



## Fatty acid profile and nutrient composition of muscle and adipose tissue from Malpura and fat-tailed Dumba sheep

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### ABSTRACT

Fatty acid (FA) profile and nutrient composition of *Longissimus dorsi* (LD) muscle and various adipose tissues of adult Malpura sheep (4–6 years) and lambs (6 month), and fat tailed Dumba sheep (1 year) were evaluated. Compared to lamb, LD muscle of adult Malpura sheep had lower polyunsaturated FA (PUFA),  $\omega$ -6,  $\omega$ -6/ $\omega$ -3, desirable FA (DFA) and higher atherogenic index (AI), monounsaturated FA (MUFA),  $\omega$ -3, MUFA:PUFA ratio, short-chain FA (SCFA) and conjugated linoleic acid (CLA). Similarly, adipose tissue fat had higher MUFA, MUFA:PUFA ratio and AI in adult than the lamb. Dumba sheep showed a different FA profile with higher SFA in caul fat and lower in LD muscle, while proportionally lower PUFA in caul fat and higher in LD muscle. Likewise,  $\omega$ -3 and  $\omega$ -6 FA was comparatively more in LD muscle while *c911* CLA was highest in the tail adipose tissue. Between Malpura and Dumba, the FA profile of LD muscle revealed higher SFA and *cis-9 trans-11* CLA but lower PUFA and  $\omega$ -6 FA in Malpura. It can thus be concluded that Malpura lamb meat is healthier having improved PUFA,  $\omega$ -6: $\omega$ -3 ratio and AI than the adult. Furthermore, Dumba may also be considered a promising mutton breed with significant PUFA,  $\omega$ -3 and  $\omega$ -6 FA. Further studies are needed to ascertain the effects of different dietary regime on the FA profile of Dumba and Malpura sheep.

**Keywords:** Adipose tissue, Dumba, Fat quality, Malpura, Muscle

Recently, research is being focused on the quality improvement of sheep meat as the produce are considered as good source of polyunsaturated fatty acids (PUFA) especially, conjugated linoleic acid (CLA) (Allen 1993) which have wide range of health benefits (Enser 2001). Further, the quality of sheep meat is variably affected by many factors like age and breed. Hoffman *et al.* (2003) reported that there are differences in pH values and fatty acid (FA) composition of the meat among different breeds. The ratio of different FA in human diet must be optimum for synergy. The optimum ratio of PUFA to saturated FA (SFA) must be 0.45 or above in the diet (Warris 2000). The values of n-6 : n-3 ratio lower than 4 is most favourable in order to prevent cardiovascular diseases in human (Scollan *et al.* 2006). Hence there is a need to find ways to produce healthier meat with a higher ratio of PUFA to SFA and a more favourable balance between  $\omega$ -6 and  $\omega$ -3 (Wood *et al.* 2003). Hence it is important to have data regarding the FA and nutrient composition of meat from different breeds.

Malpura is native to North-Western semi-arid India and promises a meat-type breed besides wool, hence there is need to explore the nutrient composition and FA profile of mutton from Malpura sheep at different age groups. Additionally, fat-tailed Dumba sheep can also be a meat-

type breed for the farmers. Dumba sheep is often crossbred with Patanwadi and Marwari ewes (Jyotsana *et al.* 2010). However, till date no reports are available regarding the nutritional profile and FA composition of Dumba meat. Therefore, the present study compares the nutrient composition and FA profile of Malpura *vis-à-vis* Dumba sheep so as to generate basic information for future research.

### MATERIALS AND METHODS

The experiment was carried out at ICAR-Central Sheep and Wool Research Institute, Avikanagar, Rajasthan, India. The animal care, handling, slaughtering, and sampling procedures were approved by the CPCSEA, India. The Malpura finisher lambs (6 months) were kept under stall-fed conditions and offered *ad lib* legume roughage and concentrate mixture (CP16% and DE2, 700 Kcal). Similarly, adult Dumba sheep were also stall fed and offered *ad lib* *Cenchrus* hay and concentrate mixture at 500 g/day. Adult ewes were fed on concentrate mixture at 300 g/day and grazed on pasture for 6–8 h.

Animals were slaughtered by Halal method in the Experimental Abattoir of the Institute. Samples of *Longissimus dorsi* (LD) muscle and adipose tissue were collected from the loin area. Additionally, fat samples from tail, kidney and caul region were collected from Dumba. They were processed for nutrient composition (AOAC

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2000) and FA analysis (Bhatt *et al.* 2017).

