weights gain

during the fattening period were not statistically significant (13.34, 13.86 and 14.73 kg, respectively), total live weight gained at end of the fattening period slightly increased by feeding 150 ppm YSE. This finding is in line with the reports of Hale *et al.*<sup>[8]</sup>, Goodall and Matsushima<sup>[13]</sup> and Goodall *et al.*<sup>[14-15]</sup>. According to their results, supplementation of YSE to the diet without anabolic steroids or any other feed additives improved the growth rate of fattening animals.

Feed conversion ratio (FCR) in 0 ppm, 75 ppm and 150 ppm groups was detected as 7.72±0.69, 7.27±0.24 and 6.07±0.62, respectively. The difference between groups based on this ratio (on feed basis) was not statistically significant ( $p>0.05$ ). Johnston *et al.*<sup>[10]</sup> and Oleszek *et al.*<sup>[16]</sup> reported that yucca saponins play an important role in animal nutrition, because of their chemical structure. Due to their strong surfactant power, nutrient absorption would be better from the cell membranes of the intestinal wall as well as the increasing effect of saponins to the intestinal flora activity. As a result of these, the FCR was improved. Thus, daily concentrate intake in groups were found as 1.55±0.05, 1.59±0.04 and 1.41±0.15 kg day<sup>-1</sup>, respectively ( $p>0.05$ ).

Our findings are also supported by Görgülü *et al.*<sup>[17]</sup>. According to their study in similar region, 150 ppm of YS powder in diet had no significant effect on fattening performance of Assaf and Ille de France×Awassi crossbred lambs.

Table 2: Comparison of Awassi Lamb fattening performance with respect to *Yucca schidigera* extract (YSE) supplement

Parameters/YSE level	0 ppm		75 ppm		150 ppm		Significance
	Mean	SE	Mean	SE	Mean	SE	
Live weights, kg/lambs							
Initial	31.76	1.65	31.12	0.84	30.52	1.39	NS
1 <sup>th</sup> week	32.01	1.79	33.50	0.88	31.35	1.09	NS
2 <sup>nd</sup> week	33.95	1.65	35.01	0.54	33.64	1.18	NS
3 <sup>th</sup> week	35.61	1.89	36.45	0.74	34.44	1.17	NS
4 <sup>th</sup> week	36.98	2.23	37.65	0.55	36.19	1.12	NS
5 <sup>th</sup> week	38.02	2.06	39.36	0.59	37.62	1.36	NS
6 <sup>th</sup> week	39.45	2.35	39.96	0.87	39.33	1.41	NS
7 <sup>th</sup> week	41.60	2.58	41.76	0.83	41.79	1.53	NS
8 <sup>th</sup> week	43.56	3.11	43.28	0.95	43.31	1.67	NS
9 <sup>th</sup> week	45.11	2.87	44.98	0.76	45.25	1.53	NS
0-9 <sup>th</sup> week total live weight gain	13.34	1.92	13.86	0.41	14.73	0.89	NS
Daily live weight gains, g/lambs							
1 <sup>th</sup> week	225.20	58.75	238.20	59.60	232.00	40.29	NS
2 <sup>nd</sup> week	242.25	72.53	189.25	71.58	286.87	61.91	NS
3 <sup>th</sup> week	276.33	96.80	240.00	78.99	132.78	88.93	NS
4 <sup>th</sup> week	170.75	66.14	149.75	47.13	219.79	50.17	NS
5 <sup>th</sup> week	148.00	50.74	244.28	13.09	204.28	49.27	NS
6 <sup>th</sup> week	205.14	72.97	85.14	57.01	243.28	17.07	NS
7 <sup>th</sup> week	306.85	78.89	258.28	60.10	352.42	46.82	NS
8 <sup>th</sup> week	280.57	102.45	216.00	29.65	216.43	31.68	NS
9 <sup>th</sup> week	220.57	51.43	243.43	40.76	277.38	20.08	NS
Daily intakes and feed conversion ratio							
Concentrate intake, kg/day	1.55	0.05	1.59	0.04	1.41	0.15	NS
0-9 week total feed intake, kg	97.80	3.65	100.66	2.68	88.94	9.65	NS
FCR (feed basis)	7.72	0.69	7.28	0.24	6.07	0.62	NS

## CONCLUSION

Although YSE does not possess significant effect on fattening performance, total live weight gained at end of the fattening period could be increased by feeding 150 ppm YSE.

