Comparatıve Evaluatıon of Technıcal and Economıcal Performances in Lamb and Beef Fattenıng in Syria*

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Abstract

This study was conducted in Syria with the aims of comparing lamb and beef production in terms of technical and economical aspects and assessing effect of improved feeding practices on lamb and beef performances. A total of 120 male Awassi lambs and 12 male Friesian calves of the local available breed (mixture of Frisian and local breeds) were assigned. Each flock (lambs and calves) was subdivided into two groups randomly to apply improved feeding and management practices to one half of the animals while the other half was fed according to the farmer's traditional practices. The feeding technical and economic performance of lambs was significantly developed with the improved diet as compared with the traditional diet. Fattening performance of male calves did not show significant differences ($P > 0.05$) with the improved feeding program. Net profits of 1 kg live weight were 85 SL and 74 SL ($P < 0.05$) in lamb and beef fattening, respectively.

Key Words: Awassi, Frisian, Traditional, Improved, Feeding, Performance, Syria

Suriye'de Sığır ve Kuzu Besiciliğinde Teknik ve Ekonomik Performansın Karşılaştırılmalı Değerlendirilmesi

Özet

Bu çalışma Suriye'de geleneksel ve iyileştirilmiş besleme uygulamalarının kuzu ve sığır kuzu ve sığır performansları üzerine teknik ve ekonomik olarak etkisini değerlendirmek amacı ile yürütülmüştür. Bu amaçla, 120 erkek İvesi ve yerel ırk Frizyen melezi 12 erkek buzağı denem gruplarına ayrılmıştır. Her deneme yapılan çiftlikte iyileştirilmiş metot ile geleneksel uygulama grupları takip edilmiştir. Kuzuların besleme teknik ve ekonomik performans analiz geleneksel sistem ile iyileştirilmiş sistemin teknik ve ekonomik değerlendirmesi yapılmıştır. İyileştirilmiş beslenme programı ile geleneksel sistem arasında besi performansı, bakımından anlamlı farklılıklar ($P> 0.05$) tespit edilmemiştir. 1 kg canlı ağırlığın net kar kuzu ve sığır besi için sırasıyla 85 SL ve 74 SL ($p <0.05$) olarak belirlenmiştir.

Anahtar Kelimeler: İvesi, Frizyen, Geleneksel, Entansif, Yemleme, Performans, Suriye

Introduction

The meat of Awassi lambs in Syria has favorable taste not only in Syria but also in Gulf countries. Therefore, live sheep exports are a major contributor to export returns opening up a significant source of income for farmers. Thus, the high demand for meat is fundamental for enhancing opportunities for resource-poor farmers aiming at increasing individual and the national incomes (Hartwell et al., 2010b). The demand for beef meat has grown significantly influenced by increased human populations as well as growing economies and individual incomes (ICARDA, 2003). Cattle farmers wean male calves in order to fatten them for meat production, or they sell them after weaning to beef producers who try to improve growth rate by using the feedlot system. Besides several institutional constraints, the other major constraint of fattening industry is fluctuation of animal prices during the year which is an important factor affecting profitability. Moreover, animal health together with seasonal diseases, veterinary costs, and appropriate drugs are important constraints to be considered. Overcrowding and bad ventilation are also

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significant difficulties facing the sector (Hartwell et al., 2008a and Hartwell et al., 2010a). The main objectives of this study are to compare lamb and beef production in terms of economical aspects and assess in effect of improved feeding practices on lamb and beef fattening performances.

Material and Methods

The study was conducted in Barrie Sharki village which is located to the east of Salamieh City (Central Syria) covering an area of 3312 ha. Livestock production in this village more generally, is characterized by a constant feed deficit and fluctuating numbers of livestock holding in drought years, due to culling and mass sale. 23 sheep and 4 cow farmers were selected from different villages. A total of 120 male Awassi and 12 male Holstein Friesian male calves of the local available breed (mixture of Frisian and local breeds) were assigned. The selection of the feeder animals was based on the factors of good general appearance, healthy, males and appropriate body (Tatum et al., 1998). Each farmer provided 3-5 lambs or 1 male calf. Thus, 106 male lambs and 4 male calves were assigned from the farmer flocks. The rest of the lambs (14 heads) and the male calves (8 heads) were purchased from the local market. The animals were shipped to an experimental barn which was divided into two divisions; one to accommodate the lambs and the other one was used for the male calves. Then, Each flock (lambs and male calves) was subdivided into two groups randomly to apply improved feeding practices to one half of the animals while the other half to be fed according to the farmer's traditional practices. The animals assigned to each cluster were randomly allocated to the four treatments:

