Growth performance and carcass traits of growing Chios and Farafra lambs fed diets containing different hay levels

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Abstract

Thirty lambs aged 3 months with average body weight 18.93 kg were randomly assigned to three groups of Chios and Farafra lambs fed 0%, 6% and 15% hay for 105 days. Farafra final body weight was significantly higher 41.76 than Chios lambs 36.57kg. Total daily gain was 218 g/day for Farafra and 168 g/day for Chios lambs. Lambs fed 15% hay, had the highest body weight, total gain and daily gain. The highest Feed conversion efficiency value was of 15% hay fed group (5.88 DM). Feed cost per kg gain when using diets containing hay was reduced by about 15.5 and 20.2% for 6% hay and 15% hay, respectively. Farafra lambs had higher slaughter weight (43.11 kg) than Chios (37.44 kg). Dressing percentage was significantly (P< 0.05) better in Farafra lambs than in Chios (50.11 *vs*. 47.89%). Eye muscle area was significantly (P< 0.01) higher in Farafra than Chios lambs (11.91 *vs*. 11.42 cm^2). Protein was higher (73.77%) in Farafra meat than Chios (71.86%) on dry basis. Statistical analysis–GLM-LSMEANS procedure using SAS package. In conclusion, using concentrates with alfalfa hay for early lambs fattening improved growth performance.

Key words: *Chios, Farafra, growing lambs, growth, Carcass traits.*

Introduction

In Egypt, fattening process depends on supplementary feeding rather than grazing. This is due to that production of either grazing or cultivated areas, permissible to animals, is not enough to cover even the maintenance requirements of livestock population which renders possibility to increase livestock population to a rather unfeasible process. Towards better utilization of concentrates in feeding sheep and economic optimization of production per animal unit (Shehata, 1997). Furthermore, lambs were also fed grain supplements with feeding of hay, in order to reduce the risk of acidosis (Ponnampalam et al., 2004)

Material and methods

The present study was carried out at Mallawi Animal Production Research Station. Thirty growing Chios and Farafra ram lambs, with 3 months of age, and divided into three equal groups. Average initial body weight was 18.93 kg. All animals were vaccinated using Covaxin® 8 and Ivomec® before the start of fattening experiment. The rations were offered ad lib. Feed intakes and refusals were recorded weekly.

Table (1): Formulation of the experimental rations

Ingredients	Experimental rations		
	Ration 1	Ration 2	Ration 3
Barley grain	83	77	68
Soybean meal	15	15	15
Berseem hay	0.0	6	15
Sodium chloride	0.5	0.5	0.5
Limestone (CaCo3)	1.4	1.4	1.4
Preimex*	0.1	0.1	0.1

*Preimex consists per 3 kg consists of: Vit. A. 12000 000 IU, Vit. D_3 2200 000 IU, Vit. E 10 gm., Vit. k_3 29 gm., Copper, 10 gm., Zinc, 50 gm., Manganese, 55 gm., Iodine, 1 gm., Selenium, 0.1 gm., Carrier (Ca Co_3) 3000 gm.

At the end of the experimental period 105 days, 6 animals from each groups (3 Farafra and 3 Chios) were slaughtered after fasting for 12 hours, to study carcass yield and traits. The 9, 10 and 11th ribs cut of right side was separated and chilled for 24 hours at 5ºC, then physically dissected to their components. Eye muscle area (*longissimus dorsi*) was measured in squared centimeters using planimeter Model LI–3000, LI COR, U.S.A., and analyzed according to AOAC (1995). Data were analysis statistically using GLM procedure, LSM Method, (SAS, 1995).

Results and discussion

1. Fattening performance: Genotype differences were significant effect (P< 0.05) at final weight. So, daily gain values and total daily gain of Farafra lambs were higher than Chios lambs at all periods. Moreover, average total daily gain was 218 g/day for Farafra lambs and 168 g/day for Chios lambs.

2. Feeding system: The third group which received the 15% hay containing diet, had the highest body weight, total gain, and average daily gain. than the second and first group.

3. Feed intake and feed efficiency: Lambs received 6 or 15% hay rations consumed less feed DM by 5.8 and 6.9%, respectively. Feed conversion ratio was enhanced gradually with increasing hay percentage in the ration. Feed cost per kg gain of diets containing hay was reduced by about 5.5 and 20.2% for groups 6 and 15% hay, respectively, compared with the control. Such results may indicate that using higher hay percent than that applied here would be used, accordingly more profitability could be obtained.

4. Carcass traits

Breed effect: Farafra lambs recorded the highest significantly (P< 0.05) slaughter weight (43.11 kg), compared to Chios lambs (37.44 kg). Also, empty body weights were 39.17 and 32.33 kg, and hot carcass weights were 21.61 and 17.97 kg for Farafra and Chios lambs, respectively. The dressing percentage, relative to slaughter weight was better in Farafra lambs than in Chios lambs (50.11 *vs*. 47.89%), (Tables,2). Farafra lambs had higher carcass cuts weights than Chios lambs. Farafra lambs had the highest weight of liver, kidneys, testes, heart, lungs & trachea, internal fat, kidneys fat, fat and total offals. While, gut contents were heavier in Chios than in Farafra lambs (5.118 *vs*. 3.945 kg) and the differences were significant (P< 0.05). So, the dressing percentage, as estimated relative to empty body weight, was higher in Chios lambs (55.44%) than in Farafra lambs (55.11%).

