Journal of Animal & Plant Sciences, 34(4): 2024, Page: 1091-1098
ISSN (print): 1018-7081; ISSN (online): 2309-8694
https://doi.org/10.36899/JAPS.2024.4.0791

INFLUENCE OF LOCAL BREEDS NAJDI AND AWASSI ON FATTY ACID COMPOSITION AND LIPID QUALITY OF DAIRY SHEEP IN SAUDI ARABIA

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ABSTRACT

The breed of dairy sheep is an important factor affecting milk quality. The aim of this study is to identify the fatty acids (FA) and indices of lipid quality of milk fat in two indigenous Saudi sheep breeds. In this study, thirty-one multiparous ewes of Najdi (n=16) and Awassi (n=15) were examined. The breeds were kept under identical conditions and provided with the same feed (alfalfa hay and commercial pellets). After weaning at 9 to 12 weeks, ewes were milked twice daily until the end of lactation. Duplicate samples were taken from each ewe at weeks 9 and 10 for analysis of FA using a GC mass spectrometer. The collected data were analyzed using the SAS 9.4 program as a general liner modal (GLM) method. Najdi ewes produced more milk than Awassi ewes (0.75 vs. 0.63 L/day; $P \leq 0.01$), while milk components were not influenced by breed. The milk fat of Awassi ewes had higher content of saturated fatty acids (SFA: 59.2%), monounsaturated fatty acid (MUFA: 35.9%), and polyunsaturated fatty acid, (PUFA: 5.06%). Compared to the Najdi breed, the milk from Awassi ewes had a higher of conjugated linoleic acid (CLA), content with values of 0.72% compared to 0.56% in the milk of Najdi ewes. The atherogenic and thrombogenic indices of milk fat varied between 1.52% and 1.79% with sufficiently low values (less than 3%). The milk fat of the Awassi breed had a higher omega-3 (n3) ratio (0.94 vs. 0.54%), a lower n6/n3 ratio (3.77 vs. 7.39%) and a lower Hypocholesterolemia index value (33.6 vs. 36.9%) compared to Najdi's milk fat. These results showed that breed had a significant impact on milk quality, particularly essential fatty acids (CLA and ALA). The importance of selecting the Awassi breed in sheep breeding for the production of the milk with a slightly more favorable FA and lipid quality. This milk can potentially contribute to a healthier diet and improve the overall well-being of consumers.

Keywords: Ewe's milk, conjugated linoleic acid, fatty acid profile, Najdi breed, Awassi breed.

Published first online August 01, 2024 Published final August 25, 2024

INTRODUCTION

Sheep's milk is often used in cheese production and its importance in other dairy products is also increasing (Balthazar *et al.*, 2016). Compared to the milk of other ruminant's, sheep's milk has a high concentrate of total fat CLA (Haenlein and Park, 2006). The altered synthesis of the FA profile of milk, which has received increasing attention in several studies, through management and feeding (Chilliard *et al.*, 2007; Coppa *et al.*, 2013; Matar *et al.*, 2020) and genetic (Arnould and Soyeurt, 2009) are efficient tools. The UFA, especially CLA and omega-3 (n3), have played a crucial role in human health, such as preventing cardiovascular disease, reducing the risk of certain cancers, improving neurological function, and strengthening the immune system (Sretenović *et al.*, 2009).