T1: Improved management system (60 Lambs)
T2: Traditional feeding applied in the improved management system (60 Lambs)
T3: Improved management system (6 Calves)
T4: Traditional feeding applied in the improved management system (6 Calves)

Feeding trials were planned to last about 90 days with lambs and 180 days with male calve. Each of the lambs of T1 and the calves of T3 were offered high concentrate diet containing 65%barley grain, 15%cotton seed meal, 10%wheat bran, 10% straw. All vitamins and minerals were added to exceed the requirements (4kg/ton M&V and 3kg/ton salt). The mixed ration diets of ad libitum were provided four times a day (at 6.00 am, 11.00am, 3.00 pm and 7.00 pm) for lambs and three times a day for male calves (at 6.00 am, 12.00am and 6.00 pm) allowing a refusal rate of not more than 5%.

Rations locally used by farmers in the district were determined in order to be fed as a control representing the traditional fattening diet. Therefore, many meetings were conducted with the 23 farmers who were involved in the experiment. Most of the farmers agreed on the following ration: 73% barley grain, 10 % wheat bran and 17% lentil straw. Salt added was about 6 kg/ton. Concentrates were coarsely ground and offered 4 times a day (at 6.00 am, 11.00am, 3.00 pm and 7.00 pm)

Beef producers were using ready-mixture feeds advised and ground by feed mills. The ration frequently used and identified after contacting all mill owners was found to be 42% barley grain, 17% wheat bran, 8% wheat grain, 8% corn grain, 8% ervilia grain and 17% wheat straw. Also, 4kg/ton M&V and 3kg/ton salt were added. All ingredients were finely ground and provided 3 times a day (at 6.00 am, 12.00am and 6.00 pm). Upon arrival at the experiment site, special care was given to the animals because they were undergoing heavy stress. Most of them were newly weaned and shipped. Therefore, lambs had free access to good quality straw and water (Ensminger, 1970). When they appeared to be eating near capacity after about 3 days then the roughage level was reduced about 10% and replaced by the experimental diet every day for lambs and 3 days for male calves. Thus, lambs were given about 15 days and male calves 24 days during which the dietary proportion of concentrate as DM gradually increased to reach about 90%.

In order to determine the chemical composition of the diets used, samples for the three feed rations were taken and analysed for Dry Matter (DM), Crude Protein (CP) and Metabolisable Energy (ME) at the Feed

Analysis Laboratory of the Ministry of Food, Agriculture and Livestock in Adana\ Turkey (Table 1).

Table1.Chemical characteristics of the feeds used in the experiment (% DM basis)

Ration*	DM (%)	CP (%)	ME (kcal/kg)
1	91.93	13.65	2470.33
2	91.18	9.72	2511.77
3	91.54	11.64	2388.69

*: Ration 1:65%barley grain, 15%cotton seed meal, 10%wheat bran, 10% straw.
Ration 2:73% barley grain, 10 % wheat bran and 17% lentil straw.
Ration 3:42% barley grain, 17% wheat bran, 8% wheat grain, 8% corn grain, 8% ervilia grain and 17% wheat straw; 2 DM: Dry Matter; 3 CP: Crude Protein; 4 ME: Metabolizable Energy.

All animals were treated against parasites. However, lambs were vaccinated against enterotoxemia, pasteurellosis and foot and mouth disease, and the calves against foot and mouth disease. Clean and fresh drinking water was provided ad libitum.

Animals' weights were taken at 15-day intervals for lambs and every 30 days for male calves. All data related to weights and prices of feed intakes, prices of other production inputs, weights and prices of manure and health practices and costs were collected on a daily basis. Software Excel was used for managing the data and SPPS version 17 was employed for analyzing them using descriptive analysis. Also, the data were subject to ANOVA using the General Leaner Model (GLM) procedure. This method refers to frequencies and charts of the quantitative and qualitative variables. In order to economically evaluate the fattening performance of the two species (lambs and male calves) Cost and Return analysis (CAR) tool was used (AAEA Task Force, 2000).

