Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SP1: 2660-2664

R Santhoshkumar
Department of Livestock Production Management Veterinary College and Research Institute, Namakkal, Tamil Nadu Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

V Ramesh
Department of Livestock Production Management Veterinary College and Research Institute, Namakkal, Tamil Nadu Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

K Sivakumar
Department of Livestock Production Management Veterinary College and Research Institute, Namakkal, Tamil Nadu Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

AK Thiruvenkadan
Department of Livestock Production Management Veterinary College and Research Institute, Namakkal, Tamil Nadu Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Correspondence
R Santhoshkumar
Department of Livestock Production Management Veterinary College and Research Institute, Namakkal, Tamil Nadu Tamil Nadu Veterinary and Animal Sciences University, Tamil Nadu, India

Influence of weaning age and level of concentrate supplementation on carcass characteristics of Mecheri lambs

R Santhoshkumar, V Ramesh, K Sivakumar and AK Thiruvenkadan

Abstract
A study was carried out to evaluate the effect of weaning age and level of concentrate supplementation on carcass characteristics of Mecheri lambs at Mecheri Sheep Research Station, Pottaneri, Tamil Nadu. A total of 72 Mecheri lambs were selected and divided into three treatment i.e., weaned at 90 days (T_1), 75 days (T_2) and 60 days (T_3) with 24 lambs in each treatment. Each treatment is again divided into two groups, based on the concentrate supplementation level i.e., 1 and 1.5 per cent of body weight. A total of twenty four ram lambs, four from each group were selected randomly and slaughtered at the end of seven months of age to assess the carcass characteristics. Different weaning age had non-significant effect on pre-slaughter weight, hot carcass weight, dressing percentage, loin eye area and carcass measurements. Among these concentrate supplementation group lambs fed with 1.5 per cent concentrate supplementation group had higher carcass characteristics. There was significant difference ($P<0.01$) between weaning age and concentrate supplementation in kidney fat. Hind leg portion contributed the highest proportion followed by breast and fore shank, shoulder, loin and neck.

Keywords: Mecheri lambs, weaning age, concentrate supplementation, carcass traits

Introduction
Mecheri sheep is one of the most important meat breeds among the native breed in Tamil Nadu with high skin quality and also their adaptability to poor pasture condition. The time of weaning is of particular importance in lambs performance since it affects feed consumption, growth performance and carcass characteristics of lambs. Early weaning of lambs can be useful in ewes with low milk production in tropical sheep is poor and rapidly drops after lambing. The weaning of the lambs as early as possible would be beneficial provided that the growth performance and feed intake of lambs are not affected in a negative way. Reduction in the availability of grazing lands and their quality coupled with irregular pattern of rainfall are the important factor affecting the performance of sheep because of these reasons grazing with supplementation are now a days being tried by the farmers rearing on sheep production. Considering aforesaid facts the present study was conducted to compare the carcass characteristics of Mecheri lambs reared under three different weaning ages and two level of concentrate supplementation.

Materials and methods
The study was carried out at Mecheri Sheep Research Station, Pottaneri, Salem district, Tamil Nadu. Seventy two Mecheri lambs weaned at three weaning ages viz., 60, 75 and 90 days were selected and divided randomly into six groups of twelve animals each. Each group consists of six male and six female lambs. The weaned lambs in all the groups were allowed for grazing from 9.00 am to 5.00 pm. Treatments *viz*., T_1, T_2 and T_3 groups were grazed together and separated in their respective pens in the evening. Animals in all the six groups were supplemented with concentrate mixture at two different levels after returning from grazing land. The animals under group I were fed with concentrate supplementation of 1.0 per cent of their body weight and concentrate supplementation of 1.5 per cent of their body weight for group II. The requirements were calculated based on the body weight of the animals, recorded once in fortnight. In addition to concentrate feeding, animals in all the treatments were offered with *ad libitum* Cumbu Napier grass CO (CN) 4 and guinea grass.
A total of twenty four ram lambs, four from each group were selected randomly and slaughtered at the end of seven months of age to assess the carcass characteristics. Slaughter study was conducted at Department of Livestock Products Technology (Meat Science), Veterinary College and Research Institute, Namakkal, Tamil Nadu. Slaughter of animals was