Meat and milk from ruminants considered major dietary sources of CLA in the human diet. This is because rumen acid (RA), the main source of CLA, is synthesized by the biohydrogenation process in the rumen for LA, while endogenous conversion in the mammary gland and other tissues leads to the production of vaccenic acid (VA). (Bouattour *et al.*, 2007; Mierlita, 2016). In Saudi Arabia, the sheep population is almost 9.5 million animals (General Authority of Statistics, KSA, 2018). The native ewes Najdi and Awassi (Naeimi) are very popular and predominant breeds in the Central Province of Saudi Arabia and are used for meat production. However, these breeds have a high potential for milk production in harsh conditions. In the Eastern Province, the Najdi breed is the main indigenous sheep breed (Abouheif *et al.*, 1989). Awassi sheep, also called Naeimi, were exported from their native region in the Mediterranean to most countries in Arabia and Asia, such as Saudi Arabia (Galal *et al.*, 2008). The Najdi ewes showed high potential for milk production (1.94 litters/day) in intensive systems (Ayadi *et al.*, 2014). Study by Matar *et al.* (2017) reported that early weaning of Najdi lambs is considered a factor affecting milk characteristics and improving milk production and FA profile. However, there is little literature on the milk components and FA profile of indigenous Awassi ewes reared under intensive conditions in Saudi Arabia. Therefore, the purpose of this study was addressing this gap by determining the milk FA profile for native Saudi sheep breeds (Najdi and Awassi) and examining the influence of breed on milk FA profile and its association with milk quality indices.

MATERIALS AND METHODS

The experiment took place in spring 2015 (January to March) at the Animal Research Station (Al-Ammariah), College of Food and Agriculture Sciences, King Saud University, Saudi Arabia. The Ethics Committee of King Saud University approved the experimental protocol for handling ewes (KSU-SE-20-19).

Ewes management and feeding: In this experiment, 31 multiparous Najdi (n = 16, with 60 ± 3 kg average body weight) and Awassi (n = 15, with 51 ± 4 kg average body weight) ewes of normal health that had given birth to single lambs were used. During this study, animals were housed in semi-open pens to allow close observation, with no apparent differences in diet or management. Throughout the experiment, sheep were fed concentrate and alfalfa hay (1.5 kg/ewe/day) *ad libitum*. Drinking water was always available. All lambs remained free with their mothers during the first two months of lactation. After weaning, all ewes were milked twice at 8:30 a.m. and 4:30 p.m. from the 9^{th} to 12^{th} week of lactation.

Experimental diets analysis: The feed samples were subjected to chemical analysis to determine their crude protein (CP), ash content and ether extract (EE) according to the methods described in (AOAC, 2016). The content of neutral detergent fiber (NDF) and acid detergent fiber (ADF) was determined according to the methods described by (Van Soest *et al.*, 1991). Fat was obtained from commercial pellets and alfalfa hay using the Soxhlet method. In particular, FOSS has introduced the SoxtecTM 8000 extraction unit and the Hydrotechydrolysis unit, the first fully automated solution for total fat analysis. Detailed information for the composition and FA profile of the two dietary components can be found in Table 1.

Milk Sample and analysis: A milk sample (100 ml) was collected in duplicate after weaning (weeks 9 to 12) to determine total milk production for each individual ewe. The samples were stored at minus 20 °C until time analysis. One sample was used for reference analysis of the FA profile using GC-MASS. The remaining samples were using for analysis the chemical components (fat, lactose, protein and total solid) by a MilkoScan (Minor Type 78100, FOSS Electric, Denmark). To assess udder health, was performed using the Bovine CMT test kit, Kruuse, Germany.

The milk samples used for FA analysis were thawed in the heater at a temperature of 35 °C. The extraction of the sheep's milk fat was performed according the recommended methods in the relevant guidelines (Luna *et al.*, 2005). Milk fat was prepared for saponified and methylated using standard techniques and reagents according to the methods described by Matar *et al.* (2023). The FA concentration was presented as a percentage (g/100 g). The fatty acid methyl ester was prepared by mixing 0.4 g of milk fat with one ml of hexane and mixing with 0.2 ml of sodium methoxide (NaOH). Then, 0.2 ml of HCl added after heating to 50 °C in a water bath. The top layer samples were collected for analysis in glass bottle 2 ml. Identification and quantification of fatty acids is performed using a Gas Chromatography-Mass spectrometry ultra-device (GCMS-QP2010, Shimadzu and Kyoto, Japan) equipped with a column (Rtx-1: 30 m, 0.25 mm i.d., 0.25 m film thickness).