Results and Discussion

Effect of Improved Feeding Practices on Lamb Performance

Initially, 120 lambs were involved in the experiment (60 lambs for each treatment). However, 1 lamb of the T1 and 2 lambs of the T2 showed poor fattening performance as their weights did not change after few weeks of the start. That was likely attributable to a physiological disturbance resulted from old and undetected diseases. Therefore, they were discarded with their data from the experiment.

Intakes of Dry Matter (DM), Crude Protein (CP) and Metabolizable Energy (ME) tended to be 163 g/day, 70 g/day and 364 kcal higher in T1 (the improved feeding treatment) than in T2 (the traditional feeding treatment) ($P < 0.001$), respectively (Table 2).

Table2. Mean values of Dry Matter (DM), Crude Protein (CP) and Metabolizable Energy (ME) intakes of fattening lambs

T*	n	Length of fattening period, d	Feed intake, g /d		
			DM	CP	ME
T1	59	91	1259±18.0	187±2.7	3382±48.3
T2	58	91	1096±13.3	117±1.4	3018±36.7

*T: Treatment

The results of T1 (the improved feeding treatment) are in agreement with the findings reported by Haddad et al. (2001) when the level of dietary protein offered to Awassi lambs in a fattening experiment was 16%. Haddad and Husein (2004) found out that Dry Matter (DM), Crude Protein (CP) and Metabolizable Energy (ME) intakes of Awassi lambs fed 15% wheat straw were 1066 g/day, 170 g/day and 2.99 Mca/d respectively. Lower feed intake was reported by Haddad and Nasr (2007) when they replaced 20% of barley grain by corn grain in their Awassi fattening study; 854 g/day Dry Matter (DM), 137 g/day Crude Protein (CP) and 2.40Mca/d Metabolizable Energy (ME).

Lambs fed with the improved diet maintained higher weights throughout the whole experimental period (Figure 4.10) and (Table 4.8). Final weights for those lambs (46.8 kg) were higher ($P < 0.001$) compared with lambs fed the local diet (42.1 kg) as shown in Table 3.2. Lambs fed the improved diet had a greater ($P < 0.001$) weight gain (22.2kg) compared with lambs fed the traditional diet (17.3 kg). Average daily gain for lambs fed the improved diet was higher ($P < 0.001$) compared with lambs fed the traditional diet (244 versus 190 g day). FCR (Feed Conversion Rate) was improved with the improved diet (5.4) as compared with the traditional diet (6.3) (Table 3) as expected.

Table 3. Effect of the improved feeding treatment on production responses in fattening Awassi lambs.

Mean Weight, kg	**Improved Diet (I), n=59**	**Local Diet (T) n=58**	**Significance**
Day1(Initial weight)	24.6±0.35	24.9±0.32	NS
Day91 (Final weight)	46.8±0.69	42.1±0.63	***
Total Weight Gain	22.2±0.56	17.3±0.51	***
Daily Weight Gain, g	243.9±6.19	189.8±5.65	***
FCR[1]	5.4±0.17	6.3±0.35	Not applicable

[1] FCR = feed conversion rate (kg DM fed/kg weight gain), *** P < 0:001, * P < 0:05.

Haddad and Younis (2004) reported improved fattening performances of Awassi lambs under intensive feeding systems. Average daily gain of the improved feeding was also in agreement with that detected by Haddad and Husein (2004). However, feed conversion rate (FCR) in our experiment was higher as Haddad and Husein (2003) found out that FCR of the lambs fed high concentrate diet was 3.8 kg DM fed/kg weight gain. Haddad and Ata (2009) reported that daily weight gain and feed conversion rate of lambs offered 15% wheat straw were 244g and 4.9 kg DM fed/kg weight gain, respectively. Haddad and Nasr (2007) observed less daily weight gain with 186 g\d when they replaced 20% of barley grain by corn grain in Awassi fattening study.

Effect of Improved Feeding Practices on Male Calves Performance

Table 4 shows that mean of daily intakes of Dry Matter (DM), Crude Protein (CP) and Metabolizable Energy (ME) were almost similar (DM, CP and ME were 6911g/d and 6630 g/d, 1043g/d and 843g/d, and 18883 kcal/d and 17300 kcal/d in T3 and T4, respectively).

Table 4. Mean values of Dry Matter (DM), Crude Protein (CP) and Metabolizable Energy (ME) intakes of fattening male calves / calf.

