

# Effect of different herbage conservation methods on milk composition and milk sensory properties

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## German headline

Effekt unterschiedlicher Konservierungsverfahren von Wiesenfutter auf die Zusammensetzung der Milch und ihre sensorischen Eigenschaften

The nutritional benefits of milk produced in grass-based dairy systems (e.g. richer in omega-3 fatty acids, fat-soluble vitamins and antioxidants) are well known. However, different methods of herbage conservation (drying and ensiling) and feeding (grazing and indoor feeding of fresh herbage) also affect the milk properties. Recently, milk and milk products from cows fed no fermented forages was recognized as a guaranteed traditional speciality (g.t.S.) by the European Union and sold under a 'hay milk' label. The increasing interest of consumers for authentic and high-quality products reveals the need for a reliable differentiation between silage- and silage-free produced milk. This study investigates the effects of the herbage conservation method as well as grazing and indoor grass feeding on composition and sensory quality of the milk.

**Methods** Grass for hay and silage production was harvested on the same day from the same plot in May 2019. Forty-eight late lactating dairy cows (24 Holstein, 24 Montbéliarde) were allocated to four balanced groups. One group was fed hay, the second group was fed grass silage. The third and fourth groups were fed fresh herbage from the regrowth of the same plot previously used for hay and silage making either indoors or by strip-grazing. All animals were supplemented with 3 kg/day of concentrate and had free access to mineral blocks and water. Fifteen days of adaption were followed by 10 days of sampling. During the sampling period, milk yield was registered daily and individual milk samples were collected twice a week from morning and evening milkings. Each group was divided into three balanced sub-groups (two Holstein, two Montbéliarde). Bulk milk samples from evening and morning milkings of each sub-group were collected once during the sampling period. Bulk milk samples of the subgroups were pasteurised and conserved at 4°C for sensory evaluation on the following day. Nine trained panellists performed a descriptive sensory analysis (19 descriptors of colour (1), odour (5), taste (6), aroma (5), and texture (2); graded from 0 to 10) of the 12 milks, which were served in a sequential monadic way at room temperature (20±2°C). Individual milk samples were analysed by infrared spectroscopy (Milkoscan 6000, Foss, Hilleroed, Denmark) for contents of fat, protein, lactose, casein and urea. Data on milk yield and composition were analysed with PROC MIXED in SAS. Milk sensory analysis data were analysed with SensoMineR in R.

**Results** The milk yield did not differ between the treatments with  $13.8 \pm 3.04$  kg/day (mean  $\pm$  standard deviation). Likewise, the milk fat content did not differ between the four treatment groups and was on average  $36.9 \pm 3.95$  g/L. The protein content was higher ( $P=0.03$ ) in the milk of the hay-fed cows (33.6 g/L) in comparison to the cows fed silage (30.7 g/L) and fresh herbage indoor (30.6 g/L). The protein content in milk from grazing cows (31.5 g/L) did not differ from the other treatments. The milk urea content was higher ( $P<0.001$ ) in the milk of silage-fed (294 mg/L) and grazing cows (288 mg/L), than in the milk of cows fed hay (206 mg/L) or fresh grass indoor (220 mg/L). Milk from hay-fed and silage-fed cows had a less intense colour than that from cows fed fresh herbage indoors or on pasture. The milk from hay-fed cows had a less intense odour than the milk from grazing cows. Furthermore, creamy odour and creamy aroma were less intense in the milk from hay-fed cows than in all other milks. Moreover, milk from hay-fed cows had a less intense 'cooked milk' odour than milk from cows fed fresh herbage indoor.

**Conclusions** The herbage conservation and feeding method had a clear effect on the milk's sensory properties. This was most pronounced with milk from fresh herbage, and less clear with silage-based milk, only partially justifying the aforementioned labelling from a sensory perspective.

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### **Bibliographical references**