

## Effect of Calf Presence during Milking on Milk Fatty Acid Profile in Prim'Holstein and Salers Cow Breeds

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**Abstract.** The present study was conducted in order to evaluate the effects of calf presence during milking and cow breed on milk fatty acid (FA) profile. 30 Prim'Holstein (H) and Salers (S) primiparous lactating cows were milked in the presence (CP) or in the absence (CA) of their calves, during the 9 months of lactation. Milk FA profile was significantly influenced by breed: 4:0, 12:0, 18:2 n-6 and cis-18:1 had higher concentrations in milk from H cows, whereas 14:0, 18:3 n-3, cis-9,trans-11-CLA and trans-18:1 had higher concentrations in milk from S cows. The presence of the calf during milking also had an important effect: it decreased the milk fat content, as well as 18:0, 18:2 n-6, 18:3 n-3 and trans-18:1 levels and it increased 16:0 level. Cis-9,trans-11-CLA concentration increased in the presence of the calf, for H cows, whereas it decreased for S cows.

**Keywords:** milk fatty acids, calf presence, breed

### INTRODUCTION

Milk fat content and its fatty acid (FA) profile are important components of the nutritional and technological qualities of milk, influenced by many factors, such as breed. In dairy cows, fat content in milked milk is negatively linked to the reduction of cow-calf contact during milking, whereas maintaining this contact considerably increases the work of farmers. Traditional milking of Salers cows requires the presence of the calf (Tournadre *et al.*, 2008). The aim of this study was to evaluate the effects of calf presence during milking and cow breed on milk FA profile.

### MATERIALS AND METHODS

During the 9 months of lactation, 30 Prim'Holstein (H) and Salers (S) primiparous lactating cows were divided into four groups: (1) H cows milked in the presence of the calf (HCP), (2) H cows milked in the absence of the calf (HCA), (3) S cows milked in the presence of the calf (SCP) and (4) S cows milked in the absence of the calf (SCA).

The bulk morning milk was pooled with the previous evening milk stored at 4°C for each group, and thus the bulk milks were collected in four separate tanks, at seven pre-established cheesemaking dates. Milk FA profile was determined by gas chromatography according to Ferlay *et al.* (2010).

Data were analyzed with the mixed procedure of SAS with breed (B), treatment (CP or CA) and breed x treatment as fixed effects, and cheesemaking dates as random effect.

## RESULTS AND DISCUSSIONS

Milk FA profile from bulk milks are shown in Table 1. Breed had a significant effect on milk FA profile, except for 16:0, 18:0 and sum of polyunsaturated (PUFA). The milk from H cows had higher levels of 4:0 ( $P<0.01$ ), 12:0 ( $P<0.05$ ), 18:2 n-6 ( $P<0.001$ ) and cis-18:1 ( $P<0.05$ ), whereas S milk had higher levels of 14:0 ( $P<0.10$ ), 18:3 n-3 ( $P<0.001$ ) (Fig. 1), cis-9,trans-11-CLA ( $P<0.001$ ) (Fig. 1) and trans-18:1 ( $P=0.001$ ).

The presence of the calf during milking induced a lower fat content ( $P<0.001$ ) of milks, the difference being higher between S groups ( $P<0.05$ ). This can be explained by the fact that when a calf empties the udder after the milking, it drinks the milk with the highest fat content (Lollivier *et al.*, 2002). Calf presence during milking increased 16:0 level ( $P<0.01$ ) and decreased 18:0 ( $P<0.05$ ), 18:2 n-6 ( $P<0.001$ ), 18:3 n-3 ( $P<0.001$ ) (Fig. 1) and trans-18:1 ( $P<0.05$ ) levels. The decrease was more important for trans-18:1 ( $P<0.05$ ) in S groups. Cis-9,trans-11-CLA concentration increased in the presence of the calf, in H groups, whereas it decreased in S groups ( $P<0.001$ ) (Fig. 1).

Tab. 1.