done by a trained butcher by '*Halal'* method. Animals were not given feed for 12 hours prior to slaughter, but had free access to water. Animals were weighed by electronic weighing scale prior to slaughter. After bleeding head was separated first. Legs were cut and carcass was hoisted on a moving overhead rail. Flaying was done and skin was weighed. At this point of time, carcass length (length in centimeters from point of shoulder to point of aitch bone, where the carcass was in its normal hanging position) was taken. Then evisceration was done and carcass chest circumference was measured from behind the elbow joint. Then the carcass was split up into fore quarters and hind quarters by using meat and bone cutting instrument and the weights were recorded. Then, by using the same equipment the carcass were split into different wholesale cuts, then the wholesale cuts were separated into bone and meat manually. Weight of all edible organs (liver, heart, testicles, kidney and spleen) and in-edible offals (blood, skin, head, feet, stomach, intestine, lungs and trachea) were noted.

The loin eye area was measured with a help of parchment paper by taking the impression of longissimus dorsi muscles on it and drawing the outline by using a marker pen. Then the outline was superimposed on a graph sheet and the area was measured in square centimeters. In addition the loin width and back fat thickness were measured by using a measuring scale. The data were analyzed using SPSS 17.0. Duncan's test was used to determine differences among groups. The linear model used for the analysis.

Results and discussion

The mean (± SE) of carcass characteristics of Mecheri lambs as influenced by weaning age are given in Table 1 and weight of edible and in-edible offals in Table 2 and 3. In the present study, the hot carcass weight and dressing percentage increased with increasing slaughter weight. The dressing percentage increased with gain in weight in the present study is similar to the result of Arun Das *et al.* (2008). Lower dressing percentage observed in 60 days weaned group might be due to getting exposure to concentrates and roughages at an early ages having a higher proportion of the gastrointestinal tract (29.64 per cent) compared to 75 days (25.66 per cent) and 90 days (24.45 per cent) weaned groups. Ekiz *et al.* (2016) also reported that lambs weaned at 120 days of age (un-weaned lambs) had higher hot carcass weight and lower gastro intestinal content compared to 75 and 45 days weaned lambs. They stated that the differences in carcass weight between the groups might be due to longer suckling period and lower dry fodder intake in late weaned group. Similar findings were reported in different breeds (Caneque *et al.,* 2001; Singh *et al.,* 2003; Maiorano *et al.,* 2009). On the contrary, Hashem *et al.* (2013) and Patel *et al.* (2015) reported higher dressing percentage in early weaned kids due to higher slaughter weight and higher carcass weight. This clearly indicated that suckling length or weaning status may affect carcass and meat quality of lambs.

Lean and bone ratio were corresponding to the hot carcass weight of the animals. Meat : bone ratio ranged from 1.60 : 1 to 1.72 : 1 and T_1 and T_2 had higher values than T_3 (Table 1). From the table, it can be observed that the percentage of meat content of whole carcass was higher in 90 days weaned lambs (61.0 per cent) followed by 75 days (60.0 per cent) and 60 days (59.0 per cent) weaned lambs. Higher meat lightness in late weaned lambs compared with that of weaned lambs was found by Caneque *et al.* (2001).

The least LEA value observed in early weaned group might be due to lower pre-slaughter weight compared to other groups. This concurred with the results of Muralidharan (2010) and Ramya (2016) who reported that Mecheri lambs slaughtered at heavy body weight had higher loin eye area.

Carcass length and chest circumference were also higher in T_1 and T_2 group and also having higher pre-slaughter weight than T_3 group. The results of the present study were in accordance with the findings of Ekiz *et al.* (2016) who observed that the higher pre-slaughter weight lambs had higher carcass length and chest circumference. Back fat thickness was also higher in later weaned groups compared to lambs weaned at 60 days of age.