Meat samples of adult sheep and lambs were compared for analysis of variance using Tukey's test. Similarly, FA profile between Dumba and adult Malpura sheep was compared. The fat samples from different portions (except

LD muscle) of Dumba sheep were compared statistically.

## RESULTS AND DISCUSSION

Nutrient composition of LD muscle revealed significantly higher ( $P<0.05$ ) CP in lamb and higher EE in

Table 1. Composition of carcass from adult (4 years and above) and finisher (6 month) lamb of Malpura sheep

Nutrient	<i>Longissimus dorsi</i> muscle				Adipose tissue			
	Adult sheep	Lamb	SEM	P value	Adult Sheep	Lamb	SEM	P value
DM	29.81	28.19	0.25	1.112	86.02	85.19	0.338	0.124
TA	1.31	1.14	0.05	0.674	1.60	1.35	0.071	0.111
CP	22.34 <sup>a</sup>	24.79 <sup>b</sup>	1.022	0.040	3.41	2.86	1.211	0.614
EE	5.16 <sup>b</sup>	2.15 <sup>a</sup>	0.021	0.038	82.00	83.84	0.429	0.211
Water	70.19	71.81	0.571	0.432	13.98	14.81	0.21	0.219

Values bearing different superscripts in a row (within the box) differ significantly ( $P<0.05$ ). DM, dry matter; TA, total ash; CP, crude protein; EE, ether extract.

Table 2. Fatty acids profile of *Longissimus dorsi* and adipose tissue of adult Malpura sheep and lambs

Fatty acid	<i>Longissimus dorsi</i> muscle				Adipose tissue			
	Adult sheep	Lamb	SEM	P value	Adult sheep	Lamb	SEM	P value
Σ SFA	49.13	49.06	1.602	0.128	60.33 <sup>a</sup>	64.63 <sup>b</sup>	1.219	0.041
Σ MUFA	45.18 <sup>b</sup>	38.78 <sup>a</sup>	1.103	0.032	33.85 <sup>b</sup>	29.37 <sup>a</sup>	1.242	0.019
Σ PUFA	5.40 <sup>a</sup>	11.71 <sup>b</sup>	2.452	0.032	3.25	5.87	0.986	0.231
Σ ω-6	4.12 <sup>a</sup>	10.96 <sup>b</sup>	0.686	0.042	1.28 <sup>a</sup>	3.70 <sup>b</sup>	0.486	0.025
Σ ω-3	2.86 <sup>b</sup>	0.75 <sup>a</sup>	0.355	0.011	1.83	2.17	0.370	0.231
ω-6/ω-3	1.44 <sup>a</sup>	14.61	0.393	0.022	0.70 <sup>a</sup>	1.70 <sup>b</sup>	0.307	0.028
PUFA/SFA	0.11	0.24	0.067	0.412	0.07	0.09	0.012	0.073
MUFA/PUFA	8.36 <sup>b</sup>	3.31 <sup>a</sup>	0.123	0.039	10.41 <sup>b</sup>	5.00 <sup>a</sup>	0.117	0.022
DFA	60.19 <sup>a</sup>	65.54 <sup>b</sup>	1.179	0.017	51.10	51.43	2.423	0.132
Σ SCFA	41.56 <sup>b</sup>	33.3 <sup>a</sup>	1.145	0.037	45.25	41.1	2.381	0.128
Σ LCFA	56.26	65.1	3.421	0.051	51.10 <sup>a</sup>	57.5 <sup>b</sup>	1.347	0.026
AI value	2.46	1.28	0.143	0.021	3.20 <sup>b</sup>	1.51	0.126	0.024
TI value	1.39	1.68	0.147	0.072	2.86	2.25	0.177	0.073
<i>Conjugated linoleic acid</i>								
c9t11t9c11	1.06 <sup>b</sup>	0.19 <sup>a</sup>	0.029	0.017	3.12 <sup>b</sup>	0.29 <sup>a</sup>	0.022	0.021
t10c12	0.02	0.07	0.010	0.095	0.05	0.04	0.052	0.084
t9t11	0.69 <sup>b</sup>	0.09 <sup>a</sup>	0.011	0.043	0.61	0.14	0.034	0.071
Σ CLA	1.77 <sup>b</sup>	0.35 <sup>a</sup>	0.035	0.038	3.78 <sup>b</sup>	0.46 <sup>a</sup>	0.035	0.031
<i>Individual fatty acids</i>								
C12	1.62	1.72	0.320	0.145	2.13 <sup>b</sup>	0.58	0.100	0.042
C14:0	2.48	1.85	1.093	0.068	3.80 <sup>a</sup>	6.96 <sup>b</sup>	0.901	0.044
C14:1	2.58 <sup>b</sup>	0.27 <sup>a</sup>	0.109	0.041	0.06	0.13	0.038	0.123
C15:1	2.47 <sup>b</sup>	0.05 <sup>a</sup>	2.11	0.029	0.68 <sup>b</sup>	0.03	0.035	0.021
C16:0	30.99	26.84	1.274	0.127	37.53 <sup>b</sup>	29.53 <sup>a</sup>	3.080	0.039
C18:0	9.61	15.05	1.111	0.038	14.00	16.19	0.859	0.140
C18:1n9t	3.42	2.02	0.572	0.125	1.38 <sup>b</sup>	0.56	0.465	0.023
C18:1n9c	32.02	33.21	0.128	0.121	30.43 <sup>b</sup>	24.47 <sup>a</sup>	0.092	0.019
C18:2n6t	0.11	2.98	0.513	0.039	0.08 <sup>a</sup>	0.31 <sup>b</sup>	0.066	0.021
C18:2n6c	2.78	5.36	0.059	0.021	1.20 <sup>a</sup>	3.33 <sup>b</sup>	0.062	0.037
C20:0	0.11	0.24	0.414	0.112	0.33 <sup>a</sup>	5.84 <sup>b</sup>	0.208	0.023
C18:3n6	7.61 <sup>b</sup>	0.09 <sup>a</sup>	0.017	0.027	1.40	0.06	0.125	0.282
C20:1	1.30 <sup>b</sup>	0.03 <sup>a</sup>	0.033	0.061	0.10	0.10	0.104	0.097
C18:3n3	0.24	0.31	0.052	0.415	0.20 <sup>a</sup>	1.82 <sup>b</sup>	0.075	0.044

