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Different protein source (soybean or faba bean) in postweaning diets for Apennine and Sopravissana (Italian Merino) light lamb: slaughtering performances

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RIASSUNTO – Differente fonte proteica (soia o favino) in diete postsvezzamento per agnelli leggeri Appenninici o Sopravissani (Merino Italiani): rilievi alla macellazione. *Trentasei agnelli delle razze Appenninica (AP) e Sopravissana (IM) sono stati sottoposti ad un breve finissaggio post-svezzamento in stalla, allo scopo di valutare la possibilità di ottenere agnelli leggeri in intensivo, utilizzando un fieno comune e dei concentrati con differente fonte proteica: farina di estrazione di soia (SBM) e favino fioccatato (FFB), per l'esigenza di trovare fonti alternative alla soia sia dal punto di vista agronomico che da quello legato alla sicurezza rispetto agli OGM. La prova ha evidenziato differenze di performance sia, com'era da attendersi, tra animali di razza differente (resa netta: 55,56 vs. 52,39% in AP e IM), sia tra soggetti alimentati con diete diverse, a scapito della soia, sia per quanto riguarda le rese (55,49 vs. 52,46% in FFB e SBM) che per le caratteristiche delle carcasse.*

Key words: light lamb, Apennine and Italian Merino breeds, protein source, carcass quality.

INTRODUCTION – While Apennine is an autochthonous medium-large size Italian meat sheep breed well placed in Central Italy, Italian Merino (Sopravissana) is an ancient endangered sheep breed once raised all over Central Italy and now interesting a marginal sheep farming. Due to economical problems in fattening lamb at high weights for Italian farmers (Sanudo *et al.*, 2000; Sarti, 1992), light lamb is one of the main products in Italian meat sheep farming.

It would be important to look for new protein sources, to be used for light lamb production to solve crop rotation problems or to make an alternative to soybean meal (SBM) which price depends on international market and that can show GMO presence. Faba bean (*Vicia faba* var. *minor*) is a common legume seed largely diffused and well inserted in agronomical rotations of Mediterranean areas (Lanza *et al.*, 1999; Manso *et al.*, 1998), despite the variable yields and the risks of use as animal food for presence of antinutritional factors (e.g. protease inhibitors, tannins, etc.) (Rubio and Brenes, 1995). The aim of the work was to evaluate the effect of two different fattening diets with different protein sources: soybean meal (SBM) and flaked faba bean (FFB), on slaughtering performance and carcass quality in light Apennine (AP) and Italian Merino (IM) lambs.

MATERIAL AND METHODS – Thirty-six male AP and IM lambs born and raised, until weaning (at about 15 kg live weight) in two farms in Umbria, were conducted at the experimental stables of Perugia University, and penned indoor for a short intensive finishing period. The lambs were divided into four groups,

formed combining two different breeds: AP or IM, and two different isoenergetic and isoproteic diets, with hay *ad libitum* and a concentrate with SBM or FFB as protein source. The rate hay:concentrate was 30:70, according with INRA (1978). Composition of diets, chemical analysis (average concentrate values: 20.7% of crude protein and 0.99 MFU/kg of dry matter) and *in vivo* performance of lambs were reported in a previous work (Morbidini *et al.*, 2004). To refer to a market product, slaughtering was programmed when lambs reached 25 kg of live weight or, if not possible, in the Easter week. Slaughtering and dissection were performed according to ASPA methodology (1991), while carcasses were assessed according to EU Regg. 2137/92 and 461/93. Statistical analysis was performed using SAS (1999) package.

RESULTS AND CONCLUSIONS – No interaction effects between breeds and diets were found in analysis of variance. Significant differences were found (table 1) in dressing percentage (on EBW), with better results for AP lambs, caused by a natural significant higher head and pelt incidence in IM lambs.

Table 1. Slaughtering and dissection results on light lambs (least square means).

