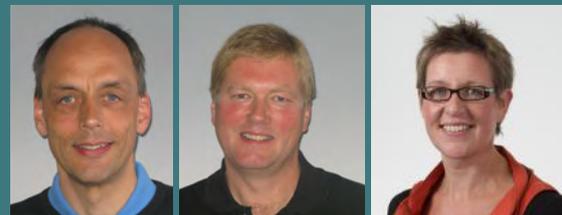


# Green veal is not dark red



Margrethe Therkildsen<sup>1</sup>, Søren K. Jensen<sup>2</sup> and Mogens Vestergaard<sup>2</sup>

<sup>1</sup>Department of Food Science and <sup>2</sup>Department of Animal Science, Science and Technology, Aarhus University, DK-8830 Tjele, Denmark  
Mogens Vestergaard, e-mail: mv@agrsci.dk

Among many farmers, butchers and consumers, the expectation is that meat arising from grazing cattle generally is darker than meat from cattle primarily fed cereals. Without necessarily being the truth, this dogma is a constraint to the marketing of 'green' meat. In an attempt to increase the supply of organic meat from young cattle, we need to know which quality parameters are the characteristics for this type of meat, including colour characteristics.

## Organic beef from young cattle

The organic rules require that bull calves are raised outdoor at least 6 months a year in Denmark and are fed at least 60% roughage of the total diet. These rules are a constraint for an organic production of beef based on the bull calves born in the organic dairy herds because of extra labor costs, expected lower growth rate, difficulties in raising bull calves outdoor, possibly lower meat quality and lack of sufficiently high organic premium payment for the carcass. Among the meat quality characteristics often considered to be compromised by grazing animals is meat colour, that among most people are thought to be darker compared with

meat from animals fed a cereal-based ration. As a consequence, bull calves born in the organic dairy herds are sold for conventional fattening. The supply of organic beef from young cattle is concomitantly very limited. However, in order to obtain the necessary higher payment for beef from organic-raised young cattle, it is important that consumers like the beef from grass- and herb-fed young cattle, as this is the primary feeds for organic meat-producing cattle.

## Experiment with young Holstein bulls calves

We recently completed an experiment aimed at elucidating the effect of purely grass or herb feeding of Holstein bull calves for 8

weeks prior to slaughter at 9-10 months of age on meat colour, fatty acid composition, vitamin content and eating quality of the meat in comparison with meat from traditional rosé veal calves fed a concentrate-based diet and slaughtered at 9-10 months of age. Calves were housed in door in straw-bedded pens and fresh green feed was cut and brought to the barn every morning.

After a 2-week adaption period, 6 bull calves were fed purely grass and 5 bull calves were fed purely herb-based green feed for 6 weeks prior to slaughter. All calves had free access to the feed, and the grass-fed calves ate 50 kg per calf per day of the mainly Perennial ryegrass sward, whereas the herb-fed calves consumed 60 kg per calf per day. The major species in the herb sward was English plantain (56%), and White clover, Sainfoin, White melilot, Salad burnet and Yarrow each constituted approximately 5% of the sward (table 1). As dry matter content and feeding value of the two swards were slightly different, the energy intake was similar on the two treatments. The growth rate was lower than for a traditional veal calf in this period and amounted to 1.0 kg per day for both grass- and herb-fed calves.

At slaughter, meat from 6 traditionally concentrate-fed Holstein bull calves was also included in study. All calves were less than 10 months old at time of slaughter. We chose the young and lean veal calf for this study to avoid interference from the fatty tissue on taste and colour characteristics and focused the study on what happened in the muscle/meat. Carcass weights were 175 to 200 kg.

## No dark red meat

The lean/fat colour evaluated on the carcass showed a 'normal' colour score of all three treatment groups giving no evidence for the dogma that meat from grass-fed and herb-fed cattle turned dark. This was supported by measurements of colour traits on both the loin (*M. longissimus dorsi*) and a thigh muscle (*M. semimembranosus*) 2 days after slaughter on steaks bloomed in normal atmospheric conditions for 1 h at 4°C. We assessed L\* for lightness, a\* for red/green colours and b\* for yellow/blue colours, but found no differences between the three feeding strategies (table 2). We have to keep in mind that these calves were only 10 months and the green-feeding was only offered for two months.



### No tenderness compromise

The loin and thigh muscles were aged (at 2 C) for additional 7 days, before sensory analysis by a trained panel. Steaks and roasts, respectively, were cooked and served for the panelists. Except for more meat flavor and juiciness in loin and less sweet aroma in the thigh muscle from herb-fed calves compared with grass- and concentrate-fed calves, there were no significant differences in the sensory profile. Furthermore, a mechanical testing device that can measure the shear force to cut through the meat sample were also applied and showed a good 'tenderness' of the meat. In fact herb- and grass-fed meat from the thigh showed a better tenderness than meat from concentrate-fed calves. These findings are important, because it seems unrealistic to increase the

premium payment for organic veal and beef (i.e., where grass and herbs constitute at least 60 % of the ration) if the sensory quality is not good.

### Healthy fat in herb- and grass-fed beef

The meat from herb-fed calves contained less oleic acid, and more linoleic acid,  $\alpha$ -linolenic acid,  $\alpha$ -tocopherol and  $\beta$ -carotene compared with concentrate-fed calves and with grass-fed calves in between. The (n-6)/(n-3) ratio in the meat, which is considered important for the human diet, improved from 8.6 for concentrate-fed to 4.6 and 5.3 for herb- and grass-fed calves, respectively. Despite this positive effect, we have to remember that these calves only contained 1-2% of intramuscular fat in the loin, so the real benefit from the 'improved' fatty acid composition is probably not large.



### Marketing potential

Overall, the study showed that green-feeding for a 2-months period prior to slaughter can improve fatty acid composition and vitamin content, produce tender meat with a good flavor and with no signs of a darkening of the meat. All facts are important for the marketing of veal and beef from organic raised cattle.

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Table 1 Composition of grass and herb swards fed to the calves

Name	Latin name	Grass	Herbs
% in sward			
English plantain	<i>Plantago lanceolata</i>		56.4
Salad burnet	<i>Sanguisorba minor</i>		4.6
Sainfoin	<i>Onobrychis viciifolia</i>		6.1
White melilot	<i>Melilotus alba</i>		5.7
Yarrow	<i>Achillea millefolium</i>		3.9
White clover	<i>Trifolium repens</i>	2.4	4.3
Perennial ryegrass	<i>Lolium perenne</i>	83.6	0.7
Weeds		14.0	18.4

Table 2 Performance and carcass quality of bull calves fed either purely grass (Grass) or herb-based green feed (Herbs) compared with concentrate-fed bull calves (Con)

Feeding	Grass	Herbs	Con	P-value
Number of calves	6	5	6	
Age at slaughter, days	299	299	< 305	ns
ADG (6 wks), g/d	987	969	~1250	ns
Live weight at slaughter, kg	363	365	~390	ns
Carcass weight, kg	178	185	197	0.10
Dressing, %	49.0	50.7	~ 50.5	0.09
EUROP conformation	2.7b	2.9b	3.7a	0.004
EUROP fatness	1.7	1.8	2.2	ns
Lean/fat colour	3.0	2.8	3.0	ns
L* loin	32.5	31.8	31.5	ns
a* loin	14.2	14.9	13.4	ns
b* loin	5.7	5.8	5.3	ns

ns: Non significant. a b numbers with different superscript are significantly different. Numbers in gray are estimated