The helium gas flowing rate was 1.41 ml/min. The oven temperature was set by increased 15 °C per minute from 150 to 180 °C and then 1 °C per minute to 210 °C. The temperatures of injector and detector were set at 225 °C and 265 °C. The 70 eV electron ionization system was used for gas GC-MASS detection. The temperature of interface was set at 280 °C and the ion source temperature was kept constant at 230 °C. The main system components (R-times and mass spectra) were derived using standard and identified components.

Calculation of lipid quality indices: FA composition data were processed to determine the lipid quality indices. The following parameters were calculated:
TI: thrombogenicity index $= \frac{C12{:}0+C16{:}0+18{:}0}{(0.5\times MUFA)+(0.5\times n\text{-}6)+(3\times n\text{-}3)+(n\text{-}3{:}n\text{-}6)}$ (Średnicka-Tober *et al.*, 2016). hFA: hypocholesterolemia FA = C18:1 + PUFA; H FA-hypercholesterolemia FA = C12:0 + C14:0 + C16:0; h/H: hypocholesterolemia/hypercholesterolemic ratio $= \frac{C18{:}1+PUFA}{C14{:}0+C16{:}0}$, the hypocholesterolaemia and

hypercholesterolaemia FA ratio (h/H) calculated by the method described by Santos-Silva *et al.* (2002).

Statistical Analyses: The GLM procedure in SAS 9.4 (SAS, 2012) used for data analysis. According to model: $Y_{ijk} = \mu + BD_i + e_{ijk}$.. the Y_{ijk} is observation of sampling milk ewes, μ is overall mean, BD_i is the influence of breed (i.e., Najdi and Awassi), and e_{ijk} is the residual error. Using the Scheffe test, significant variances between the means were identified. Statistical tests were performed at a significance level of $P \leq 0.05$.

RESULTS AND DISCUSSION

Subclinical mastitis was not observed in any of the udder quarters during the experiment, as confirmed by a CMT score of less than 1. The average milk yield and chemical composition of Najdi and Awassi ewes after weaning (weeks 9 to 12) are shown in Table 2. In this study total milk production and energy-corrected milk (ECM) were significantly ($P \leq 0.05$) influenced by breed (Najdi and Awassi). Najdi ewes produced high milk yield, with 16% high total milk production and 31% high in ECM compared to Awassi ewes ($P \leq 0.01$). Previous studies have reported differences in milk production between different dairy sheep breeds (Alkass *et al.*, 2009; Mierlita *et al.*, 2011a; Alkass and Akreyi, 2016). Milk composition did not differ between Najdi and Awassi breeds ($P > 0.05$). This result is consistent with the result of studies with dairy sheep (Mierlita *et al.*, 2011a; Sinanoglou *et al.*, 2015).

The calculated values of FA groups, n6/n3 ratio and lipid quality indices for milk as represent in Table 3. For the majority of FA, no differences were found between the two local breeds. On average, SFA, MUFA, and PUFA were 59.2%, 35.9%, and 5.06%, respectively (Table 3). Similar findings have been reported in various studies focusing on dairy sheep (Rozbicka-Wieczorek *et al.*, 2013; Sinanoglou *et al.*, 2015). On the other hand, researchers have found variation in the proportions of SFA, MUFA and PUFA between breeds (Talpur *et al.*, 2009; Mierlita *et al.*, 2011b). According to Bouattour *et al.* (2007), higher SFA levels (>70%) were found in Lacunae sheep's milk fat than in native Najdi and Awassi ewes (65%). This percentage is similar to that reported in dairy breeds whose milk had elevated SFA content (Kay *et al.*, 2005). The lower content of SFA in Najdi and Awassi milk fat has positive effects on human health as mentioned by Ellis *et al.* (2006).