Among the edible organs lambs weaned at 90 days of age had significantly higher weight of liver, heart and fat (omental, caudal and kidney fat) content (Table 2). There were appreciable differences in the weights of edible organs and was mainly due to the difference in slaughter weights. Support of this findings with Vergara and Gallego (1999), Diaz *et al.* (2002) and Maiorano *et al.* (2009) they reported that lambs suckling for longer duration had higher fat deposition. Among the weaning age groups, lambs at 90 days of age had significantly higher weights of stomach and intestine and the values ranges from 1.11 kg to 1.26 kg. Similarly the weight of lungs, feet and skin also higher in T_1 group compared to T_2 and T_3 (Table 3).

Carcass characteristics of Mecheri lambs were significantly higher with increasing concentrate mixture at 1.5 per cent level (Table 1) than at lower level of 1.0 per cent. Dressing percentage based on pre-slaughter weight was higher for the 1.5 per cent concentrate supplemented compared to 1.0 per cent level irrespective of weaning ages. This might be due to higher level of concentrate mixture which leads to an increase in the available nutrients for absorption and improved feed utilization efficiency. It was in accordance with the reports of Mahgoub *et al.* (2000), Girish *et al.* (2012), Boughami and Araba (2016) and Jalajakshi *et al.* (2016). They found increased slaughter weight and improved dressing percentage with increasing level of concentrate supplementation in lambs. On contrary, Mohammed and Yagoub (2016) stated that level of concentrate mixture did not have any significant influence on slaughter weight and dressing percentage.

Meat : bone ratio was higher in lambs fed with 1.5 per cent concentrate supplementation than at 1.0 per cent level irrespective of weaning ages. This reflects better quality of carcass from higher level of supplemented group. Loin eye area and loin width was also higher in 1.5 per cent level supplemented groups than the 1.0 per cent fed groups. Significantly ($P< 0.01$) higher loin eye area observed in 1.5 per cent concentrate supplementation group was due to improve muscling and better growth under high plane of nutrition. This concurred with the results of Karim *et al.* (2007) and Zaharia *et al.* (2012).

Similarly, carcass length, back fat thickness and chest circumference were significantly higher in Mecheri lambs fed with 1.5 per cent concentrate mixture, In concurrence with the present findings, Karim and Verma (2001), Rajkumar and Agnihotri (2005) and Rajkumar *et al.* (2010). They reported that lambs fed with high concentrate ration had significantly ($P< 0.01$) higher proportion of fat than the lambs fed with lower concentrate diet. Support of these findings, Chaudhary *et al.* (2015) who also reported that Sirohi kids fed with 1.5 per cent concentrate supplementation resulted in increased fat deposition. Higher depot fat in concentrate supplemented group is due to better plane of nutrition and higher energy availability.

Most of the edible organs weights were significantly higher in 1.5 per cent supplemented group except organs like kidney, spleen and caudal fat (Table 2) and the difference was mainly due to difference in the carcass weight. This finding was supported with statement of visceral organ size turned out to be affected by the level of feed intake (Loerch and Fluharty, 1999). The result of Drouillard *et al.* (1991) stated that mechanisms involved in reducing total energy expenditure of liver tissue may differ under condition of dietary protein and energy restriction. The maintenance of energy requirements can be attributed to the visceral organs, especially the liver and were associated with the high rates of protein synthesis in these tissues. This is in accordance with Fluharty and Mcclure (1997) stated that lambs fed with high level of concentrate with high protein intake resulted in greater weights and faster accretion rates of liver and kidney compared with normal concentrate and protein intake.

Singh *et al.* (2003) reported positive correlation between carcass fat content and quantity of concentrate offered to lambs as the nutrients available over and above the requirement for growth will get diverted towards fat deposition, Lambs reared with good plane of nutrition during fattening period had more fat content in the carcass and carcass fat content expressed by the amount of kidney fat (Mierlita and Lup, 2011). These findings were in accordance with the results observed in the present study on Mecheri sheep. In-edible organs weights also followed the same trend except for weights of blood, skin and trachea and lungs.

Wholesale cuts

Wholesale cuts percentage was found similar between the different weaning age groups (Table 4). However, the weight of neck was significantly higher in early weaned group (T_3), whereas shoulder weight was higher in late weaned group (T_1) compared to other groups. Similar report was recorded in the finding of same breed by Muralidharan (2010).

