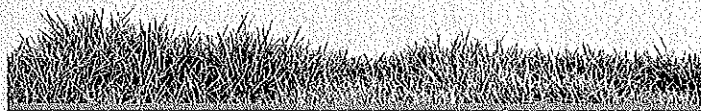


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AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

# How four typical Swedish production systems for lambs affect sensory attributes of the meat

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## Abstract

The aim of this study was to evaluate the effect of the four most typical production systems for Swedish lamb on sensory attributes of meat, including appearance, texture, taste and flavour using an analytical panel. The experiment included four production treatments for weaned intact male lambs: (1) indoor fed with grass and clover silage *ad libitum* and 0.8 kg concentrate daily per lamb; (2) grazing on cultivated pasture with; or (3) without 0.3 kg concentrate supplementation daily per lamb; and (4) grazing on semi natural pasture; eight lambs per production treatment were used. Feed rations, pasture height and live weight of the lambs were recorded. At slaughter, live weight, carcass conformation, fatness, pH and temperature decline in muscle during 24 hours after slaughter were registered. Sensory and technological meat quality parameters were tested in cooked samples of *M. longissimus dorsi*. Meat colour was not affected by treatment. Most sensor attributes were unaffected by production system but for 'hay odour' and 'resistance to cutting', differences between the systems were manifested.

**Keywords:** live weight gain, pH-value, temperature, sensory attributes, texture, colour

## Introduction

It is well known that meat quality is a complex subject that includes a multitude of parameters. These parameters are, in turn, affected by many factors e.g. the production system with different feeding strategies, breeds and sexes (Toldrá, 2017). In 2016, the Swedish sheep and lamb meat production accounted for only 28% of the total Swedish consumption (Jordbruksverket, 2017). To satisfy the consumers' demand of lamb meat, with a consumption of 1.8 kg lamb meat per person annually, the import of sheep and lamb meat increased substantially both in 2015 and 2016 (Jordbruksverket, 2017). An increasing demand of high quality lamb meat produced in Sweden results in a need to know how lamb should be reared under Swedish conditions, with the goal to obtain a high and consistent eating quality. Consumers usually determine meat quality by its eating quality, where tenderness, juiciness and flavour are the most important elements (McIlveen and Buchanan, 2001). The eating quality of today's Swedish lamb meat varies, which might be due to, for example, the use of different production systems, different breeds, slaughter ages and weights. It has been shown that different diets could affect the meat quality of lamb. Different feeding strategies could be grazing contra grain feeding, which could affect the flavour of the meat, for example (Watkins *et al.*, 2013). The aim of this study was to evaluate the impact of different production models on meat quality attributes.

## Materials and methods

In total, 32 crossbred intact ram lambs (Dorset × Fine Wool; 75:25) were included in the study. Groups of eight animals were assigned to one of four production treatments for weaned intact male lambs; Group 1 on indoor feeding, Groups 2 and 3 on cultivated pasture with or without supplemented concentrate, respectively, and Group 4 on semi-natural pasture. All animals in the study had access to water, salt and minerals *ad libitum*. Group 1 was offered a total mixed ration consisting of grass and clover silage *ad libitum* and a constant amount of 0.8 kg concentrate per lamb and day. Groups 2 and 3 grazed two

Table 2. Sensory attributes from lambs reared in the different production models.

Parameters	Group 1 <sup>1</sup>	Group 2	Group 3	Group 4	SEM <sup>2</sup>	Significance
Pinkness	46 <sup>3</sup>	47	45	46	2.34	NS
Fibre structure	37	35	35	33	1.57	NS
Total lamb meat odour	48	48	49	49	1.07	NS
Acidic odour	32	30	31	33	0.97	NS
Hay odour	30 <sup>a</sup>	29 <sup>a</sup>	29 <sup>a</sup>	32 <sup>b</sup>	1.07	0.051
Resistance to cutting	37 <sup>ab</sup>	43 <sup>a</sup>	33 <sup>b</sup>	39 <sup>a</sup>	1.91	0.017
Softness	55	50	55	54	1.90	NS
Tenderness	60	52	65	61	3.47	NS
Crumbliness	45	41	49	50	3.31	NS
Total lamb meat flavour	54	53	54	56	1.16	NS
Metal flavour	38	42	41	43	1.57	NS
Leafy flavour	31	33	33	35	2.43	NS
Oiliness	34	35	34	36	1.16	NS

<sup>1</sup> Group 1 on indoor feeding, group 2 on cultivated pasture with 0.3 kg supplemented concentrate per lamb daily, group 3 on only cultivated pasture and group 4 on only semi natural pasture.

<sup>2</sup> SEM = standard error of the mean.

<sup>3</sup> Scores are between 0-100.

<sup>a,b</sup> Mean values with different superscripts in the same row differ significantly ( $P < 0.05$ ). NS: non-significant ( $P > 0.05$ ).

## Conclusion

The results from this study indicate that intact ram lambs reared to four different production treatments (indoor, cultivated pasture with or without supplemented concentrate or semi natural pasture), covering the Swedish lamb production, did not seem to affect technological meat quality in terms of final pH and temperature of lamb carcasses. Meat colour was not affected by treatment. Sensory parameters that were affected by production system were 'hay odour' and 'resistance to cutting'. With that in mind, it seems that the different production systems did not have an overall effect on eating quality such as tenderness and flavour that are the most important from a consumer perspective. From this study it was also found that in general the variation between animals was higher than between different rearing systems.

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