# Assessment of the impact of herd management on sensorial quality of charolais heifer meat

Session code : C6.8 (p219)
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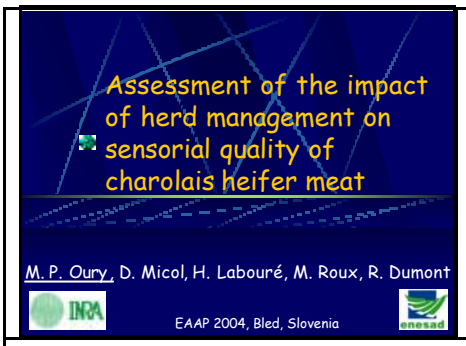
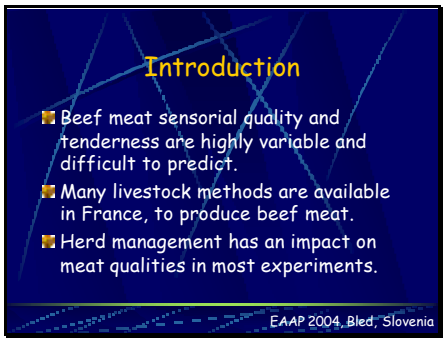
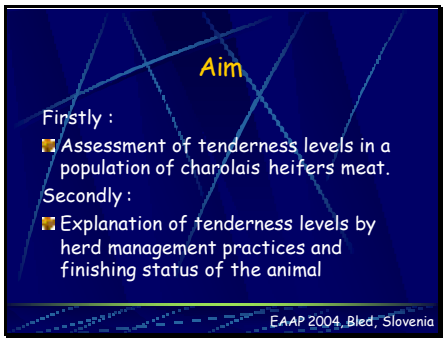


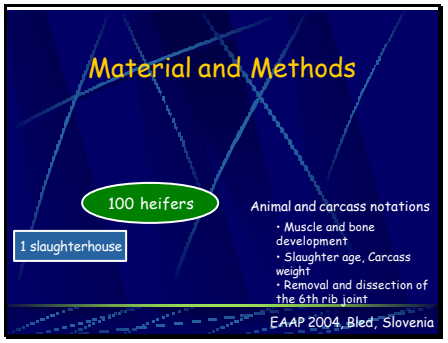

This research was done in bourgoundy (France) and is about the assessment of the impact of herd management on sensorial quality of charolais heifer meat.




* Meat industry and some consumers often criticize beef meat because the organoleptic quality and tenderness are highly variable and difficult to predict. So, beef meat consumption could be penalized, by the marketing of an irregular quality product.
* There are many livestock rearing methods in France to produce beef meat, depending on the region, the breed used, the feeding used (and so on).
* Herd management has an impact on meat qualities in most experiments, where the different factors are tested in controlled situations. For example, the effects of compensatory growth, type of feedstuff, sex, age, exercise, or slaughter characteristics, were already tested.




* The aim of this study is first to assess different tenderness levels in a population of 100 charolais heifers.
* Then, the second aim of this study is to explain these tenderness levels by herd management pratices and finishing status of the animal.
* The originality of this study is also that it tried to explain tenderness variability by a combination of herd management practices. This is different to the approaches generally used in the literature which consist of studying the effect of ONE breeding factor on sensorial quality.

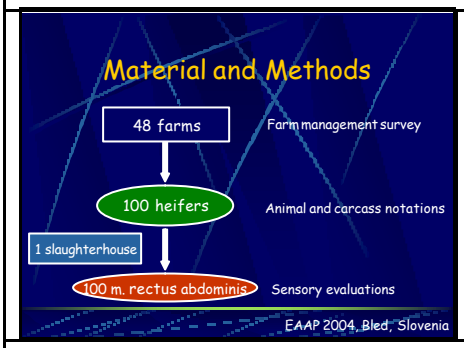
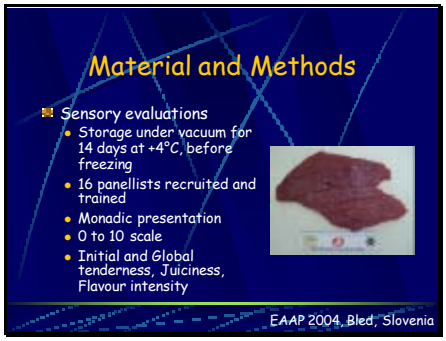



* One hundred Charolais heifers were selected on carcass weight, higher than 330 kg.
* Heifers were sampled in a commercial slaughterhouse between February 2003 and January 2004.

In order to prevent the effects of technological factors, standardized procedures were applied when slaughtering animals, chilling and storing carcasses.

