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## Effect of live yeast on ruminal biohydrogenation. A preliminary in vitro approach

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**Background and Objective**

- Live yeast used on field: a better diet utilisation
- Ruminal biohydrogenation (BH): interesting fatty acids (FA), like conjugated linoleic acids (CLA), are synthesised by ruminal bacteria, and then could be transferred into milk after desaturation of a part of vaccenic acid (*trans11-C18:1*) in CLA by the mammary gland (Figure 1)
- References are scarce about live yeast diet supplementation and BH of dietary lipids in dairy cows
- A preliminary *in vitro* approach of the effect of live yeast on BH with a high forage diet, which allows a high biohydrogenating ruminal activity

**Material and Design**

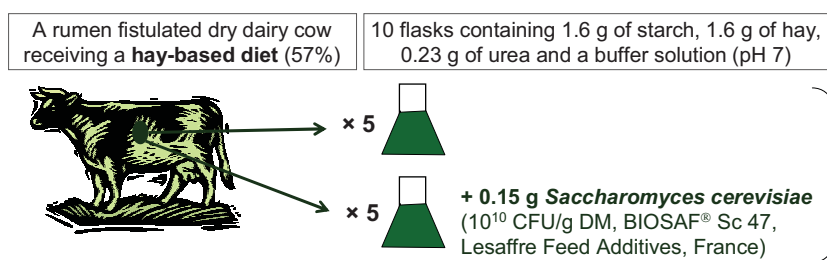
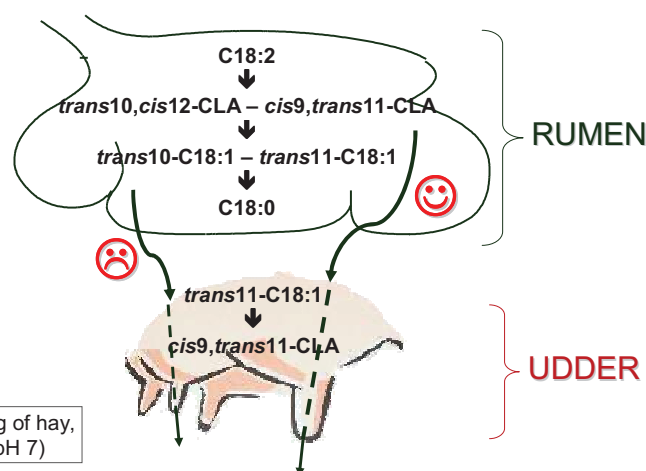


Figure 1. Linoleic acid (C18:2) biohydrogenation in rumen and transfer in milk



**Results and Discussion**

- No strong difference of FA composition in incubated media (Table 1):
  - The percentage C16:1+C17:0 *anteiso* twice higher ( $P < 0.01$ ) with live yeast : live yeast contains large amount of C16:1
  - The percentage of C15:0 *anteiso* lower with live yeast ( $P = 0.03$ ), possibly due to a decrease of *Ruminobacter amilophilus*<sup>3</sup> induced by yeast<sup>1</sup>
  - No effect on C18:2 BH intermediates like *trans-11* or *trans-10* CLA
  - No effect in such conditions on the extent of C18:2 ( $P = 0.566$ ) or  $\alpha$ -linolenic acid (C18:3) BH ( $P = 0.838$ ), 51% and 54% on average, respectively

Table 1. Fatty acids (FA) composition of incubated media

FA, % FAME	Control	Live Yeast	SEM	P-value
C12:0	0.21	0.17	0.023	0.384
C13:0	0.05	0.04	0.005	0.461
C14:0	0.61	0.76	0.078	0.382
C15:0	0.57	0.54	0.008	0.121
C15:0 <i>anteiso</i>	0.47	0.43	0.008	0.026
C15:0 <i>iso</i>	0.26	0.25	0.005	0.646
C16:0	12.04	11.82	0.151	0.484
C16:1 + 17:0 <i>anteiso</i>	0.36	0.73	0.011	<0.001
C17:0	0.38	0.36	0.006	0.166
C17:0 <i>iso</i>	0.12	0.12	0.003	0.215
C18:0	20.78	21.20	0.525	0.703
<i>cis-9</i> C18:1	13.13	13.46	0.237	0.515
Total <i>trans</i> -C18:1	7.50	7.18	0.636	0.812
<i>trans10</i> -C18:1	0.24	0.23	0.030	0.881
<i>trans11</i> -C18:1	5.26	5.27	0.536	0.989
<i>cis9,cis12</i> -C18:2	17.30	17.75	1.034	0.834
Total CLA	1.99	1.81	0.204	0.682
<i>trans10,cis12</i> -CLA	0.05	0.04	0.004	0.617
<i>cis9,trans11</i> -CLA	1.56	1.43	0.160	0.709
<i>cis9,cis12,cis15</i> -C18:3	7.16	7.10	0.532	0.955

■ Rates and efficiencies of the three reactions of C18:2 BH (Table 2) :

- An efficient ruminal BH in all media certainly because of pH 7 and presence of hay in the fermentative substrate
- No significant modification by live yeast

Table 2. Rates and efficiencies<sup>2</sup> of the three reactions of C18:2 biohydrogenation

	Control	Live Yeast	SEM	P-value
<b>v1*</b> (mg/L/h)	64.24	59.77	3.711	0.564
<b>E1</b> (%)	52.39	48.79	3.011	0.566
<b>v2*</b> (mg/L/h)	59.15	54.37	3.342	0.495
<b>E2</b> (%)	90.74	89.34	0.852	0.437
<b>v3*</b> (mg/L/h)	22.86	27.94	2.062	0.253

\* 1 refers to the isomerisation of C18:2 into CLA; 2 refers to the reduction of CLA into *trans*-C18:1; 3 refers to the reduction of all C18:1 in C18:0.

**Conclusions**

- No clear effect of live yeast on C18:2 and C18:3 BH with a high forage diet

**Perspectives**

- Live yeast effect on BH with high concentrate diets ?
- Effect after adaptation of cows to live yeast ?

<sup>1</sup>Pinloche et al., 2008 6<sup>th</sup> INRA-RRR Symposium. Gut Microbiology. 18-28 June 2008. Clermont-Ferrand, France.

<sup>2</sup>Troegeler-Meynadier et al., 2006. Repr. Nutr. Dev. 46:713-724.

<sup>3</sup>Vlaeminck et al., 2006. J. Dairy Sci. 89:2668-2678.