Feeding system: Slaughter weights, empty body weights and hot carcass weights increased as the level of hay in the ration increased, (Table,1). Hay levels of 0, 6 and 15% in the ration were associated with slaughter weights of 38.33, 40.00 and 42.50 kg, as well as, empty body weights of 34.36, 35.64 and 37.24 kg, with hot carcass weights 19.10, 19.60 and 20.68 kg, respectively. The dressing percentage, as estimated relative to slaughter weight was better in

full concentrate ration without hay than in concentrate rations with different hay levels (6 and 15% hay), but the differences due to hay level were non significant. The dressing percentage, as estimated relative to empty body weight was higher in concentrate ration with 15% hay than in full concentrate ration (55.67 *vs*. 55.33%). These results may be attributed to the differences in hay levels were probably not sufficient for changes in carcass composition to occur. Table (2) show that shoulder, leg, loin, rack and neck weights were increased as the level of hay in the ration increased. The prime cuts percentages were similarly in lambs fed full concentrate without hay and lambs fed concentrate with 15% hay (78.00%), but they were lower (76.50%) in lambs fed concentrate with 6% hay. The high level of hay ration (15%) recorded higher offal weights than the low level of hay ration (6%) or full concentrate without hay. Level of hay in the rations did not affect significantly (P>0.05) on full, empty GIT weights and gastro intestinal content. However, full GIT weight and gastro intestinal content tended to increase with the level of hay in the ration. The difference between the three hay levels were not significant in the full, empty GIT weight and gastro intestinal content. But, heavier full GIT weight of lambs fed ration containing hay could be attributed to the higher fiber content which has a greater capacity to retain water (Fimbres et al., 2002).

5. Physical and chemical composition of 9, 10 and 11th ribs cut

Breed effect: Data in Tables (3) show results of physical evaluation of 9, 10 and 11th ribs cut. Weight of 9, 10 and 11th ribs cut of the Farafra lambs were higher by 25.3% compared to Chios lambs, Also, the same trend was observed for samples of meat and fat weights, samples of meat and fat percentages, boneless meat percentage, meat : bone ratio, coefficient of meat, eye muscle area, meat in carcass. The mean Eye muscle area (*longissimus dorsi*) of the Farafra was 4.11% larger (P< 0.01) than that of Chios lambs. This result is consistent with assumption of the Farafra being an earlier maturing type. Farafra had higher protein percentage (73.77%) and ash percentage (3.10%) than Chios (71.86% and 2.99%), respectively.

Feeding system: Weight of 9, 10 and 11th rib cut of the group 15% hay carcasses was higher by 7.73 and 8.66% compared to those of group 6% hay or group 0% hay, respectively. Protein and moisture percentage increased as the level of hay in the ration increased. However, ether extract was decreased as hay level increased.

Conclusion

Concerning early fattening performance, Farafra ram lambs exhibited better performance than Chios ram lambs. The use of concentrate with alfalfa hay level for early fattening improved growth performance, increased feed conversion efficiency and reduced feed cost per kilograms by about 20.2%.

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Table (2): Carcass traits of the slaughtered lambs.

