

# Effect of extended lactation on chemical composition and sensory quality of milk

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## Extended lactation

- Consists in delaying re-breeding and emphasizing management to maximize the persistency of lactation
- The strategy replaces 3 lactation cycles of 12 months for 2 cycles of 18 months
- Improvements in farms productivity, animal welfare and reduction in the greenhouse gases emission
- Milk quality must be investigated to ensure that its quality is not compromised when delivered to the industry

## Chemical composition

- Milk from 24 Danish-Holstein cows were sampled in 3 different stages of lactation (Figure 1)
- Milk from late (II) or extended (III) lactation presented higher amount of total solids when compared to mid lactation milk (Table 1)

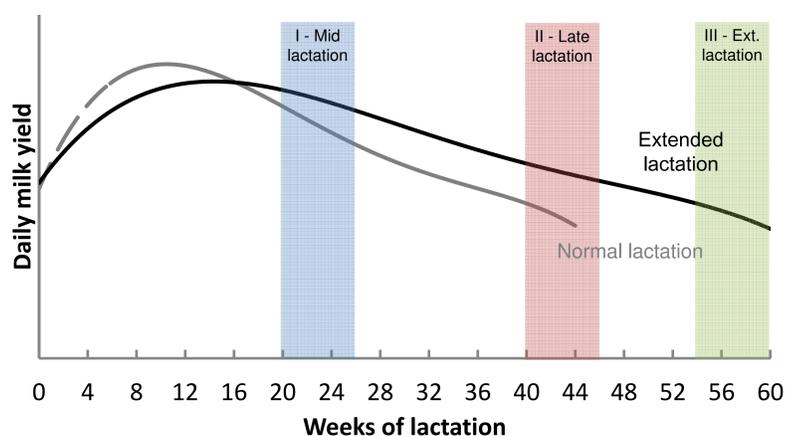


Figure 1. Extended lactation concept and sampling plan according to the lactation stage

Table 1. LS-Means ( $\pm$  SE) of the daily milk yield and chemical composition of milk from cows in mid lactation (I), late lactation (II) or extended lactation (III) (n = 24)

Parameters	I	II	III	P-value
Daily yield (Kg)	36.4 $\pm$ 1.1 <sup>a</sup>	30.5 $\pm$ 1.1 <sup>b</sup>	25.5 $\pm$ 1.5 <sup>c</sup>	***
log SCC (cells/mL) <sup>1</sup>	4.71 $\pm$ 0.10 <sup>a</sup>	4.94 $\pm$ 0.08 <sup>b</sup>	4.95 $\pm$ 0.07 <sup>b</sup>	**
Protein (%)	3.13 $\pm$ 0.04 <sup>a</sup>	3.63 $\pm$ 0.05 <sup>b</sup>	3.84 $\pm$ 0.06 <sup>c</sup>	***
Fat (%)	3.68 $\pm$ 0.10 <sup>a</sup>	4.18 $\pm$ 0.14 <sup>b</sup>	4.29 $\pm$ 0.17 <sup>b</sup>	***
Casein (%)	2.42 $\pm$ 0.03 <sup>a</sup>	2.77 $\pm$ 0.04 <sup>b</sup>	2.97 $\pm$ 1.1 <sup>c</sup>	***
Lactose (%)	4.80 $\pm$ 0.01 <sup>a</sup>	4.73 $\pm$ 0.01 <sup>b</sup>	4.74 $\pm$ 0.01 <sup>b</sup>	***
Chloride (g/L)	0.91 $\pm$ 0.02	0.97 $\pm$ 0.03	0.93 $\pm$ 0.03	NS
FFA (mEq/L) <sup>2</sup>	0.98 $\pm$ 0.02 <sup>a</sup>	0.98 $\pm$ 0.03 <sup>a</sup>	1.06 $\pm$ 0.04 <sup>b</sup>	*

<sup>1</sup>SCC: somatic cells counting in cells/mL; <sup>2</sup>FFA: free fatty acid in miliequivalent/mL; \*P < 0.1; \*\*P < 0.05; \*\*\*P < 0.001

## Descriptive sensory analysis

- Pasteurized whole milk from individual cows in mid lactation (I), extended lactation (III), and 2 distinct pooled samples from both lactation stages were analyzed by a trained sensory panel
- Attributes associated to off-flavours were mainly noticed for mid-lactation milk (I) and extended lactation milk (III) had higher grades for fat-related attributes (Figure 2)

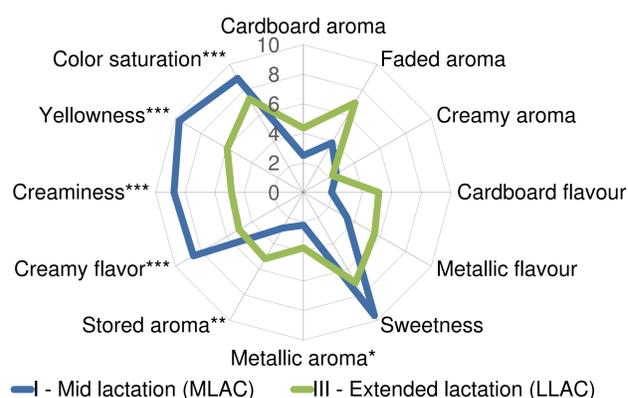


Figure 2. Cobweb plot of sensory profiles from the pooled milk of cows in I-mid lactation (MLAC) and II-extended lactation (LLAC). Intensity scale: 0 (low) to 15 (high). \*P < 0.05; \*\*P < 0.01; \*\*\*P < 0.001

## Lactation stage, milk composition and flavor

- PCA model showed a clear separation between the two lactation stages (Figure 3).
- The bi-plot evidences a group of compositional variables that is highly positively correlated with the sensory descriptors yellowness and creaminess
- The PCA model indicates that the decreased yield and increased fat and protein content are the main explanatory variables for the sensory differences

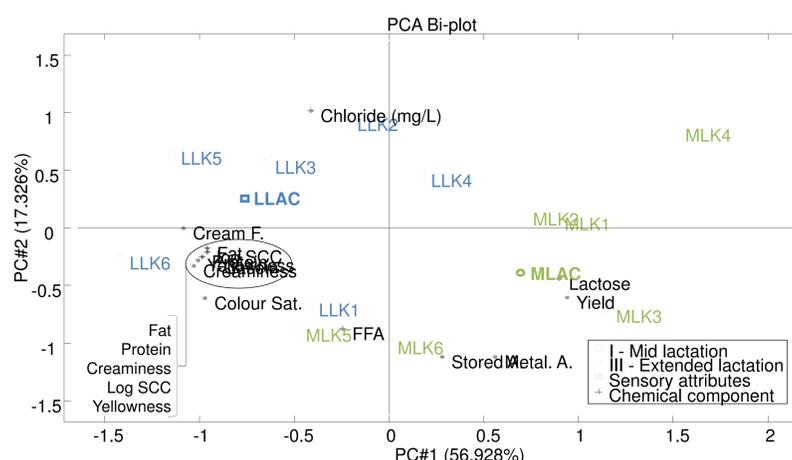


Figure 3. PCA Bi-plot displaying the relationship between lactation stage, milk composition and sensory attributes. Principal component (PC) one and two explaining 74% of the total variation. MLK 1-6: individual mid lactation milk; MLAC: pooled mid lactation milk; LLK 1-6: individual late lactation milk; LLAC: pooled late lactation milk

## Conclusions

- The variation in sensory quality is due to differences in milk composition through the lactation phases
- Extended lactation milk did not present sensory demerits when compared to mid lactation milk