Effect of calf presence during milking and cow breed on FA profile from bulk milks

	H		S		SEM	Significance (P-value)		
	CP	CA	CP	CA		B	Calf	B x Calf
Fat content (g/kg)	31.8 1	33.3 1	26.8 3	35.3 0	1.67	Ns	<0.001	<0.05
<i>Fatty acid (g/100 g of FA)</i>								
4:0	2.89	2.86	2.77	2.74	0.07	<0.01	Ns	ns
12:0	3.34	3.50	3.21	3.28	0.14	<0.05	Ns	ns
14:0	11.1 2	11.1 2	11.4 4	11.3 2	0.35	<0.10	Ns	ns
16:0	27.2 7	26.4 8	27.5 2	26.3 8	0.58	ns	<0.01	ns
18:0	10.3 4	10.9 1	10.4 4	10.5 8	0.43	ns	<0.05	ns
18:2 n-6	2.00	2.13	1.43	1.54	0.09	<0.001	<0.001	ns
18:3 n-3	0.82	0.85	0.91	1.00	0.02	<0.001	<0.001	<0.10
cis-9,trans-11-CLA	0.57	0.53	0.86	0.90	0.03	<0.001	Ns	<0.001
Sum of MUFA	27.6 0	27.4 5	26.4 6	27.0 3	0.72	<0.10	Ns	ns
Sum of PUFA	4.38	4.55	4.29	4.60	0.13	ns	<0.001	ns
Sum of trans-18:1	2.97	2.98	3.05	3.26	0.18	0.001	<0.05	<0.05
Sum of cis-18:1	22.1 1	22.1 0	20.8 4	21.3 2	0.65	<0.05	Ns	ns

SEM = Standard Error of the Mean; ns = not significant

SFA = saturated FA; MUFA = monounsaturated FA; PUFA = polyunsaturated FA

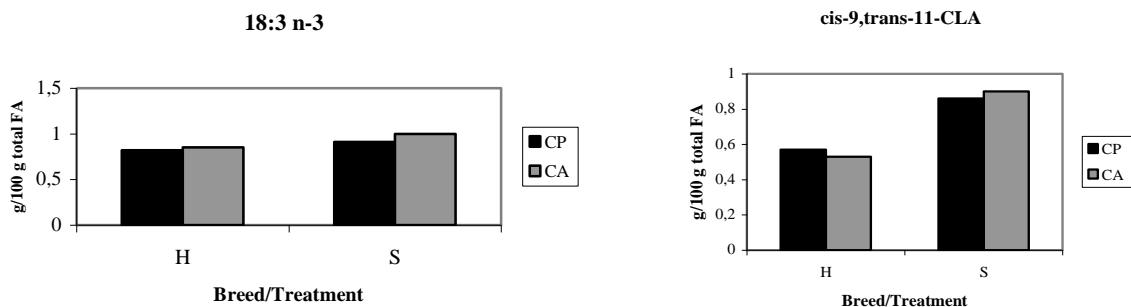


Fig. 1. Percentages of 18:3 n-3 and cis-9,trans-11-CLA in milk from Prim'Holstein and Salers cows, milked in the presence or in the absence of the calf

### CONCLUSIONS

The present study reports an important effect of breed on milk FA profile. The presence of the calf during milking also has a significant influence on milk fat content and some milk FA, either by decreasing or increasing their levels. Further research on individual milks is needed to confirm these results.

### REFERENCES

1. Ferlay, A., B. Martin, S. Lerch, M. Gobert, Ph. Pradel and Y. Chilliard (2010). Effects of supplementation of maize silage diets with extruded linseed, vitamin E and plant extracts rich in polyphenols, and morning v. evening milking on milk fatty acid profiles in Holstein and Montbéliarde cows. *Animal*. 4(4):627-640.
2. Lollivier, V., J. Guinard-Flament, M. Ollivier-Bousquet and P.-G. Marnet (2002). Oxytocin and milk removal: two important sources of variation in milk production and milk quality during and between milkings. *Reprod. Nutr. Dev.* 42:173-186.
3. SAS Institute. 2000. SAS User's guide: Statistics. Version 8 ed. SAS Inst. Inc., Cary, NC.
4. Tournadre, H., I. Veissier, B. Martin and J. P. Garel (2008). Influence of cow-calf contact before milking and mother-young relationship on yield and composition of milk in Salers cows. *Renc. Rech. Ruminants*. 15:159-162.