Values bearing different superscripts in a row (within the box) differ significantly ( $P<0.05$ ). SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; DFA, desirable fatty acids; SCFA, short chain fatty acids; LCFA, long chain fatty acids; AI, atherogenic index; TI, thrombogenic index.

adult sheep (Table 1). Lambs accrued tissue protein for growth and hence produced lean meat whereas adult sheep accumulated more fat compared to tissue protein. Similar results were reported in finisher lambs by Bhatt *et al.* (2017). The LD muscle fat of adult sheep had lower ( $P<0.05$ ) PUFA,  $\omega-6$ ,  $\omega-6 : \omega-3$  ratio and higher ( $P<0.05$ ) monounsaturated fatty acids (MUFA),  $\omega-3$ , MUFA:PUFA, desirable FA (DFA) and short-chain FA (SCFA) as compared to lamb (Table 2). Similarly, the proportion of CLA was also higher ( $P<0.05$ ) in fat of adult animal as compared to that of lamb. Individual FA in LD muscle revealed higher ( $P<0.05$ ) C14:1, C15:1 and C18:3n-6 and C20:1 in adult while C18:0, C18:2n-6c and C18:2n-6t were higher in lamb.

Fatty acid analysis of adipose tissue revealed higher ( $P<0.05$ ) proportion of SFA,  $\omega-6$ ,  $\omega-3$ , ratio of  $\omega-6/\omega-3$  and LCFA in lambs whereas in adult sheep MUFA, MUFA:PUFA ratio and atherogenic index (AI) were higher (Table 2). The observed inverse relation in PUFA:SFA ratio between adult and lamb meat was in line with Raes *et al.* (2004). At par with our results Scerra *et al.* (2011) reported that independent of feed type, the PUFA:SFA ratio in sheep meat is around 0.1–0.26. Proportion of different (except *t9t11*) and total CLA was higher in adipose tissue of adult animal. Individual fatty acids revealed higher ( $P<0.05$ ) content of C12, C16:0, C18:1n9t and C18:1n9c in adipose tissue of adult animal and C14:0, C18:2n-6t, C18:2n-6c, C20:0 and C18:3n3 in that of lamb. In agreement to the present findings, Al-Suwaiegh and Al-Shathri (2013) reported that C14:0, C15:0, C17:0, C16:1, C17:1, C18:1t-9,  $\omega-6/\omega-3$  ratio, and SFA were significantly higher ( $P<0.05$ ) in sheep at higher slaughter age. From these results, it appears that the fat of lamb is healthier than that of adult sheep due to lower C12:0, C14:0 and C16:0 as these increase LDL in blood while the other SFA are found to neutralize their effect since they increase HDL level (Parodi 2009). In addition, adult sheep fat has higher AI than lambs which renders it more detrimental to human health (Ulbricht and Southgate 1991).

