Replacing soybean meal with proteins of European origin in dairy cow feeding

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Context & Aim

1. EU imports more than 30.10^6 tons/year of soybean meal (SBM) with some consequences :
   Nitrogen enrichment of Europe, Economical dependency, GMO, Deforestation…

2. SBM will be more and more used by Asian countries ⟹ the offer/demand balance could change

➡ **Is it possible to replace SBM by European protein sources in the feeding of intensive dairy herds ?**

Material & Methods

Table 1. Composition and nutritional value of the diets

	'SBM' diet	'Local' diet
FORAGES, % Dry Matter Intake (DMI)		
Grass silage	31.4	29.3
Maize silage	46.8	44.5
Wheat straw	2.0	2.2
TOTAL	80.2	76.0
PROTEIN CONCENTRATE, % DMI		
Soybean meal	8.6	-
Rapeseed meal	5.8	10.5
Sunflower meal	-	3.4
DDGS	-	3.4
Corn germs meal	-	0.7
Sugarbeet vinasse	0.6	0.8
Urea	-	0.1
NaCl	-	0.1
TOTAL	15.0	19.0
PRODUCTION CONCENTRATE, % DMI		
Promilk super 19	4.8	5.0
NUTRITIONAL VALUE, g/kg DMI		
Protein	147	150
Digestible protein	83	81
Net energy, kcal/kg DMI	1559	1543
NDF	374	382
ADF	286	290
Fat	33	36

- **2 diets,** with or without SBM, having a similar nutritional value (Table 1) and fed at an *ad libitum* intake level
- **2 groups of 9 Holstein dairy cows** (28.6 L/d, 185-d in lactation)
- Experimental design : **cross over**
- **2 periods** of 24-d (21-d adaptation and 3-d experiment)
  - Daily production level,
  - Individual milk sample at each milking (6:30 and 16:30) and MIR analysis,
  - Daily refusals by group for composition analysis,
  - Individual weights before and after each period.
- **Statistical analyses** : GLM, 3 effects (diet, animal and period)
- **Calculation of feed cost** according to market prices (May 2010) for concentrates ingredients and to Deprez et al. (2007) for forages

Results & Discussion

ZOOTECHNICAL RESULTS

- Similar intake level for both diets (23 kg DM/al/d)
- Similar milk production and weight gain (320 g/al/d) for both diets (Table 2)
- No significant difference in major components of the milk (Table 2)
- Significant increase ($P < 0.011$) of the milk unsaturated fatty acid content with the 'Local' diet (rapessed effect, data not shown)

Table 2. Milk production and composition according to the diet

	'SBM' diet	'Local' diet	*P*
Milk production, kg/d			
kg/d	25.9	25.5	0.600
kg/d Fat-Protein Corrected Milk	25.8	24.9	0.303
Milk composition			
Milk fat, %	4.18	4.06	0.345
Milk fat, g/d	1081	1031	0.270
Milk protein, %	3.61	3.57	0.485
Milk protein, g/d	931	905	0.340
Milk urean content, mg/dL	187	179	0.404

ECONOMICAL RESULTS

- **Protein concentrate cost**: 'SBM' = **259 €/ton**
  'Local' = **197 €/ton**
  But, similar cost related to the digestible protein content
- **Feed production cost**: 'SBM' diet = **11.85 €/100 L milk**
  'Local' diet = **12.25 €/100 L milk**

Conclusion

This study confirms the feasibility to replace SBM by local protein sources in high producing dairy cows feeding, as well of an economical as a zootechnical aspect.

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