* The carcass results were recorded directly at the slaughterhouse.

Muscle and bone development were recorded according to the Institut de l'Elevage method.

| | |
|---|---|
| | We also recorded the animal slaughter age and carcass weight.<br>The 6th rib joint was removed and dissected in order to assess muscle, fat and bone proportions. |
|  | * The 100 heifers came from 48 farms.<br>* Livestock rearing methods of each heifer were studied by farm management survey.<br>* Every muscle m. rectus abdominis of each right half-carcass was taken for sensory analysis. |
|  | * The muscle m. rectus abdominis was stored under vacuum for a 14 day period at +4°C.<br>Homogenous slices of 1.5 cm were then cut by a professional butcher and freezed until the sensorial analyses.<br>* Sixteen panellists were recruited and trained for meat assessment.<br>* Steaks were grilled on a double-sided grill at 300°C for 1.45 minute, then cut into cubes and served to the jury, in a monadic presentation.<br>* The sensorial characteristics were described on a 0 to 10 scale.<br>* Four sensory characteristics were use : initial tenderness, global tenderness, juiciness and flavour intensity. The score 10 also correspond to a very tender, juicy and well-flavoured meat. |
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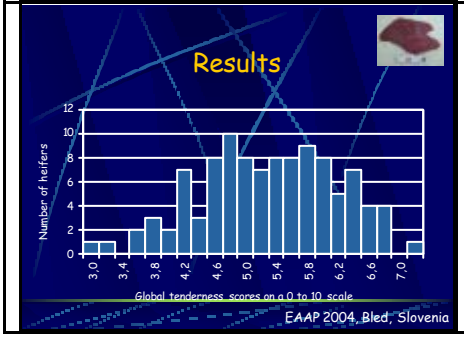
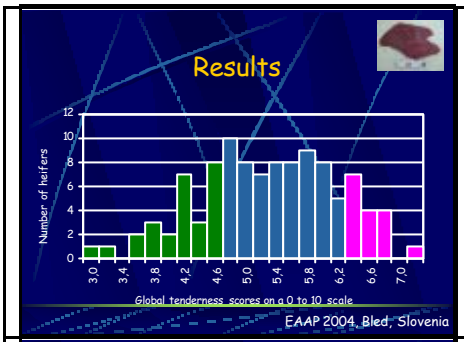
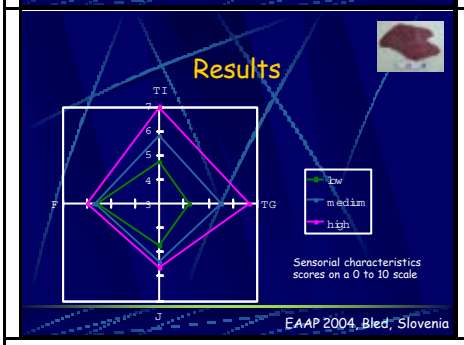
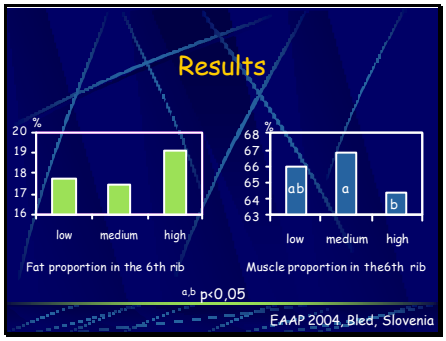
|  | The distribution frequency of the global tenderness mark varied between 3.0 and 7.2, with an average of 5.3. |




From a hierarchical classification on the initial and global tenderness data, it appeared that three different tenderness classes could be observed in the population : low , medium, high.
High tenderness level consisted of 11 heifers, with initial and global tenderness significantly higher than low and medium tenderness classes.

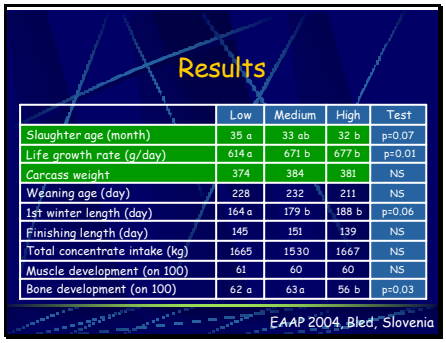



There was also a significant difference between the low tenderness class and the two others, with respect to juiciness, even if the classes were only established on tenderness.
Thus, meat of animals from high tenderness, which scored better for tenderness than low and medium classes, was also more juicy and tended to have a more intense flavour.