Percentage of wholesale cuts were similar between the different level of concentrate fed groups and is in accordance with the values reported by Karunanithi *et al.* (2004) in the same breed. Mohammed and Yagoub (2016) studied the weight of wholesale cuts in Sudan Desert lambs fed with different levels of concentrate supplementation (0, 200 and 400 g) and concluded that the weight of wholesale cuts increases directly proportionate with the level of concentrate supplementation, with non-significant difference. Similar findings were observed in the present study on Mecheri sheep.

Table 1: Mean (± SE) of carcass characteristics of Mecheri lambs

Carcass traits	T_1 (90 days)			T_2 (75 days)			T_3 (60 days)			P - Value		
	Concentrate supplementation											
	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	Weaning age	Concentrate Supplementation	Weaning Age × Supplementation
Pre-slaughter weight (kg)	$17.58^{x} \pm 0.72$	$22.75^{y} \pm 0.34$	20.16 ± 1.04	$19.13^{x} \pm 1.07$	$19.30^{y} \pm 0.54$	19.21 ± 0.56	$18.85^{x} \pm 0.77$	$19.80^{y} \pm 0.80$	19.33 ± 0.54	0.395^{NS}	0.003^{**}	0.007^{**}
Hot carcass weight (kg)	$7.83^{x} \pm 0.36$	$10.88^{y} \pm 0.13$	9.35 ± 0.60	$8.33^{x} \pm 0.66$	$9.23^{y} \pm 0.30$	8.78 ± 0.38	$8.03^{x} \pm 0.36$	$8.73^{y} \pm 0.21$	8.38 ± 0.23	0.056^{NS}	0.000^{**}	0.010^{*}
Dressing percentage (%)	$44.53^{x} \pm 0.85$	$47.84^{y} \pm 0.99$	46.18 ± 0.87	$43.36^{x} \pm 1.10^{x}$	$47.79^{y} \pm 0.67$	45.57 ± 1.03	$42.57^{x} \pm 0.62$	$44.19^{y} \pm 1.32$	43.38 ± 0.74	0.069^{NS}	0.008^{**}	0.357^{NS}
Meat:Bone ratio	1.61 ± 0.07	1.83 ± 0.03	$1.72^{c} \pm 0.06$	1.59 ± 0.04	1.68 ± 0.05	$1.64^{ab} \pm 0.04$	1.59 ± 0.06	1.62 ± 0.02	$1.60^{a} \pm 0.03$	0.001^{**}	0.070^{NS}	0.148^{NS}
Loin eye area (cm^2)	$7.76^{x} \pm 0.38$	$8.12^{y} \pm 0.30$	7.94 ± 0.23	$7.34^{x} \pm 0.75$	$8.95^{y} \pm 0.46$	8.14 ± 0.51	$5.94^{x} \pm 0.24$	$06.19^{y} \pm 0.55$	6.06 ± 0.28	0.267^{NS}	0.002^{**}	0.308^{NS}
Loin width (cm)	$5.45^{x} \pm 0.24$	$5.93^{y} \pm 0.11$	5.69 ± 0.15	$4.50^{x} \pm 0.18$	$4.93^{y} \pm 0.21$	4.71 ± 0.15	$4.00^{x} \pm 0.16$	$04.75^{y} \pm 0.09$	4.38 ± 0.17	0.123^{NS}	0.001^{**}	0.608^{NS}
Carcass length (cm)	$56.25^{x} \pm 1.55$	$63.00^{y} \pm 0.71$	59.63 ± 1.50	$58.00^{x} \pm 0.91$	$59.75^{y} \pm 0.85$	58.88 ± 0.67	$57.25^{x} \pm 0.63$	$58.00^{y} \pm 0.58$	57.63 ± 0.42	0.210^{NS}	0.030^{*}	0.010^{*}
Back fat thickness (mm)	$0.13^{x} \pm 0.03$	$0.25^{y} \pm 0.03$	0.19 ± 0.03	$0.13^{x} \pm 0.03$	$0.18^{y} \pm 0.03$	0.15 ± 0.02	$0.15^{x} \pm 0.03$	$0.20^{y} \pm 0.00$	0.18 ± 0.02	0.314^{NS}	0.001^{**}	0.262^{NS}
Chest circumference (cm)	$56.25^{x} \pm 1.25$	$60.75^{y} \pm 1.11$	58.50 ± 1.15	$57.00^{x} \pm 1.41$	$59.00^{y} \pm 0.58$	58.00 ± 0.80	$56.50^{x} \pm 1.44$	$57.50^{y} \pm 0.50$	57.00 ± 0.73	0.410^{NS}	0.013^{*}	0.295^{NS}