The chemical composition of LD muscle in fat tailed Dumba sheep revealed similar value like that of adult Malpura sheep (Table 3). The value of nutrient composition was similar in all the fat depots of Dumba sheep. The composition of FA from fat-tailed sheep revealed significant ( $P<0.05$ ) differences for SFA, MUFA, PUFA,  $\omega-6$ ,  $\omega-3$ ,  $\omega-$

$6:\omega-3$  ratio, PUFA:SFA ratio, DFA, SCFA, long-chain FA (LCFA), AI and thrombogenic index (TI) among different tissues (Table 4). The composition of fat from LD muscle was similar to that of Malpura sheep. While comparing the proportion of FA from different fat depots of Dumba sheep with that of Malpura sheep it can be inferred that fat of Dumba is low in SFA and  $\omega-3$  FA having higher  $\omega-6:\omega-3$  and MUFA:PUFA ratio and a similar proportion of CLA. Significant ( $P<0.05$ ) differences were also observed in the proportion of C18, C18:1n9c, C18:2n6t, C18:2n6c, C20:3n3 and C20:4n6 FA among fat of different tissues in Dumba sheep. Proportion of C18 FA was lower ( $P<0.05$ ) in subcutaneous and higher ( $P<0.05$ ) in caul fat; C18:1n9c higher ( $P<0.05$ ) in LD and kidney fat and lower in caul fat; C18:2n6c, C20:3n3 FA were higher ( $P<0.05$ ) in LD fat and low in caul fat whereas C20:4n6 FA is highest in LD and lower in subcutaneous fat. In agreement to these results, Yousefi *et al.* (2012) reported almost similar values for FA profile in LD muscle of traditional fat-tailed and non-tail fat Iranian sheep. It has been shown that as the deposition of intramuscular fat (IMF) increases, the ratio of PUFA to SFA decreases (Webb and O’Neil 2008) which also hold true in this experiment as the ratio of PUFA:SFA was lower in fat-tailed Dumba due to more IMF deposition compared to Malpura sheep.

A comparative analysis of LD muscle FA profile between adult Malpura ewe and Dumba sheep has been presented in Table 5. Adult Malpura ewes contained proportionally more SFA than Dumba sheep while Dumba had more unsaturated fatty acids than Malpura ewes. Total  $\omega-6$  FA were higher in Dumba sheep in comparison to Malpura ewes. The increased  $\omega-6$  FA content in Dumba may be due to feeding of high concentrate diet (Lorenz *et al.* 2002; Nürnberg *et al.* 2002). Therefore, the quantity of DFA was also higher in Dumba than Malpura. Index of atherogenicity (AI) indicates a relationship between the sum of the main SFA and that of the main classes of unsaturated, the former being considered pro-atherogenic and the latter anti-atherogenic (Ulbricht and Southgate 1991). Typical AI value of animal fat should not be more than 2.0 (Bobe *et al.* 2004). In the present study, it was observed that AI value of LD muscle in adult Malpura ewes was greater than 2.0 whereas in Dumba sheep it lies within the maximum limit indicating better quality FA profile. However, no significant

Table 3. Composition of carcass of fat tailed Dumba sheep

Nutrient	<i>Longissimus dorsi</i> muscle	Fat source				SEM	P-value
		Tail	Subcutaneous	Kidney	Caul		
DM	27.46	90.52	88.67	83.78	88.68	2.471	0.673
CP	21.83	1.56	1.95	1.72	0.32	2.112	0.452
EE	4.08	80.01	77.53	80.83	81.84	3.827	0.219
TA	0.43	5.40	5.49	1.03	3.13	2.785	0.117
OM	27.04	85.13	83.19	82.75	85.56	1.932	0.546

Values bearing different superscripts in a row (within the box) differ significantly ( $P<0.05$ ). DM, dry matter; TA, total ash; CP, crude protein; EE, ether extract.