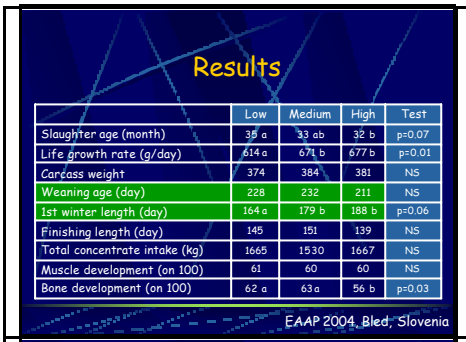

Secondly, we will look at the results of carcass and herd management.

From the 6th rib joint dissection it appeared that heifers from the different tenderness levels were characterized by the same fat and bone proportions.
Moreover, meat tenderness increased when the heifers' bone development mark decreased.
We may also think that the lowest muscle proportion of high tenderness level, goes with a higher fat proportion, even if the highest fat proportion is not significant.



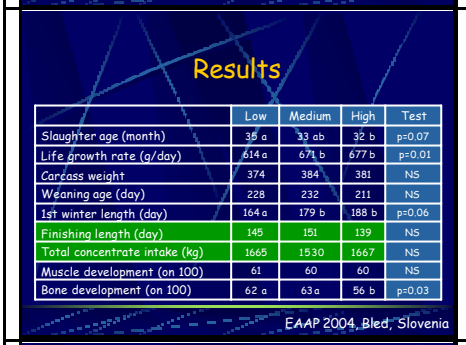

| | Low | Medium | High | Test |
|---|---|---|---|---|
| Slaughter age (month) | 35 a | 33 ab | 32 b | p=0.07 |
| Life growth rate (g/day) | 614 a | 671 b | 677 b | p=0.01 |
| Carcass weight | 374 | 384 | 381 | NS |
| Weaning age (day) | 228 | 232 | 211 | NS |
| 1st winter length (day) | 164 a | 179 b | 188 b | p=0.06 |
| Finishing length (day) | 145 | 151 | 139 | NS |
| Total concentrate intake (kg) | 1665 | 1530 | 1667 | NS |
| Muscle development (on 100) | 61 | 60 | 60 | NS |
| Bone development (on 100) | 62 a | 63 a | 56 b | p=0.03 |

* There was a significant effect of age at slaughter on tenderness levels.
Between tenderness levels, increasing slaughter age (32, 33 and 35 months respectively) leads to a decrease of tenderness.
* Moreover, the average carcass weights of the three classes were not significantly different.
* Life growth rate of medium and high tenderness levels was significantly higher than those from low tenderness level.
* We also conclude that a higher growth rate is in favour of greater tenderness. So, meat tenderness may be positively correlated to intramuscular fat. Thus, growth rate could induce improved tenderness by increasing fat deposition.



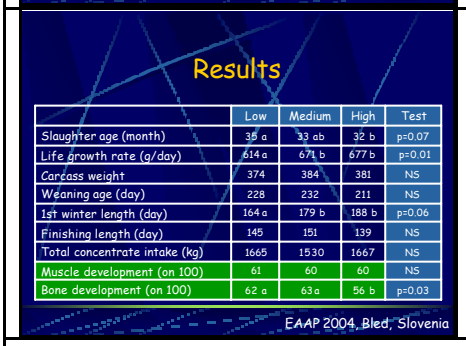

* Analysis of herd management of the heifers in the three tenderness classes showed that the high tenderness level animals were born one month after animals from the low and medium tenderness levels, and were weaned at the same age.

* The first winter (9 to 15 months period) was longer for the medium and high tenderness class animals, than for the low tenderness class animals.



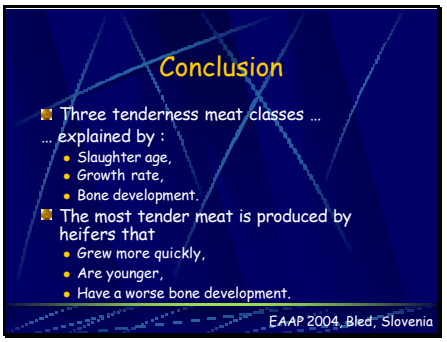

* The analysis of finishing length and concentrate intake did not show any difference between the three tenderness classes.

* There were no consistent variations in concentrate intake between tenderness classes.




* There were also no consistent variation in muscle development between tenderness classes,

* but heifers from the high tenderness level have nevertheless smallest carcass, with a lowest bone development.




* This experiment allowed firstly to conclude that it was possible within one type of animal, such as the Charolais heifer, to assess three meat tenderness classes.

* These three tenderness levels may be explained by three characteristics of herd management : slaughter age, growth rate, and bone development.

* Heifers that produce the most tender meat : grew more quickly, were younger, and had less bone developme nt than heifers from medium and low tenderness levels.