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Effect of feeding cost-efficient diets on the meat quality of fattened Awassi lambs

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Abstract

The meat of Awassi lambs fed and fattened in two experiments designed to reduce feeding costs in fattening production systems in Syria, was evaluated using sensory tests to assess the possible effect of diets on meat quality. The assessed meat derived from two sets of experiments: on-station (E1) and on-farm (E2). In E1, two low-cost diets were tested in comparison with the traditional diet used by farmers. In E2 the on-station most promising diet was compared also to the traditional diet on three farms at Khanasser, near Aleppo. Lambs were slaughtered at the age of 6.5-8.5 months. The carcass pH was measured at different *post mortem* times and samples of the *Longissimus dorsi* muscle were obtained. Sensory panels assessed the quality of cooked meat samples from E1 and E2, according to local preferences. The pH was unaffected by diets ($P>0.05$). The sensory evaluation did not revealed differences in quality among diets in E1 and between diets within farms in E2 ($P>0.05$). The results suggest that the alternative diets that promoted important growth and were less costly in the fattening experiment, did not affect the quality of the meat.

Introduction

Feeding cost is a major constraint in the small-scale intensive lamb fattening production systems in Syria ([1]Hartwell *et al.*, 2006a; [2]Hartwell *et al.*, 2006b). To assess the biological and economic feasibility of least-cost alternative diets (LCD), on-station and on-farm trials were conducted in Syria in 2003–2004,
respectively. Two non-conventional and traditional diets were tested, and their effects on meat quality evaluated. This report summarizes the results of the sensory evaluation involving local people to reflect the preferences for meat in Syria.

Materials and methods

Feeding experiments

- Weaned male Awassi lambs were used for on-station and on-farm fattening trials.
- Two unconventional and one traditional diet were used for a 90-day on-station fattening trial in 2003 at the ICARDA subsequent 72-day on-farm fattening trial tested the optimized on-station LCD against the traditional diet used by farmers in three farms in Khanasser, northern Syria (Table 1).

Table 1. Diet composition (%) and use of treated and untreated wheat straw

Diet composition	**On-station trial**[1]			**On-farm trial**[2]			
	C	**LCD**		**Traditional diet**			**LCD**
	(n=12)	**D1** (n=12)	**D2** (n=12)	**F1** (n=10)	**F2** (n=10)	**F3** (n=10)	(n=10)
Broken corn	✓		✓				✓
Broken faba bean		✓					
Molasses		✓	✓				✓
Cotton seed cake	✓	✓	✓		✓	✓	✓
Whole barley	✓	✓	✓	✓	✓	✓	✓
Wheat bran	✓	✓	✓	✓	✓	✓	✓
Wheat grain				✓	✓	✓	
Salt, vitamin, and minerals	✓	✓	✓				✓
Vetch				✓			
Wheat/barley straw	*Ad lib*			*Ad lib*	*Ad lib*	*Ad lib*	
Urea-treated wheat straw		*Ad lib*	*Ad lib*				*Ad lib*

C = Control (traditional diet used by lamb fattening farmers); D1 & D2 = improved diets; LCD = Least-cost diet; F1, F2 and F3 = farms in the Khanasser valley.
[1]Hartwell *et al.*, 2006a; [2]Hartwell *et al.*, 2006b

Slaughtering, meat preparation, and evaluation

- Fasting lambs were slaughtered at the slaughterhouse in Aleppo, their carcasses kept at 2°C for 35 hours, and their *Longissimus dorsi* muscles (MLDs) extracted.

- pH of the meat was recorded at slaughtering (0 hr), 35 hours, and 72 hours after.

- The MLDs of each animal were exposed to two ageing times—T0 (immediately stored at -20°C) and T72 (stored for 72 hours at 2°C after slaughtering and then stored at -20°C until evaluation).

- The meat was cooked for 70 minutes in a circulating water bath at 70°C core temperature, cut into small cubes, and offered to a panel of 27 male and female local evaluators.

- The ranking screening method for tenderness, juiciness, smell, and flavor on a 1–6 scale, from low to high score (Amtliche Sammlung §35LMBG, 1984) was used for the sensory assessment.

Statistical analysis

Linear models were used to analyze the quantitative variables and the link to a cumulative logits to analyze the multinomial sensory categorical variable.

Results and discussion

pH

- The pH values in both on-station and on-farm trials did not differ among the diets, and the overall averages were 5.99 and 6.05, respectively ($p>0.05$).
- There was a decrease in pH values in both trials from slaughter time (0 hours) to 35 hours and an additional but less pronounced decrease between 35 and 72 hours after. The pH values were 6.17, 5.97, and 5.84, at 0, 35, and 72 hours after slaughtering in the on-station ($p<0.0001$), and 6.6, 5.8, and 5.76 in on-farm ($p<0.0001$) trials.

Sensory variables

- There was no difference between the meat produced by the LCD D1 and D2 and the control diets on-station with regard to smell, taste, and juiciness ($p\geq0.104$). There was no difference in tenderness between LCD D2 and C ($p\geq0.07$); however the probability for diet 1 to produce a more tender meat was higher than the control ($p=0.032$).