^{ab} Pooled means with different superscript in a row differ significantly for weaning age. ^{xy} means bearing different superscript in a row differ significantly for supplementation with in weaning age.

* Significant ($P < 0.05$). ** Highly significant ($P < 0.01$). ^{NS} Non-significant.

Table 2: Mean (± SE) of edible offals (kg) of Mecheri lambs

Edible offals	T_1 (90 days)			T_2 (75 days)			T_3 (60 days)			P - Value		
	Concentrate supplementation											
	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	Weaning age	Concentrate Supplementation	Weaning Age × Supplementation
Liver	$0.30^{x} \pm 0.01$	$0.38^{y} \pm 0.02$	$0.34^{b} \pm 0.02$	$0.28^{x} \pm 0.02$	$0.30^{y} \pm 0.01$	$0.29^{a} \pm 0.01$	$0.29^{x} \pm 0.01$	$0.32^{y} \pm 0.01$	$0.31^{a} \pm 0.01$	0.009^{**}	0.003^{**}	0.128^{NS}
Heart	$0.09^{x} \pm 0.01$	$0.12^{y} \pm 0.00$	$0.10^{b} \pm 0.01$	$0.10^{x} \pm 0.01$	$0.11^{y} \pm 0.00$	$0.10^{b} \pm 0.00$	$0.08^{x} \pm .00$	$0.09^{y} \pm 0.01$	$0.09^{a} \pm 0.00$	0.040^{*}	0.007^{**}	0.212^{NS}
Kidney	0.06 ± 0.00	0.07 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.234^{NS}	0.056^{NS}	0.026^{*}
Spleen	0.05 ± 0.00	0.07 ± 0.00	0.06 ± 0.00	$0.06 \pm .00$	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.06 ± 0.00	0.718^{NS}	0.059^{NS}	0.436^{NS}
Testicle	$0.15^{x} \pm 0.03$	$0.27^{y} \pm 0.01$	0.21 ± 0.02	$0.19^{x} \pm 0.03$	$0.17^{y} \pm 0.03$	0.18 ± 0.02	$0.16^{x} \pm 0.03$	$0.20^{y} \pm 0.03$	0.18 ± 0.02	0.450^{NS}	0.055^{*}	0.055^{*}
Omental fat	0.06^{x}	0.14^{y}	0.10^{b}	0.06^{x}	0.07^{y}	0.07^{a}	0.8^{x}	0.10^{y}	0.09^{b}	0.015^{*}	0.000^{**}	0.004^{**}

	± 0.00	± 0.01	± 0.02	± 0.01	± 0.01	± 0.01	± 0.08	± 0.02	± 0.01			
Caudal fat	0.25 ± 0.03	0.29 ± 0.01	0.27 [b] ± 0.02	0.23 ± 0.01	0.24 ± 0.01	0.24 [a] ± 0.01	0.22 ± 0.01	0.23 ± 0.00	0.23 [a] ± 0.00	0.021*	0.133NS	0.399NS
Kidney fat	0.06 [x] ± 0.01	0.13 [y] ± 0.01	0.10 [c] ± 0.01	0.06 [x] ± 0.01	0.06 [y] ± 0.00	0.06 [a] ± 0.00	0.07 [x] ± 0.00	0.09 [y] ± 0.01	0.08 [b] ± 0.00	0.000**	0.000**	0.000**

[ab] Pooled means with different superscript in a row differ significantly for weaning age. [xy] means bearing different superscript in a row differ significantly for supplementation with in weaning age.
* Significant ($P< 0.05$). ** Highly significant ($P< 0.01$). NS Non-significant.