Milk fat of Awassi breed was characterized by higher n3 content compared to milk fat of Najdi breed (Table 3). Similar results were observed in the Sanjabi and Mehraban breeds (Payandeh *et al.*, 2016) and in the Karagouniko and Chios breeds (Sinanoglou *et al.*, 2015). Nevertheless, no difference was observed in the percentage of n3 and n6 FA in milk between Najdi and Awassi ewes. The ratio of n6/n3 FA plays a crucial role in reducing the risk various diseases, such as coronary heart (Simopoulos, 2008). A higher ratio of n6/n3 fatty acids is believed to be linked to an elevated risk of type 2 diabetes and coronary heart disease (Ellis *et al.*, 2006). The n6/n3 ratio in milk fat of Najdi ewes was higher than that of Awassi (7.39% vs. 3.77%, $P \leq 0.05$; respectively), but the two values were very close to each other. In human nutrition, diets with a ratio of n6/n3 FA (2:1 to 4:1) have been recommended to reduce cardiovascular disease, reduce the rheumatoid arthritis, and reduce the risk of breast cancer (Sretenović *et al.*, 2009). These study results differ from those previously reported regarding the n6/n3 FA ratio, which was similar in two breeds (Bouattour *et al.*, 2007; Mierlita *et al.*, 2011b; Matar *et al.*, 2017).

The thrombogenicity index (TI), atherogenicity index (AI), and hypocholesterolaemia to hypercholesterolemia (h/H) ratio in animal products are important indicators for evaluating the nutritional value and health effects on consumer. These indices provide valuable insight into the possible effects of consuming animal fats on conditions such as heart disease and blood clot formation. (Pilarczyk *et al.*, 2015; Sinanoglou *et al.*, 2015). In the current study AI and TI were identical between Najdi and Awassi breeds (AI = 1.52 vs. 1.64; TI = 1.78 vs. 1.79,). It is believed that high AI is more harmful to health. Result this study for AI was identical to that reported (Mierlita *et al.*, 2011a) in Turcana ewe (1.67%), but was lower than that of a study by Payandeh *et al.* (2016) for Mehraban and Sanjabi ewes (2.29 and 1.91%, respectively) and by Matar *et al.* (2017), in Najdi ewes (2.45%). Mierlita and Vicas (2015) emphasized that elevated levels of hypercholesterolemic FA, particularly palmitic acid (C16:0), may be have deleterious effects on human health. For better health outcomes, it is important to monitor and manage the intake of these fatty acids. In our study, we observed that milk fat of Awassi breed had lower FA index for hypocholesterolaemia, which was 33.6% ($P \leq 0.05$). However, no significant difference in h/H ratio between Najdi and Awassi ewes. Similar results were reported in dairy sheep (Mierlita, 2016), while other studies reported differences in h/H ratio between Karagouniko and Chios breeds (Sinanoglou *et al.*, 2015).

The FA profiles of Najdi and Awassi sheep's milk fat are summarized in Table 4. In the SFA group C14:0, C16:0 and stearic acid (C18:0), predominated and showed similar values in both sheep breeds. On average, C16:0 (27.9%) comprised of the total FA content, (C14:0) 7.9%, and C18:0 (11.9%). These results are consistent with previous literature reports, which have also shown that palmitic acid and myristic acid account for a significant proportion of the FA content in diary sheep milk (Mierlita *et al.*, 2011a; Mierlita *et al.*, 2011b; Sinanoglou *et al.*, 2015; Matar *et al.*, 2017), goat milk

(Kuchtík *et al.*, 2015) and bovine milk (Wang *et al.*, 2013).