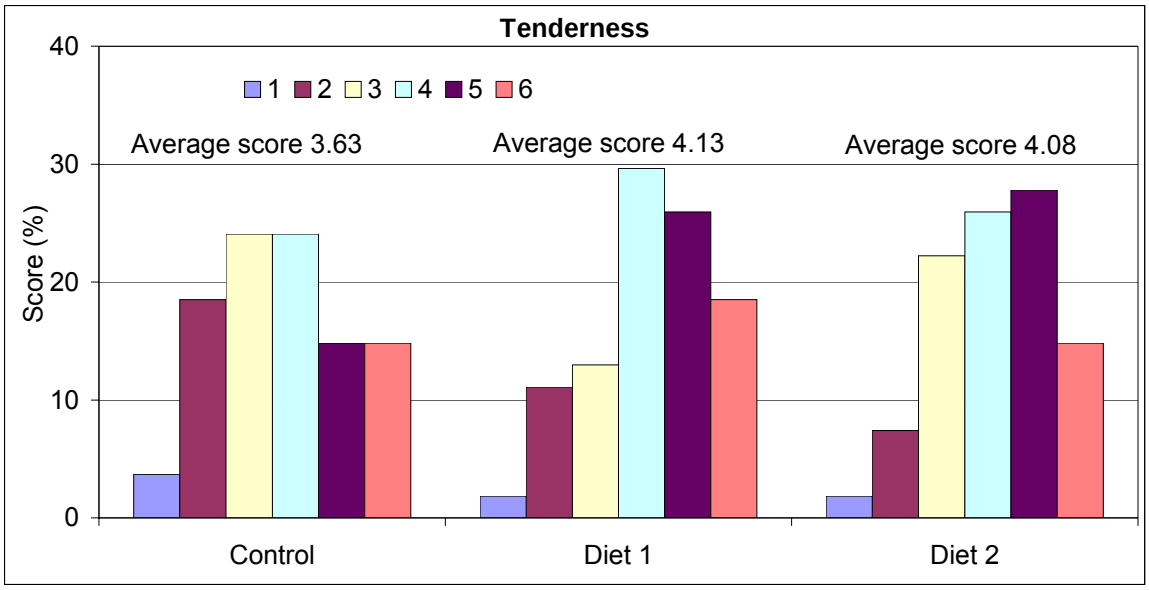

Figure 1: Percentage of meat tenderness in the on-station trials as affected by diets.
Control = traditional diet; diet 1 and diet 2 = least-cost diets; 1–6 = sensory scores.

- The on-farm results confirmed, largely, the on-station results. There was no difference in smell and taste within farms between the meat produced with the alternative diet and the control ($p\geq0.426$). Similarly, no difference in juiciness and tenderness between the alternative LCD diet and the control within farms 1 and 2 ($p\geq0.381$). However, the probability for the meat produced with the control diet to be juicy and tender was higher in farm 3 than in the alternative LCD ($p\leq0.004$).

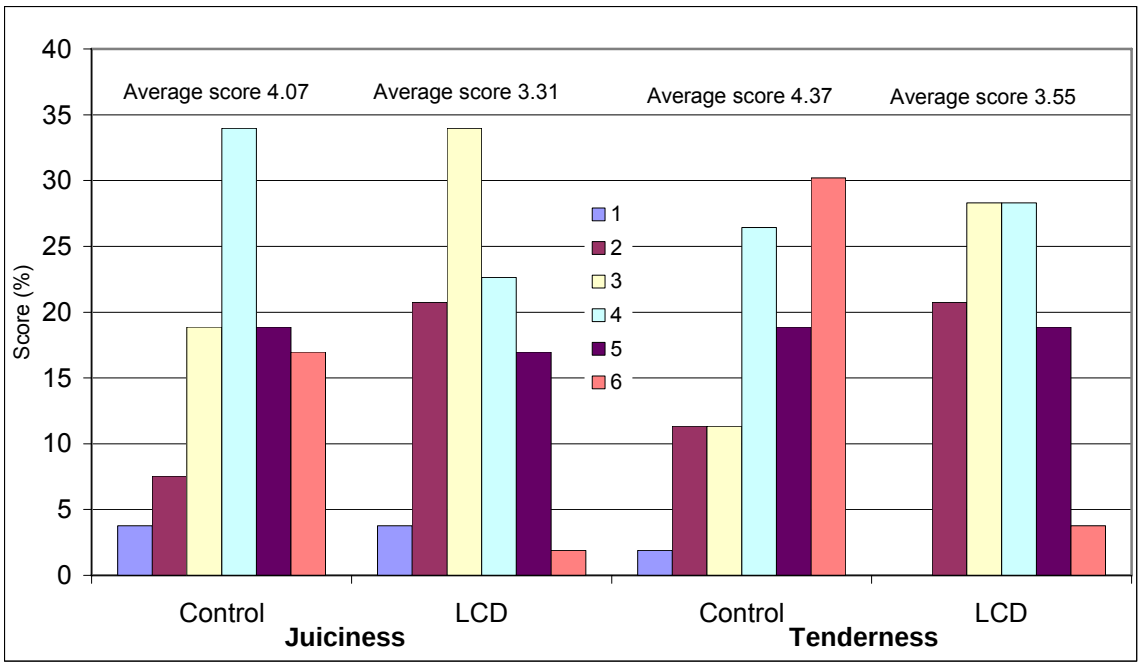

Figure 2: Percentage of juiciness and tenderness in meat produced in farm 3 as affected by the diets.
Control = traditional diet; LCD = least-cost diet; 1–6 = sensory scores.

Conclusion

The low-cost diets proposed for fattening Awassi lambs promoted the same or higher growth rates than the traditional diets, but they either did not affect the organoleptic properties of the meat or did so positively. Thus, farmers can use the alternative diets without concerns about the quality of meat produced, and earn more income.

References

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