Table 3: Mean (± SE) of in-edible offals (kg) of Mecheri lambs

In-edible Offals	T1 (90 days)			T2 (75 days)			T3 (60 days)			P - Value		
	Concentrate supplementation											
	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	Weaning age	Concentrate Supplementation	Weaning Age × Supplementation
Stomach and intestine full	4.75 ± 0.10	5.10 ± 0.27	4.93 [a] ± 0.15	5.38 ± 0.15	4.48 ± 0.27	4.93 [a] ± 0.22	5.65 ± 0.35	5.80 ± 0.30	5.73 [b] ± 0.22	0.007**	0.531NS	0.054*
Stomach and intestine empty	1.18 [x] ± 0.05	1.35 [y] ± 0.07	1.26 [b] ± 0.05	1.08 [x] ± 0.05	1.14 [y] ± 0.04	1.11 [a] ± 0.03	1.20 [x] ± 0.03	1.22 [y] ± 0.05	1.21 [b] ± 0.03	0.017*	0.049*	0.296NS
Trachea and lungs	0.31 [x] ± 0.01	0.39 ± 0.01	0.35 [b] ± 0.01	0.29 ± 0.02	0.29 ± 0.01	0.29 [a] ± 0.01	0.27 ± 0.01	0.27 ± 0.01	0.27 [a] ± 0.01	0.000**	0.081NS	0.021*
Head	1.21 [x] ± 0.03	1.46 [y] ± 0.04	1.34 ± 0.05	1.25 [x] ± 0.06	1.35 [y] ± 0.01	1.30 ± 0.03	1.24 [x] ± 0.01	1.28 [y] ± 0.06	1.26 ± 0.03	0.178NS	0.001**	0.050*
Feet	0.50 [x] ± 0.02	0.60 [y] ± 0.01	0.55 [b] ± 0.02	0.50 [x] ± 0.03	0.54 [y] ± 0.02	0.52 [ab] ± 0.02	0.49 [x] ± 0.01	0.50 [y] ± 0.01	0.50 [a] ± 0.01	0.018*	0.002**	0.049*
Blood	0.70 ± 0.06	0.78 ± 0.04	0.74 ± 0.03	0.74 ± 0.07	0.80 ± 0.03	0.77 ± 0.04	0.73 ± 0.03	0.75 ± 0.04	0.74 ± 0.02	0.765NS	0.138NS	0.765NS
Skin	2.18 ± 0.10	2.55 ± 0.09	2.36 [b] ± 0.09	1.98 ± 0.09	1.62 ± 0.48	1.80 [a] ± 0.24	1.80 ± 0.08	1.95 ± 0.09	1.88 [a] ± 0.06	0.034*	0.745NS	0.244NS

[ab] Pooled means with different superscript in a row differ significantly for weaning age. [xy] means bearing different superscript in a row differ significantly for supplementation with in weaning age.
* Significant ($P< 0.05$). ** Highly significant ($P< 0.01$). NS Non-significant

