Effect of Lactation Season on Awassi Sheep Milk Quality and Fatty Acid Profiles

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Introduction

Awassi sheep milk is the main milk used to produce traditional dairy products in the Middle East. Sheep management during lactation is affecting milk quality including fatty acid profiles. Generally, farmers graze their animals and may offer a little supplementation during spring, later on, during late spring and summer, concentrates are provided, mainly barley grains. The offered supplementation could be characterized as an energy rich unbalanced diet.

Changes in milk composition due to the progress of lactation and traditional feeding regime can affect yields of traditional dairy products, such as white cheese, whereas changes in fatty acid profiles can affect the quality and nutritional value of ghee, an other important dairy product in the Middle East.

Materials and Methods

Data were collected at control days (30, 40, 70, 100, 120, 130 days after lambing) from eight lactating Awassi ewes at the Lebanese Agricultural Research Institute – Terbol station. The ewes were put under conventional feeding regime.

Milk production was measured, and milk samples were collected. Milk composition were analyzed using an automated instrument (Foss Milkoscan FT 120) and milk fatty acid profiles using gas chromatography (GC-FID).

Results

Milk Production and Composition

Average milk production during the study period was 568 g/day. Milk production decreased significantly by 15% with the progress of milking season (Figure 1). Milk protein and total solids increased by 19%, whereas the fat content increased by 60% (P<0.01). These results allow the suggestion to producers to produce traditional yogurt at the beginning of the milking season and to produce cheese at late spring, since cheese yield will be higher at that stage.

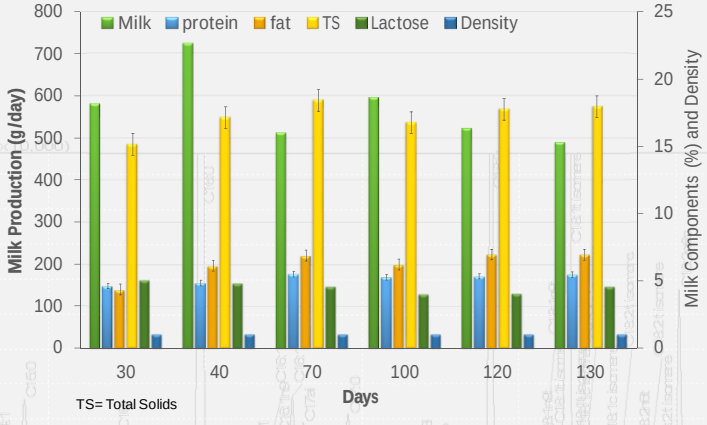

Figure 1. Milk production and milk characteristics during the experiment

Milk Fatty Acid Profile

The milk fat quality was affected by the progression of milking season and the change in feeding regime, which utilizes more stubbles and concentrates. Saturated fatty acids showed an increase of 6% towards the end of the milking season with a remarkable increase in C14:0 and C16:0, 17 and 24% respectively (P<0.01), whereas C4:0 to C12:0 decreased (Table 1).

Table 1. Milk fat content of the different fatty acids (%)

	Days						SEM	P-value
	30	40	70	100	120	130		
C4:0	4.12	4.14	3.98	4.01	4.07	3.77	0.15	NS
C6:0	2.87	2.82	2.66	2.48	2.68	2.61	0.08	*
C8:0	2.59	2.46	2.39	2.02	2.24	2.24	0.11	*
C10:0	7.60	7.31	6.73	6.01	6.75	7.11	0.54	NS
C12:0	4.36	4.06	3.83	3.48	3.81	4.12	0.39	NS
C14:0	10.40	9.79	10.39	10.71	11.46	12.18	0.51	**
C16:0	25.25	26.69	27.24	29.33	29.64	31.54	0.53	**
C18:0	9.47	9.08	10.01	10.25	8.77	7.95	0.88	NS
C20:0	0.25	0.26	0.29	0.30	0.31	0.29	0.01	NS

SEM = Standard Errors of Means
* P<0.05; ** P<0.001

Monounsaturated and polyunsaturated fatty acids were decreasing by 14 and 15% respectively (P<0.01). Moreover, the omega-3 fatty acids decreased by 40% (Figure 2), whereas omega-6 fatty acids increased by 11% (P<0.05).

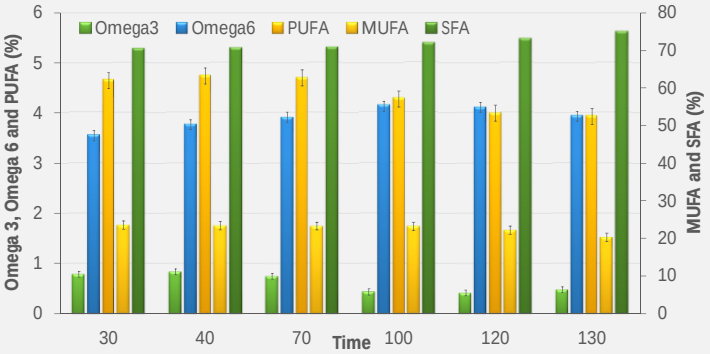

Figure 2. Milk fat content of Omega 3 and 6, Mono and poly unsaturated and saturated fatty acids

Lactation stage can promote the production of different dairy products with enhanced health benefits for family nutrition. Therefore, ghee produced in spring has a better nutritional value as it will be richer in bioactive compounds such as CLA and Omega-3 fatty acids (Figure 3).

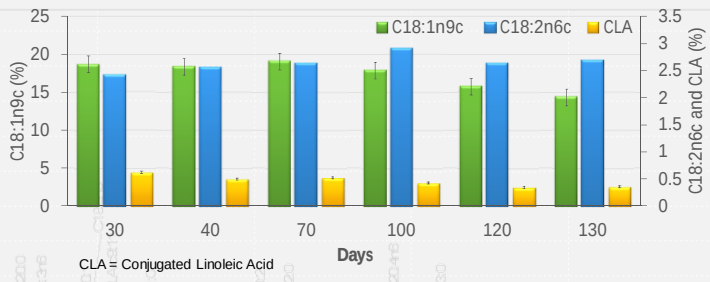

Figure 3. Milk fat content of Oleic Acid, Linoleic Acid and Conjugated Linoleic Acid

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