Compared to the Najdi breed, the Awassi milk fat has a high content of small chain FA (C8:0, C12:0 and C14:0) (Table 4). It is worth noting that these particular FA in the human diet are associated with an atherogenic effect. However, it is important to consider that lauric acid also possesses antibacterial and antiviral properties that contribute to its multiple functions (Batovska *et al.*, 2009). This results of this study was similar to reported (Sinanoglou *et al.*, 2015). Furthermore, a significant amount of odd-chain FA (OCFA), ($P \leq 0.05$) was detected in the milk fat of Awassi ewes. These fatty acids included the isomer of pentadecanoic acid (C15:0), tetradecanoic acid (C15:0 iso), heptadecanoic acid (C17:0), and hexadecanoic acid (C17:0 anteiso). Similar results have been reported in other studies (Mierlita *et al.*, 2011b; Sinanoglou *et al.*, 2015; Payandeh *et al.*, 2016).

According to Vlaeminck *et al.* (2006), the presence of OCFA, which are mainly produced by rumen bacteria and have also been shown to have anti-cancer properties, varies significantly in milk fat. Keeney *et al.* (1962) mention that rumen bacteria are the main source of OCFA and branched chain FA (BCFA). Fatty acids occur naturally in animal tissues, particularly in ruminant tissues, and their concentration is often used as a taxonomic measure (Hopkins and Macfarlane 2000). The milk fat of Najdi ewes had higher oleic acid (C18:1 cis9) content (10.8%; $P \leq 0.05$; Table 4) than that of Awassi breed. Similar results have been reported in several studies (Talpur *et al.*, 2009; Mierlita *et al.*, 2011a; Payandeh *et al.*, 2016). These differences observed between Najdi and Awassi breeds could potentially be due to differences in acetyl-CoA carboxylase activity in mammary cells and a resulting increased *de novo* synthesis of polyunsaturated fatty acids (Chilliard *et al.*, 2003; Bernard *et al.*, 2005).

Conjugated linoleic acid (CLA) levels varied significantly between breeds. The CLA content in Najdi milk fat was 22.2% higher ($P \leq 0.05$; Table 4) than in Awassi. In contrast, vaccenic acid (trans-11C18:1; VA) and linoleic acid (rumenic acid; RA) contents did not differ between the two breeds, with average values of 1.82% and 3.28% of total FA content, respectively. The content CLA, VA and RA in the milk of the Najdi and Awassi breeds was similar to the milk content of the Anjabi and Mehraban sheep breeds (Payandeh *et al.* 2016), but lower than the values reported in other studies on dairy sheep (Talpur *et al.*, 2009; Rozbicka-Wieczorek *et al.*, 2013; Sinanoglou *et al.*, 2015).

The change in CLA content between sheep breeds may be attributed to the lower stearic acid content, which is related to less biological dehydration in the rumen (Tsiplakou *et al.*, 2006). These results suggest a potential connection between the synthesis of CLA through the conversion of RA by rumen bacteria and the conversion of VA in the mammary gland.

According to the results, there is a connection between the synthesis of CLA in rumen bacteria through the conversion of RA and in the mammary gland through the conversion of VA (Sieber *et al.*, 2004; Hur *et al.*, 2017). Previous studies reported a positive correlation between VA and CLA in milk fat of dairy sheep (Mierlita *et al.*, 2011a; Payandeh *et al.*, 2016). Furthermore, Nudda *et al.* (2014) reported that fortification of sheep milk and cheese with VA, CLA and LA has health benefits for humans.

Table 1. Chemical components and fatty acids profile (FA) for Alfalfa hay and commercial pellet.

Diets	Alfalfa hay	Commercial pellet
Chemical composition		
Crud protein%	17.50	14.5
Extract Ether%	2.20	1.20
ME[1],Mcal/kg	1.94	2.87
NDF[2] %	44.80	42.9
ADF[3] %	33.40	14.20
Ash %	9.01	7.50
Fatty acids profile		
C6:0	-	0.08
C8:0	-	0.48
C10:0	-	0.79
C12:0	2.39	14.26
C14:0	2.88	5.69
C16:0	20.83	17.08
C16:1 *cis9*	-	0.22
C17:0	0.43	-
C18:0	4.72	4.33
C18:0 1.2 *Epoxycota-oxiranedecane*	2.37	0.95
C18:1 *cis 9(OLEIC)*	7.67	34.51
C18:2 *cis9 cis12 (LA)*	25.38	19.29
C18:3 *cis9 cis12 cis15* (ALA)	28.03	0.98
C20:0	2.43	0.52

[1]: ME, metabolite energy; 2: NDF, neutral detergent fiber; 3: ADF, acid detergent fiber; LA: linolenic acid; ALA: α-linoleic acid.