## ACKNOWLEDGEMENTS

The authors are grateful to the Research Fund of Mustafa Kemal University for their financial support.

## REFERENCES

- Wallace, J.R., N.R. McEwan, F.M. McIntosh, B. Teferedegne and C.J. Newbold, 2005. Natural products as manipulators of rumen fermentation. [http://rumen.snu.ac.kr/symposium/Lecturers/Wallace\\_RJ.pdf](http://rumen.snu.ac.kr/symposium/Lecturers/Wallace_RJ.pdf), Communications.
- Ryan, P. and T. Quinn, 1999. Some beneficial effects of yucca plant extracts in sheep and other domestic animals. The Irish Scientist yearbook. University College, Dublin. <http://www.irishscientist.ie/P175.htm>, Communications.
- Peris, S. and F. Calafat, 2005. Acidification and other physiological additives. Industria Tecnica Pecuaria (ITPSA). Avda. Roma, 157, 7d, 08011 Barcelona, Spain. <http://ressources.chieam.org/om/pdf/c54/01600012.pdf>, Communications.
- Wallace, R.J., L. Arthaud and C.J. Newbold, 1994. Influence of *Yucca schidigera* extract on ruminal ammonia concentrations and ruminal microorganisms. Appl. Environ. Microbiol., 60: 1762-1767.
- Goetsch, A.L. and F.N. Owens, 1985. Effects of sarsaponin on digestion and passage rates in cattle fed medium to low concentrate., J. Dairy Sci., 68: 2377-2384.
- Valdez, F.R., L.J. Bush, A.L. Goetsch and F.N. Owens, 1986. Effect of steroidal saponin on ruminal fermentation and on production of lactating dairy cows. J. Dairy Sci., 69: 1568-1575.
- Wu, Z., M. Sadik, F.T. Sleiman, J.M. Simas, M. Pessarakli and J.T. Huber, 1994. Influence of *Yucca* extract on ruminal metabolism in cows. J. Anim. Sci., 72: 1038-1042.
- Hale, W.H., W.C. Sherman, W.M. Reynolds and H.G. Luther, 1961. The value of certain steroidal saponin in rations of fattening lambs and cattle. Proc. Soc. Exp. Biol. Med., 106: 486-489.
- Dziuk, H.E., G.E. Duke, R.J. Buck and K.A. Janni, 1985. Digestive parameters in young turkeys fed yucca saponin. Poult. Sci., 64: 1143-1147.
- Johnston, N.L., C.L. Xuarles, J. Fagerberg and D.D. Caveny, 1981. Evaluation of yucca saponin on broiler performance and ammonia suppression. Poult. Sci., 61: 1052-1054.
- Goodall, S.R., P. Braddy, D. Horton and B. Beckner, 1982. Steam flaked vs. high moisture content rations with and without sarsaponin for finishing steers. Proc. Ann. Meet. Amer. Soc. Anim. Sci. West. Sect., 33: 45-46.
- Al-Bar, A., A. Ismail, P.R. Cheeke and H.S. Nakae, 1993. Effect of dietary *Yucca schidigera* extract (Deodorase) on environmental ammonia and growth performance of chickens and rabbits. Proc. West. Sec. Amer. Soc. Anim. Sci., 44: 106-108.
- Goodall, S.R. and J.K. Matsushima, 1979. Sarsaponin effects upon ruminal VFA concentrations and weight gains of feedlot cattle. J. Anim. Sci., 49 (Suppl. 1) :371.
- Goodall, S.R., D. Horton and B. Beckner 1981. Steam flaked versus dry rolled corn rations with and without sarsaponin for finishing steers. Abstr. 73rd annu. Meet., ASAS, North Carolina state Univ., Raleigh, pp: 401.
- SPSS, 2001. SPSS for Windows. Release 11 Version. SPSS Inc.
- Oleszek, W., J. Nowacka, J.M. Gee, G.M. Wortley and I.T. Johnson 1994. Effects of some purified alfalfa (*Medicago sativa*) saponins on transmural potential difference in mammalian small intestine. J. Sci. Food Agric., 65: 35.
- Görgülü, M., S.Ü. Yurtseven and H.R. Kutlu, 2004. Effect of dietary supplemental *Yucca schidigera* powder on fattening performance of male lambs. J. Appl. Anim. Res., 25: 33-36.