Table 4: Mean (± SE) of wholesale cuts (%) of Mecheri lambs

Wholesale cuts	T1 (90 days)			T2 (75 days)			T3 (60 days)			P - Value		
	Concentrate supplementation											
	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	1 per cent	1.5 per cent	Pooled	Weaning age	Concentrate Supplementation	Weaning Age × Supplementation
Neck	7.99 ± 0.26	8.39 ± 0.42	8.19 [a] ± 0.24	7.74 ± 0.46	7.82 ± 0.46	7.78 [a] ± 0.30	8.35 ± 0.54	9.18 ± 0.38	9.37 [b] ± 0.49	0.021*	0.968 NS	0.769 NS
Shoulder	11.88 ± 0.43	12.27 ± 0.48	12.08 [b] ± 0.31	7.18 ± 2.28	9.99 ± 0.23	8.58 [a] ± 1.19	10.54 ± 0.31	11.01 ± 0.52	10.77 [b] ± 0.29	0.036*	0.454NS	0.442 NS
Breast and fore shank	22.13 ± 0.61	22.40 ± 0.83	22.27 ± 0.48	22.99 ± 1.3	23.97 ± 1.75	23.48 ± 1.04	20.03 ± 0.70	20.03 ± 0.80	20.03 ± 0.80	0.140 NS	0.576 NS	0.837 NS
Rack	9.18 ± 0.88	9.79 ± 0.43	9.48 ± 0.47	11.12 ± 1.32	11.31 ± 1.24	11.21 ± 0.84	11.88 ± 1.00	12.18 ± 1.10	12.03 ± 0.69	0.067NS	0.666 NS	0.978 NS
Hind legs	32.80 ± 2.50	47.29 ± 2.82	40.05 ± 3.25	37.76 ± 5.16	41.58 ± 2.46	39.67 ± 2.75	26.71 ± 1.79	36.25 ± 3.35	31.48 ± 2.52	0.685 NS	0.373 NS	0.110 NS
Loin	11.09 ± 0.13	12.42 ± 0.94	11.76 ± 0.51	11.27 ± 0.38	12.36 ± 1.36	11.81 ± 0.69	11.46 ± 0.14	11.48 ± 0.16	11.47 ± 0.10	0.823NS	0.121NS	0.666 NS

[ab] Pooled means with different superscript in a row differ significantly for weaning age. [xy] means bearing different superscript in a row differ significantly for supplementation with in weaning age.
* Significant ($P< 0.05$). ** Highly significant ($P< 0.01$). NS Non-significant.

Conclusion

Slaughter studies also revealed that weaning age had no significant ($P< 0.05$) effect on carcass characteristics of Mecheri lambs. However, lambs weaned at 90 days (T_1) group recorded higher value for most of the traits especially, pre-slaughter weight, hot carcass weight and carcass length, whereas, the dressing percentage and meat:bone ratio was more in T_2 and T_3 group lambs. Most of the carcass traits were significantly higher in 1.5 per cent supplemented group except organs like kidneys, spleen and caudal fat and the difference was mainly due to difference in the carcass weight. Whereas, percentage of wholesale cuts were similar between the different levels of concentrate fed groups.

References

1. Arun Das K, Gopal Dass, Singh NP. Growth, carcass characteristics and meat quality of Muzaffarnagari lambs at various stages under intensive and semi-intensive management. Indian J Anim. Sci. 2008; 78(5):541-546.
2. Boughalmi A, Araba A. Effect of feeding management from grass to concentrate feed on growth, carcass characteristics, meat quality and fatty acid profile of