Treatment	Length of fattening period, d	Feed intake		
		[1]DM, , g /d	[2]CP, g /d	[3]ME, kcal/d
T3	210	6911±50.3	1043±7.4	18883±133.8
T4	228	6630±47.4	843±6.0	17300±123.7

[1] DM: Dry Matter. [2] CP: Crude Protein. [3] ME: Metabolizable Energy.

Generally, the dry matter intake measured in this experiment was presented by Smith et al. (1974) with 6.9 kg/DM/d, as well as by Arnold et al. (1992) with 6.6 kg/DM/d. However, a slightly higher value (averaged7.57 kg/DM/d) was reported by Schwabe et al. (2012) when they investigated effects of increasing amounts of Rare Earth Elements on the fattening performances of male German Holstein steers. Similarly, a slightly higher feed intake (averaged 8 kg/DM/d) was found out by Mantiziba et al. (2014) in their experiment to investigate feedlot performance of Bonsmara steers. Feed intake reported by Mckntcur et al. (1980) was higher than that found out in our experiment, as the mean of feed intake of the Holstein steers supplemented with monensin was 8.91. Zinn et al. (2008) ,Kitwell & McCormick (1956), Garrett (1971), Windels et al. (1972), Smith et al. (1973), Thonney et al. (1981), Thonney (1987) and Abney (2004) reported higher dry mater intake for Holstein steers, which are ranged from 8.4 to 12 kg/ day. The results of feed intake were close to the findings of Abney (2004) with 7.8 kg/DM/d, Garrett (1971) with 8.0 kg/DM/d , Perry et al. (1991) with 8.1 kg/DM/d and Duff and Anderson (2007) with 8.255 kg/DM/d.

Fattening performance of the T3 group did not show significant differences ($P > 0.05$) compared to the T4 group. Yet, means of Daily Weight Gain (DWG) and Feed Conversion Rate (FCR) for male calves fed the improved diet were 0.115kg and 0.391 kg DM fed/kg weight gain higher than those fed the local diet, respectively (Table 5). The low numeric differences between the T3 and T4 reflected the lack of significance. The obtained results were not unexpected as it was mainly due to the narrow difference between the two treatments concerning feed intake. It could be a result of the improved feeding program adopted by beef producers in the district.

Table 5. Effect of the improved feeding treatment on production responses in fattening male calves.

Mean Weight, kg	Improved Diet (I), n=6	Local Diet (T) n=6
At Start3	195.9±6.99	184.0±11.64
Day1(Initial weight)	195.7±5.75	181.8±10.81
Final weight	444.0±16.54	426.7±17.22
Fattening Duration, Days	210.2±16.72	227.7±7.33
Total Weight Gain	248.3±18.50	244.9±12.73
Daily Weight Gain, g	1.192±0.0453[2]	1.076±0.0441
FCR[1]	5800±206.9	6191±241.6

[1] FCR: feed conversion rate (kg DM fed/kg weight gain).

[2], Not significant (P > 0.05)

In agreement, Anuez et al. (1996) and Yanar et al. (2002) reported that the live weight gains of calves were improved when levels of concentrate supplied were increased. According to Blaxter and Wainman (1966), growth rate is negatively affected by feeding high-forage diets. Feed efficiency will be low as a result of the reduced digestibility of forage compared to grain. Therefore, intensification of livestock production has become a major policy option and can be achieved by providing animals with a maximum intake of energy. Also, because feedlot calves is economically more risky than feedlot lambs, beef producers have developed their knowledge about feeding relying on different extension resources. The low differences between the improved and local feeding treatments, on the other hand, is possibly attributable to the reduced feed intake as a result of the subacute acidosis and bloat seen in the male calves of the improved feeding treatment (T3) (Owens et al., 1998).

Economical Performances of Lamb and Beef Fattening

Production costs per animal were 13574 SL/lamb and 155804 SL/calf. In order to make the comparison as clear as possible for this experiment, total production cost per animal was divided by the animal's final weight to calculate the cost of1 kg live weight (Şahin et al., 2009). It was found out that costs per 1 kg live weight were 290 SL in lambs and 351 SL in calves. The difference between the two production costs of lamb and beef fattening was highly significant (P < 0:001) (Table 6). Net profits of 1 kg live weight were 85 SL and 74 (P < 0.05) SL in lamb and beef fattening, respectively (Table 6). Relative profit was found to be slightly higher in T1 than that in T2

Table 6. Economical performances of lambs and male calves fattened under improved management system (in Syrian Lira).

