SHEEP CHEESE MADE WITH THE ADDITION OF SUNFLOWER MEAL

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Introduction

Defatted sunflower meal is a potential protein source for human consumption, because of its nutritional and functional properties. As a part of the research on vegetable protein technology carried out at our Institute (1), we have tested the possibility of adding sunflower defatted meal to traditional and widely used foods, such as dairy products. A preliminary study was carried out to characterize sunflower protein meals obtained from whole and dehulled seeds defatted with eight different solvents (2). Three of them, whole hexane-extracted of commercial origin (WHM), dehulled hexane-extracted (DHM) and dehulled ethanol-extracted (DEM), were tested on a large scale cheese-making, using sheep milk added with 1% of meal. The material balance, the evolution of dry matter and firmness during cheese ripening were considered together with the acceptability of the final products.

Materials and Results

Control and extended cheeses were produced in a commercial dairy according to the usual curdling of a tipical italian sheep cheese. All cheeses were ripened for 1 month at 8°C and 90% R.H. and sampled at 0,3,5,8,12,16,21,26 and 31 days of ripening.

The material balance reported in Tab. 1 shows that 40-80% of the meal was recovered with the enzymatic curd, while the remaining 20-60% was thermally collectable from the whey as ricotta. The addition of sunflower meal to cheese produced an increase in the nitrogen content (2.8 - 6.9%), while the fresh cheese yield varied from -1.7 to +4.4% with respect to the control.

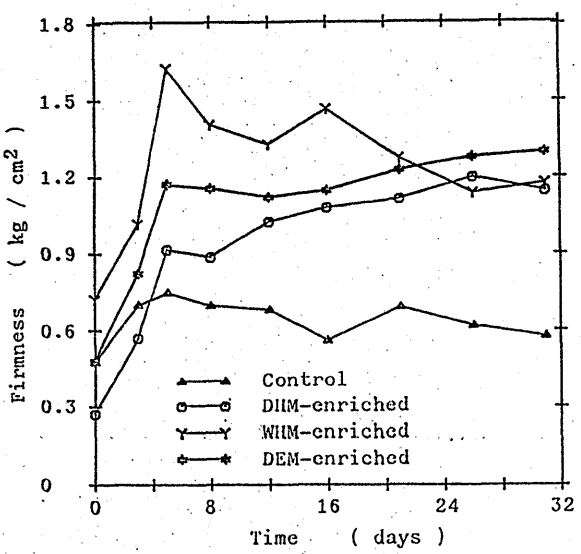
Tab. 1 - Material balance (kg) referred to 100 litres of sheep milk (milk density 1.034 kg/l) of cheese-making trials performed with the addition of three different sunflower meals.

	Control			DHM-enriched			WHM-enriched			DEM-enriched		
	as is	D.M.	N	as is	D.M.	N	as is	D.M.	N	as is	D.M.	N
Inflow												
Milk	103.4	15.9	.74	103.4	15.9	.74	103.4	15.9	.74	103.4	15.9	.74
Sunflower meal	-	-	-	1.0	1.0	.09	1.0	1.0	.05	1.0	1.0	.10
Totals	103.4	15.9	.74	104.4	16.9	.83	104.4	16.9	.79	104.4	16.9	.84
Intermediate												
Curd	21.6	9.7	.58	22.5	10.1	.62	23.0	10.1	.62	23.9	10.5	.67
Cheese whey	81.9	6.2	.16	81.9	6.8	.21	81.4	6.8	.17	80.5	6.4	.17
Totals	103.4	15.9	.74	104.4	16.9	.83	104.4	16.9	.79	104.4	16.9	.84
Outflow												
Cheese (ripened)	18.1	9.7	.58	17.8	10.1	.62	18.3	10.1	.62	18.9	10.5	.67
Ricotta	6.0	2.1	.08	7.4	2.6	.12	7.7	2.7	.09	6.6	2.3	.09
Whey	75.8	4.1	.08	74.5	4.2	.09	73.7	4.1	.08	73.9	4.1	.08
Ripening losses	3.5	-	-	4.7	-	-	4.7	-	-	5.0	-	-
Totals	103.4	15.9	.74	104.4	16.9	.83	104.4	16.9	.79	104.4	16.9	.84

The chemical composition of raw materials, wheys and ripened cheeses reported in Tab. 2 shows that almost all the fiber of WHM was collected in the cheese. Concerning the evolution of dry matter, no relevant differences were found, even if at full ripening the dry matter of the traditional cheese was 1.6% to 3.1% lower than the ones enriched with sunflower meal.

Tab. 2 - Chemical composition of raw materials, wheys and ripened cheeses (% D.M.).

	D.M. %	Protein (N*6.38) %	Lipids %	Ash %	Fiber %	N-free extracts %
Raw materials						
Milk	15.4	29.7	40.5	5.2	-	24.6
DHM	100.0	59.6	3.6	9.3	5.6	21.9
WHM	100.0	34.1	4.6	6.7	17.8	36.8
DEM	100.0	63.8	7.1	9.1	5.6	14.4
Wheys						
Control	7.6	16.5	21.3	6.3	-	55.9
DHM-enriched	8.3	19.7	21.9	6.2	-	52.2
WHM-enriched	8.3	15.9	25.0	6.2	trace	52.9
DEM-enriched	7.9	16.9	22.5	6.0	-	54.6
Cheeses						
Control	53.6	38.1	52.8	6.6	-	2.5
DHM-enriched	56.7	39.2	49.8	6.1	trace	4.9
WHM-enriched	55.2	39.2	47.3	6.5	1.7	5.3
DEM-enriched	55.6	40.7	47.5	6.7	trace	5.1



The figure reports the evolution of firmness in the middle of cheese samples during ripening. It can be noted that during the first days of ripening the extended cheeses showed a rapid increase of firmness, noticeably higher than the control. At full ripening firmness of the extended cheeses was double with respect to the control.

The acceptability of the products was fairly good, particularly with the DEM-enriched sample.

References

1) Lencioni L., Pisanelli A. M., Baldi E., Fiorentini R., Galoppini C. (1987) - Lebensm.-Wiss.-u.-Technol., in press.
2) Baldi E., Lencioni L., Fiorentini R. (1987) - Congresso "Stato attuale e prospettive delle colture oleaginose in Italia", Pisa, Italy, 24-26 february.