Table 2: Average of milk yield and composition of Najdi and Awassi ewes at week 9 and 10 of lambing.

	Najdi	Awassi	P value	Sig
Milk yield L/d[1]	0.75±0.22[a]	0.63±0.15[b]	0.003	***
ECM[2]	0.79±0.22[a]	0.54±0.15[b]	0.001	***
Milk composition, %				
Fat	4.48±0.62	4.18±0.62	0.30	NS
Protein	4.09±0.24	4.08±0.18	0.11	NS
Lactose	4.85±0.48	4.54±0.27	0.58	NS
Total solid	14.71±0.82	13.41±0.54	0.05	NS

[a,b] Means in the same row with different superscripts are different (*P≤0.05*).
[1:] Milk yield in a 24h-period was obtained by hand milking twice a day.
[2:] Energy Corrected Milk; ECM = Milk yield, L.d-1 (0.071 + 0.15 × Fat (%) +0.043×Protein (%) + 0.2224). *** = P ≤ 0.05 Significant differences, NS= P > 0.05 non-significant.

Table 3: Characteristics of fatty acid profile and lipids quality indices of milk of Najdi and Awassi ewes at week 9 and 10 of lambing.

FA	Najdi	Awassi	SEM	P value	Sig
Saturated FA	58.16±1.68	59.88±1.11	1.42	0.39	NS
Unsaturated FA	41.83±1.68	40.11±1.02	1.39	0.39	NS
monounsaturated FA	36.86±1.63	34.98±1.08	1.38	0.35	NS
polyunsaturated FA	4.97±0.47	5.14±0.23	0.36	0.76	NS
n6 FA	3.69±0.35	3.29±0.25	0.26	0.29	NS
n3 FA	0.54±0.06 [b]	0.94±0.11[a]	0.08	0.005	***
n6/ n3	7.39±0.50[a]	3.77±0.35 [b]	0.25	0.004	***
Atherogenicity index (AI)	1.49±0.11	1.61±0.10	0.10	0.46	NS
Thrombogenicity index (TI)	1.78±0.03	1.79±0.02	0.03	0.77	NS
h	36.91±1.50	33.61±0.78	1.19	0.06	NS
H	35.66±0.90	36.21±0.94	0.91	0.67	NS
h/H	1.05±0.06	0.94±0.05	0.05	0.19	NS

[a,b] Means in the same row with different superscripts are different (*P≤0.05*).
MUFA - monounsaturated fatty acids, PUFA - polyunsaturated fatty acids n6= omega-6 FA. n3= omega-3; AI: Atherogenicity index; TI: thrombogenicity; hFA: hypocholesterolemia fatty acids; HFA-hypercholesterolemia fatty acids; h/H: hypocholesterolemia/ hypercholesterolemic ratio. *** = P ≤ 0.05 Significant differences, NS= P > 0.05 non-significant.

Table 4: Milk fatty acid profiles of milk of Najdi and Awassi ewes at week 9 of lambing (% of total measured FA).