Table 4. Profile of different fatty acid in fat from different parts of Dumba sheep

Parameter	LD Muscle	Tail	Subcutaneous	Kidney	Caul	SEM	P-value
Total Fat (g/kg)	40.8 <sup>a</sup>	800.1 <sup>b</sup>	775.3 <sup>b</sup>	808.3 <sup>b</sup>	816.3 <sup>b</sup>	10.893	0.071
Σ SFA	43.90 <sup>a</sup>	52.05 <sup>b</sup>	44.58 <sup>a</sup>	53.24 <sup>b</sup>	66.34 <sup>c</sup>	2.562	0.032
Σ MUFA	44.21 <sup>b</sup>	42.46 <sup>b</sup>	51.53 <sup>c</sup>	42.17 <sup>b</sup>	30.33 <sup>a</sup>	2.609	0.038
Σ PUFA	9.85 <sup>c</sup>	3.73 <sup>b</sup>	2.39 <sup>ab</sup>	3.01 <sup>b</sup>	1.68 <sup>a</sup>	0.202	0.035
Σ ω-6	6.02 <sup>c</sup>	2.54 <sup>b</sup>	1.27 <sup>a</sup>	2.34 <sup>b</sup>	1.15 <sup>a</sup>	0.258	0.021
Σ ω-3	3.83 <sup>b</sup>	0.30 <sup>a</sup>	0.17 <sup>a</sup>	0.42 <sup>a</sup>	0.38 <sup>a</sup>	0.026	0.029
ω-6/ω-3	1.57 <sup>a</sup>	8.46 <sup>d</sup>	7.47 <sup>d</sup>	5.57 <sup>c</sup>	3.02 <sup>b</sup>	0.412	0.012
PUFA/SFA	0.24 <sup>b</sup>	0.08 <sup>a</sup>	0.06 <sup>a</sup>	0.06 <sup>a</sup>	0.03 <sup>a</sup>	0.024	0.068
MUFA/PUFA	4.46 <sup>a</sup>	11.38 <sup>b</sup>	21.54 <sup>c</sup>	14.02 <sup>b</sup>	13.99 <sup>b</sup>	0.080	0.031
DFA	70.59 <sup>c</sup>	60.49 <sup>a</sup>	61.87 <sup>a</sup>	64.36 <sup>b</sup>	59.58 <sup>a</sup>	1.125	0.041
Σ SCFA	28.37 <sup>a</sup>	44.09 <sup>b</sup>	51.06 <sup>c</sup>	36.30 <sup>b</sup>	39.76 <sup>b</sup>	2.665	0.039
Σ LCFA	69.26 <sup>c</sup>	53.65 <sup>a</sup>	46.73 <sup>a</sup>	61.87 <sup>b</sup>	58.17 <sup>b</sup>	2.679	0.035
AI value	0.53 <sup>a</sup>	1.36 <sup>b</sup>	1.55 <sup>b</sup>	0.96 <sup>b</sup>	1.23 <sup>b</sup>	0.096	0.037
TI value	1.28 <sup>a</sup>	1.83 <sup>b</sup>	1.32 <sup>a</sup>	2.14 <sup>b</sup>	3.78 <sup>c</sup>	0.165	0.043
<i>Conjugated Linoleic acid</i>							
c9t11 and t11c9	0.72 <sup>a</sup>	1.68 <sup>c</sup>	1.22 <sup>b</sup>	1.26 <sup>b</sup>	0.81 <sup>a</sup>	0.172	0.048
t10c12	0.03	0.05	0.07	0.02	0.03	0.007	0.435
t9t11	0.74	0.20	0.20	0.30	0.38	0.060	0.287
Σ CLA	1.46	1.93	1.48	1.57	1.22	0.180	0.423
<i>Individual Fatty acid</i>							
C <sub>16</sub>	22.99	28.27	26.88	26.93	30.26	2.757	0.712
C <sub>16:1</sub>	2.57	3.00	3.60	2.25	2.68	0.351	0.132
C <sub>18</sub>	16.53 <sup>b</sup>	14.30 <sup>b</sup>	7.95 <sup>c</sup>	19.18 <sup>b</sup>	27.57 <sup>c</sup>	2.032	0.039
C <sub>18:1n9t</sub>	0.64	0.01	0.01	0.01	0.01	0.006	0.231
C <sub>18:1n9c</sub>	39.26 <sup>b</sup>	31.92 <sup>a</sup>	33.13 <sup>ab</sup>	37.60 <sup>b</sup>	26.95 <sup>a</sup>	2.171	0.013
C <sub>18:2n6t</sub>	0.25	0.40	0.13	0.22	0.16	0.035	0.082
C <sub>18:2n6c</sub>	4.05 <sup>c</sup>	2.12 <sup>b</sup>	1.12 <sup>a</sup>	2.12 <sup>b</sup>	0.98 <sup>a</sup>	0.401	0.041
C <sub>18:3n6</sub>	0.13	0.02	0.01	0.06	0.07	0.027	0.083
C <sub>20:1</sub>	0.44	0.14	0.14	0.50	0.01	0.014	0.062
C <sub>18:3n3</sub>	0.27	0.22	0.14	0.23	0.15	0.066	0.053
C <sub>20:3n3</sub>	3.35 <sup>c</sup>	0.88 <sup>b</sup>	0.93 <sup>b</sup>	0.21 <sup>a</sup>	0.07 <sup>a</sup>	0.051	0.032
C <sub>20:4n6</sub>	1.45 <sup>c</sup>	0.06 <sup>a</sup>	0.03 <sup>a</sup>	0.12 <sup>b</sup>	0.16 <sup>b</sup>	0.043	0.029