Timahdite lamb breed. Small Rum. Res. 2016; 144:158 - 163.
3. Caneque V, Velasco S, Diaz M, Perez C, Huidobro F, Lauzurica S *et al*. Effect of weaning age and slaughter weight on carcass and meat quality of Talaverana breed lambs raised at pasture. Ani. Sci. 2001; 73:85-95.
4. Chaudhary UB, Das AK, Tripathi P, Tripathi MK. Effect of concentrate supplementation on growth performance, carcass traits and meat composition of Sirohi kids under field condition. Anim. Nut. & Feed Tech. 2015; 15:251-260.
5. Diaz MT, Velasco S, Caneque V, Lauzurica S, Ruiz de F, Huidobro C et al. Use of concentrate or pasture for fattening lambs and its effect on carcass and meat quality. Small Rumin. Res. 2002; 43:257-268.
6. Drouillard JS, Ferrell CL, Klopfenstein TJ, Britton RA. Compensatory growth following metabolizable protein or energy restrictions in beef steers. J Anim. Sci. 1991; 69(2):811-818.
7. Ekiz B, Omur Kocak, Hulya Yalcintan, Alper Yilmaz. Effects of suckling duration on growth, slaughtering and carcass quality characteristics of Kivirick lambs. Trop, Anim, Health Prod. 2016; 48:395 - 401.
8. Fluharty FL, Mcclure KE. Effects of dietary energy intake and protein concentration on performance and visceral organ mass in lambs. J Anim. Sci. 1997; 75:604-610.
9. Girish PS, Baswa reddy P, Ramakrishna C, Ramana reddy Y, Satish Chava, Kondaiah N. Effect of nutrient supplementation on growth performance and carcass characteristics of Nellore ram lambs – an on farm evaluation study. Indian J Anim. Sci. 2012; 82(12):1601-1602.
10. Hashem ALS, Shaker YM, Abdel-Fattah MS, Hanan Z Amer, Ashgan M Ellamei. Effect of weaning age on growth performance and carcass traits of Barki lambs in Siwa Oais, Egypt. World Appl. Sci. J. 2013; 21(7):975 - 982.
11. Jalajakshi K, Ramana Reddy Y, Reddy Vara Prasad A. Growth performance and carcass traits of Nellore Brown ram lambs kept on grazing with or without concentrate supplementation. Inter. J Sci. Environ. 2016; 5(5):2788-2797.
12. Karim SA, Verma DL. Growth performance of weaner lambs protocol of intensive feeding or grazing with supplementation. Indian. J Anim. Sci. 2001; 71(6):586-588.
13. Karim SA, Kuldeep Porwal, Suresh kumar, Singh VK. Carcass traits of Kheri lambs maintained on different system of feeding management. Meat Sci. 2007; 76:395 - 401.
14. Karunanithi K, Purushothaman MR, Thiruvenkadan AK, Gurmej Singh, Sadana K, Anand Jain et al. Mecheri sheep monograph, final report of survey, evaluation and characterization of Mecheri sheep breed, TANUVAS and NBAGR, 2004.
15. Loerch SC, Fluharty FL. Physiological changes and digestive capabilities of newly received feedlot cattle. J Anim. Sci. 1999; **77**:1113-1119.
16. Mahgoub O, Lu CD, Early RJ. Effects of dietary energy density on feed intake, body weight gain and carcass chemical composition of Omani growing lambs. Small Rumin. Res. 2000; 37:35-42.
17. Maiorano G, Ciarlariello A, Cianciullo D, Roychoudhury S, Manchisi A. Effect of suckling management on productive performance, carcass traits and meat quality of Comisana lambs. Meat Sci. 2009; 83:577-583.
18. Mierlita D, Lup F. The effects of supplementary feeding of lambs grazing on growth rate and carcass characteristics. *Lucrari stiintifice*, 2011; 54(2):252-257.
19. Mohammed AH, Yagoub YM. Effect of concentrate supplementation on the performance and carcass characteristics of natural grazing Sudanese desert lambs. J Agr. Sci & Engi. 2016; 2(1):1-4.
20. Muralidharan. Effect of concentrate and urea molasses mineral block (UMMB) supplementation on the performance of Mecheri lambs for mutton production. Ph.D., thesis submitted to the Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, 2010.
21. Patel BHM, Rangaswamy R, Upadhyay D, Kerketta S, Gaur GK. Study on carcass traits of local goats of Rohilkhand under different weaning systems. Indian Vet. J. 2015; 92(10):14-16.
22. Rajkumar V, Agnihotri MK. Carcass and meat quality attributes of Muzaffarnagari lambs reared under intensive and semi-intensive management system. *Indian J. Anim. Sci*., 2005; 75(10):1196-1198.
23. Rajkumar V, Agnihotri MK, Arun K, Das N, Ramachandran, Singh D. Effect of age on carcass characteristics and meat quality of Sirohi goat kids reared under semi- intensive management systems. Indian J Anim. Sci. 2010; 80(8):775-780.
24. Ramya. Comparative production performance of Mecheri lambs fed with cultivated fodders under intensive sysem. M.V.Sc., thesis submitted to the Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, 2016.
25. Singh NP, Karim SA, Sankhyan SK, Verma DL. Carcass characteristics of finisher lambs maintained under intensive and semi-intensive system of feeding. Indian. J Small Rum. 2003; 9(2):142-143.
26. Vergara H, Gallego L. Effect of type of suckling and length of lactation period on carcass and meat quality in intensive lamb production systems. Meat Sci. 1999; 53:211-215.
27. Zaharia R, Pascal C, Zaharia N, Roxana Lazar, Szidonia Salamon. The influence of the fattening system of growth rate and dressing percentage of the Turcana lambs bred in mountain area in the north-east of Romania. *Lucrari Stiintifice- Seria Zootehnine*, 2012; 57:190-195