FA	Najdi	Awassi	P value	Sig
C6:0	1.01±0.11	1.02±0.05	0.89	NS
C8:0	1.15±0.16	1.16±0.07	0.94	NS
C10:0	3.67±0.56	3.53±0.24	0.82	NS
C12:0	2.33±0.27	2.89±0.23	0.25	NS
C14:0	7.71±0.36	8.21±0.43	0.38	NS
C14:1 *cis9*	0.08±0.01	0.09±0.02	0.70	NS
C15:0	0.65±0.04	0.89±0.11	0.07	NS
iso C15:0[2]	0.20±0.04[b]	0.37±0.04[a]	0.01	***
C16:0	27.95±0.62	28.01±0.55	0.95	NS
iso C16:0[2]	0.16±0.01[b]	0.24±0.02[a]	0.02	***
C16:1 *cis 6*	0.22±0.02	0.29±0.02	0.05	NS
C16:1 *cis9*	1.37±0.06	1.45±0.05	0.32	NS
C17:0	0.89±0.04[b]	1.10±0.04[a]	0.003	***
antiso C17:0[3]	0.32±0.02[b]	0.43±0.04[a]	0.02	***
C17:1 *cis10*	0.38±0.05	0.41±0.03	0.65	NS
C18:0	12.14±0.76	11.82±0.59	0.74	NS

C18:1 *trans 8*	0.37±0.04	0.32±0.04	0.36	NS
C18:1 *trans 9*	0.28±0.49	0.57±0.35	0.63	NS
C18:1 *trans 11 (VA)*	1.88±0.33	1.76±0.13	0.73	NS
C18:1 *trans 13*	0.25±0.02	0.28±0.02	0.26	NS
C18:1 *cis 9 (Oleic)*	31.94±1.60	28.47±0.88	0.07	NS
C18:1 *cis 11*	0.58±0.04	0.65±0.03	0.22	NS
C18:1 *cis 13*	0.32±0.06	0.65±0.34	0.45	NS
C18:1 *cis 14*	0.22±0.01	0.25±0.02	0.17	NS
C18:2 *trans10 trans13*	0.19±0.03[b]	0.29±0.01[a]	0.001	***
C18:2 *cis 9 cis 12 (LA)*	3.41±0.32	3.16±0.13	0.32	NS
C18:2 cis9 trans11(CLA)	0.56±0.02[b]	0.72±0.11[a]	0.041	***
C18:3 cis9 cis12 cis15 (ALA)	0.54±0.06[b]	0.94±0.11[a]	0.005	***
C20:0	0.20±0.01	0.23±0.02	0.28	NS
C20:4 cis5 cis8 cis11 cis14	0.32±0.03[a]	0.24±0.02[b]	0.02	***

[a,b] Means in the same row with different superscripts are different ($P \leq 0.05$). VA: vaccenic acid; LA: linolenic acid; CLA: conjugated fatty acid; ALA: α-linoleic acid. *** = $P \leq 0.05$ Significant differences, NS= $P > 0.05$ non-significant.

Conclusions: Sheep's milk fat is known for its high content of short and medium chain fatty acids. Compared to Najdi milk, Awassi milk is characterized by a higher n3 ratio, a lower n6/n3 ratio, a higher CLA concentration and a lower hypocholesterolemic FA index. This means that consuming Awassi milk can provide significant nutritional benefits. These results highlight the importance of considering the fatty acid profile and lipid quality indices when selecting sheep breeds. It serves as a valuable criterion for breed selection and ensures the desired nutritional value of the milk.

Author Contributions: Conceptualization, methodology, validation, formal analysis, investigation, H.A.A; A.M.M and I. A writing—original draft preparation, writing—review and editing, M.A, A.M.M and S.A.A; visualization, A.M.M; supervision, R.S.A and M.A; project administration, R.S.A; funding acquisition, R.S.A

Funding: This research was funded by the Researchers Supporting Project number (RSPD2024R1036), King Saud University, Riyadh, Saudi Arabia.

Data Availability Statement: Informed consent was obtained from all subjects involved in the study.

Acknowledgments: The authors extend their appreciation to the Researchers Supporting Project number (RSPD2024R1036), King Saud University, Riyadh, Saudi Arabia.

Conflict of Interest Declaration: The authors have declared that there is no conflict of interest

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