		Breed		Protein source		s.d.E
		Apennine (AP)	Italian Merino (IM)	Flaked Faba Bean (FFB)	Soybean Meal (SBM)	
Empty body weight (EBW)	kg	19.39	19.89	19.05 a	20.23 b	1.59
Pelt	% FBW	10.76 A	14.02 B	11.86 a	12.92 b	1.21
Head	% FBW	4.07 A	4.48 B	4.39 a	4.16 b	0.29
Warm dressing pct ⁽¹⁾	%	55.56 A	52.39 B	55.49 A	52.46 B	3.03
Lean ⁽²⁾	%	67.22 a	69.56 b	67.83	68.95	2.89
Fat ⁽²⁾	%	4.50	5.50	5.50	4.50	1.63
Bone ⁽²⁾	%	28.33 A	24.81 B	26.66	26.48	3.65

(1): % on EBW. (2): % on Cold Pelvic Limb. Significance A, B: P<0.01; a, b: P<0.05.

The higher dressing percentages on empty body weight for FFB diet was not found by other authors (Lanza *et al.*, 1999 Purroy and Surra, 1990). Probably it was due to a lower offal incidence in lambs fed FFB, for a potentially reduced feed ingestion (Morbidini *et al.*, 2004; Rubio *et al.* 1995). No differences, induced by breed or diets, were found in dissection characteristics of half carcasses, while breed differences in pelvic limb dissection (representative of tissue composition of entire carcass, according with Gigli *et al.*, 1982) were pointed out (table 1). Particularly, AP lambs showed a significant lower lean and higher bone pct. compared to IM, due to a slower body growth.

Table 2. Distribution of light lambs in the various classes of fatness, meat colour and 1st quality carcasses (absolute values) as influenced by breed and protein source of diets.

Carcasses	BreedFat class ⁽¹⁾	Protein Source											
		Flaked faba bean (FFB)				Soybean meal (SBM)				All diets			
		Meat colour ⁽²⁾		Total	1 st quality	Meat colour ⁽²⁾		Total	1 st quality	Meat colour ⁽²⁾		Total	1 st quality
LP	PP	LP	PP			LP	PP						
AP	1	-	-	-	-	1	-	1	-	1	-	1	-
	2	6	3	9	9	4	4	8	8	10	7	17	17
	3	-	-	-	-	-	-	-	-	-	-	-	-
	Total	6	3	9	9	5	4	9	8	11	7	18	17
IM	1	-	-	-	-	-	-	-	-	-	-	-	-
	2	4	3	7	7	5	4	9	9	9	7	16	16
	3	1	1	2	2	-	-	-	-	1	1	2	2
	Total	5	4	9	9	5	4	9	9	10	8	18	18
All Breeds	1	-	-	-	-	1	-	1	-	1	-	1	-
	2	10	6	16	16	9	8	17	17	19	14	33	33
	3	1	1	2	2	-	-	-	-	1	1	2	2
	Total	11	7	18	18	10	8	18	17	21	15	36	35

⁽¹⁾Fat class: 1-low; 2-slight; 3-average; ⁽²⁾meat colour: LP-light pink; PP pink.

With regard to subjective carcass quality (fatness and meat colour at *rectus abdominis* level), assessed by experts according to standard procedures (table 2) almost all (97%) carcasses were of first quality. At breed level, AP scored most (93%) carcasses of slight (level 2) fatness, while IM showed also carcasses (11%) with average (level 3) fatness. Meat colour trend was similar in both breeds: about 60% of carcasses were light pink, the rest were pink. Second quality, showed in AP breed feed SBM, was due to a lack of fatness (level 1).

In conclusion the use of faba beans in moderate fattening diets for lambs of different breeds lightly depressed *in vivo* performance (Morbidini *et al.*, 2004) and slaughtering weight but preserved, as found by other authors (Lanza *et al.*, 1999; Purroy and Surra, 1990) and in our case, improved dressing percentage and maintained carcass quality of light lambs. Data regarding meat quality, provided for this experiment, could carry other interesting results.

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