Values bearing different superscripts in a row differ significantly ( $P < 0.05$ ). SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; DFA, desirable fatty acids; SCFA, short chain fatty acids; LCFA, long chain fatty acids; CLA, conjugated linoleic acid; AI, atherogenic index; TI, thrombogenic index.

Table 5. Comparison of LD muscle fatty acid profile between adult Malpura ewe and Dumba sheep

Parameter	Malpura	Dumba	SEM	P value
SFA	49.13 <sup>b</sup>	43.90 <sup>a</sup>	1.25	0.006
MUFA	45.17	44.21	0.41	0.285
PUFA	5.39 <sup>a</sup>	9.85 <sup>b</sup>	1.01	<0.001
ω-6	4.12 <sup>a</sup>	6.02 <sup>b</sup>	0.45	0.003
ω-3	2.86	3.83	0.29	0.101
ω-6/ω-3	1.44	1.57	0.31	0.664
DFA	60.19 <sup>a</sup>	70.59 <sup>b</sup>	2.41	0.002
SCFA	41.56 <sup>b</sup>	28.37 <sup>a</sup>	2.99	<0.001
LCFA	56.26 <sup>b</sup>	69.26 <sup>a</sup>	2.93	<0.001
AI value	2.46 <sup>b</sup>	0.53 <sup>a</sup>	0.44	0.001
TI value	1.39	1.28	0.06	0.432
C18:2 c9 t11 CLA	1.06 <sup>b</sup>	0.72 <sup>a</sup>	0.08	0.006

Values bearing different superscripts in a row differ significantly ( $P < 0.05$ ). SFA, saturated fatty acids; MUFA, monounsaturated fatty acids; PUFA, polyunsaturated fatty acids; DFA, desirable fatty acids; SCFA, short chain fatty acids; LCFA, long chain fatty acids; AI, atherogenic index; TI, thrombogenic index.

difference was seen in TI value of LD muscle in case of Dumba sheep and Malpura ewes. Furthermore, the content of c9t11 CLA was more in LD muscle of Malpura ewe than Dumba sheep. The high content of c9t11 CLA in Malpura could be the result of pasture grazing unlike that of Dumba which were mainly kept stall-fed. Likewise, several studies (Valvo *et al.* 2005; Scerra *et al.* 2007) reported that IMF of lambs fed on pasture have shown a significant increase in c9t11 CLA.

On the basis of the present findings, it can be concluded that Malpura lamb meat is healthier than adult ewes due to high PUFA value, ω-6:ω-3 ratio and low AI. The FA composition of muscle and adipose tissue of Dumba sheep is similar to that of other sheep breeds. However, while comparing muscle FA profile of Dumba with adult Malpura ewes it was observed that Malpura ewes had more SFA in meat, whereas Dumba had relatively more PUFA. However, further studies are needed to ascertain the effect of dietary intervention on FA profile of Dumba and Malpura sheep for producing healthier meat.

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