Items	Breed		Treatment			Overall mean
	Farafra	Chios	I	II	III	
No. of lambs	9	9	6	6	6	18
Slaughter weight, kg	43.11±2.01	37.44 ±2.01	38.33±2.47	40.00±2.47	42.50±2.47	40.28±6.04
Empty body weight, kg	39.17±1.79[a]	32.33±1.79[b]	34.36±2.19	35.64±2.19	37.24±2.19	35.75±5.37
Hot carcass weight, kg	21.61±1.08[a]	17.97±1.08[b]	19.10±1.32	19.60±1.32	20.68±1.32	19.80±3.24
Dressing A%	50.11±0.68[a]	47.89±0.68[b]	49.50±0.78	48.83±0.78	48.67±0.78	49.00±2.05
Dressing B%	55.11±0.77	55.44±0.77	55.33±0.88	54.83±0.88	55.67±0.88	55.28±2.32
			Carcass cuts weight, kg			
Shoulder (SH)	3.91±0.20	3.44±0.20	3.66±0.25	3.53±0.25	3.83±0.25	3.68±0.60
Leg (LE)	6.68±0.31	5.89±0.31	6.23±0.38	6.08±0.38	6.55±0.38	6.29±0.93
Loin (LO)	1.35±0.08	1.17±0.08	1.12±0.10	1.28±0.10	1.39±0.10	1.26±0.25
Rack (RA)	4.44±0.26	3.71±0.26	3.84±0.32	4.05±0.32	4.33±0.32	4.08±0.79
Neck (NE)	1.34±0.12	1.28±0.12	1.28±0.14	1.28±0.14	1.36±0.14	1.31±0.35
Brisket (BR)	0.89±0.04[a]	0.70±0.04[b]	0.82±0.05	0.82±0.05	0.74±0.05	0.79±0.13
Flank (FL)	1.30±0.09	1.07±0.09	1.01±0.11	1.30±0.11	1.25±0.11	1.19±0.26
Tail (TA)	1.70±0.17[a]	0.71±0.17[b]	1.15±0.21	1.26±0.21	1.22±0.21	1.21±0.50
			Carcass cuts as percentage*			
Shoulder (SH)	18.10±0.28[b]	19.22±0.28[a]	19.29±0.35[a]	18.13±0.35[b]	18.56±0.35[ab]	18.66±0.85
Leg (LE)	31.00±0.41[b]	32.86±0.41[a]	32.75±0.51	31.27±0.51	31.79±0.51	31.94±1.26
Loin (LO)	6.27±0.21	6.47±0.21	5.87±0.25[b]	6.51±0.25[ab]	6.74±0.25[a]	6.37±0.63
Rack (RA)	20.54±0.46	20.48±0.46	20.10±0.56	20.58±0.56	20.85±0.56	20.51±1.39
Neck (NE)	6.24±0.33	7.01±0.33	6.66±0.40	6.64±0.40	6.57±0.40	6.63±0.99
Brisket (BR)	4.12±0.20	3.97±0.20	4.26±0.25	4.27±0.25	3.59±0.25	4.04±0.62
Flank (FL)	6.03±0.27	5.93±0.27	5.31±0.33[b]	6.61±0.33[a]	6.01±0.33[ab]	5.98±0.81
Tail (TA)	7.71±0.71[a]	4.05±0.71[b]	5.76±0.85	5.97±0.85	5.89±0.85	5.88±2.14
Prime cuts**	75.89±0.57[b]	79.11±0.57[a]	78.00±0.70	76.50±0.70	78.00±0.70	77.50±1.72

a , b: means of the same row having different superscript different significantly ($p<0.05$) - * Relative to hot carcass weight.
**Prime cuts = [SH + LE + LO + RA, kg / carcass weight, kg] × 100

Table (3): LSM ±SE of physical and chemical composition of 9,10 and11th ribs cut of the slaughtered lambs.

Item	Breed		Treatment			Overall mean
	Farafra	Chios	I	II	III	
No. of lambs	9	9	6	6	6	18
Weight of 9,10 and11th ribs cut, g	530±0.04	423±0.04	462±0.05	466±0.05	502±0.05	476±0.11
Meat, g	287±0.02	217±0.02	247±0.02	242±0.02	267±0.02	252±0.05
Fat, g	152±0.02	113±0.02	122±0.02	133±0.02	142±0.02	133±0.06
Bone, g	91±0.01	94±0.01	93±0.01	91±0.01	93±0.01	92±0.02
Meat %	54.55±1.85	52.46±1.85	53.27±2.27	53.03±2.27	54.22±2.27	53.50±5.56
Fat %	28.33±2.41	24.75±2.41	26.01±2.95	26.97±2.95	26.65±2.95	26.54±7.24
Bone %	17.12±0.94[b]	22.79±0.94[a]	20.72±1.16	20.01±1.16	19.13±1.16	19.95±2.83
Boneless meat %(1)	82.88±0.94[a]	77.21±0.94[b]	79.28±1.16	79.99±1.16	80.87±1.16	80.05±2.83
Meat : fat ratio	2.02±0.35	2.43±0.35	2.16±0.42	2.21±0.42	2.32±0.42	2.23±1.04
Meat : bone ratio	3.21±0.11[a]	2.33±0.11[b]	2.66±0.13	2.69±0.13	2.97±0.13	2.77±0.33
Coefficient of meat(2)	4.90±0.22[a]	3.47±0.22[b]	3.98±0.27	4.09±0.27	4.49±0.27	4.18±0.67
Eye muscle area cm^2	11.91±0.11[a]	11.42±0.11[b]	11.75±0.13	11.58±0.13	11.67±0.13	11.67±0.33
Carcass meat, kg	11.73±0.46[a]	9.30±0.46[b]	10.16±0.56	10.23±0.56	11.16±0.56	10.52±1.37
Carcass fat, kg	6.18±0.67	4.66±0.67	5.07±0.82	5.53±0.82	5.65±0.82	5.42±2.01
Carcass bone, kg	3.70±0.18	4.02±0.18	3.87±0.22	3.84±0.22	3.87±0.22	3.86±0.54
Chemical analysis						
Moisture %	72.75±0.64	71.37±0.64	71.20±0.78	72.38±0.78	72.58±0.78	72.06±1.93
On dry matter basis						
Protein %	73.77±0.71	71.86±0.86	72.53±0.86	72.45±0.86	73.47±0.86	72.82±2.13
Ether extract %	23.05±0.74	25.15±0.74	24.24±0.91	24.69±0.91	23.37±0.91	24.10±2.23
Ash %	3.10±0.11	2.99±0.11	3.14±0.13	2.83±0.13	3.17±0.13	3.05±0.33

(1): [(Meat weight + fat weight)/ sample weight] x100

(2): [(Meat weight + fat weight)/ bone weight