Activity Operated	T1[1]		T2[2]	
Input Costs	SL	%	SL	%
Purchase of Feeder Animals/Animal	7000	52	45011	28.9
Feed consumed , DM/Animal	2692	20	34105	21.9
Veterinary /Animal	94	1	917	0.6
Mortality/Animal	0	0	0	0.0
Electricity/Animal[3]	0	0	0	0.0
Water/Animal[4]	0	0	0	0.0
Labour /Animal	300	2	7000	4.5
Barn rent/Animal	150	1	3500	2.2
Interest of Operating Capital/Animal	2943	22	60733	39.0
Cost of Management (3%)/Animal	395	2	4538	2.9
Total Costs /Animal	13574	100	155804	100.0
Gross Revenue				
Animal Sales/Animal	17546	99.9	188700	99.2
Manure Sales (Joint Product)/Animal	20	0.1	1433	0.8
Total Gross Revenue	17566	100.0	190133	100.0
Relative Profit /Animal	1.294		1.220	
Net Profit per Animal/Animal	3992		34329	
Costs of 1 kg Live Weight	290		351	
Sale price of 1 kg Live Weight	375		425	
Net profit of 1 kg Live Weight	85		74	

[1]T1: Improved management system (Lambs), [2]T3: Improved management system (Calves).

[4, 5]: costs of water and electricity are included in the rent cost

Based on CBS, (2014) the exchange rate used in this experiment is 1$= 149.56 Syrian Lira. Accordingly, costs of gaining 1 kg of live weight in our experiment for those lambs managed under the improved management system (T1) was 1.94$. This cost is more than those found out by Haddad and Nasr (2007) (averaged 0.62$). Obeidat et al. (2008) assessed the fattening performance of Awassi lambs fed finishing diets containing Prosopis juliflora pods. They published that the costs of 1 kg gain of the control (no supplemental Prosopis juliflora pods), 100 g/kg of Prosopis juliflora pods supplemented and 200 g/kg of Prosopis juliflora pods supplemented were 0.80$, 0.82$ and 0.74 , respectively . These results were lower than that calculated in our current experiment. Costs of gaining 1 kg of live weight in this experiment were close to the finding of Omar (2002). He tested the technical and economic effects of feeding different levels of sesame oil cake on fattening performance of Awassi lambs and found out that the cost of gaining 1 kg of live weight in the control diet was 1.91$ .The feed

costs per kilogram weight gain in the current study was calculated as 0.85$ in T1. This result is in agreement with the findings of Hartwell et al. (2010b) who investigated effects of using reduced-cost diets on the economic and technical performances of Awassi lambs. They reported that the feed costs per kilogram weight gain were 0.90$ in the control diet used by lamb fatteners, 0.98$ in the experimental diet 1 and 0.89$ in the experimental diet 2. In agreement, Scerra et al. (2001) suggested that feed cost per kilogram weight gain of Merinizzata Italiana lambs was lower in the experimental diet (0.97 Euro) compared to the traditional diet (1.22 Euro). The results of the current study indicated that the daily costs of feed per lamb were 0.198$ in T1. This finding was not in agreement with the results of the experiment undertaken by Rihawi et al. (2010). In this experiment, total feed costs were found to be 0.230$/lamb/day, 0.208$/lamb/day and 0.183$/lamb/day in the traditional, intensive and semi-intensive feeding regimes, respectively.

The cost of male calves fattening calculated in our study exceeded that reported by Umar et al. (2008) in Nigeria (339 $/animal vs 1042$/animal in T3 and 1083$/animal in T4). This is likely due to the reduced feeding cost in Nigeria which constitutes the majority portion of the production cost. However, the net profit in this study was in agreement with that in T3 of our experiment (227$/animal vs 230$/animal). Also relative profit was found to be lower in our study (1.2 in T2 compared to 1.7 as reported by Umar et al. (2008). In the study conducted by Şahin et al. (2009) in Turkey, the overall fattening costs and net profits of different cattle breeds (Holstein, Piedmont × Holstein, and Limousin × Holstein) managed under controlled conditions were higher than that found out in T3 of our study (the total production costs were 1552 $/animal in Turkey vs 1042$/animal in T3, while the net profits were 385 $/animal in Turkey vs 230$/animal in T3). These results indicate that production cost (especially feed) and gross production value of male calves fattening in Turkey are higher than those in Syria. Relative profit were found to be almost similar (1.22 versus 1.25)

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