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BODY AND CARCASS CHARACTERISTICS OF OSSIMI, BARKI AND RAHMANI RAM LAMBS RAISED UNDER INTENSIVE PRODUCTION SYSTEM

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ABSTRACT

Thirty ram lambs of native breeds (10 of each Ossimi, Barki and Rahmani), fattened up to 12 months old, were used to investigate the influence of breed and body weight on body measurements and carcass traits.

Heart girth and paunch girth of Barki ram lambs were significantly ($P < 0.05$) higher than those of Ossimi and Rahmani ones. Liver weight was significantly ($P < 0.05$) heavier in Barki ram lambs than in Ossimi and Rahmani ones. Carcass of Ossimi significantly ($P < 0.05$) excelled that of Barki and Rahmani breeds in total fat stores. Whereas, Barki carcass had significantly ($P < 0.05$) less total fat content. The superiority of Ossimi breed in total fat stores may be due to its heaviest fat tail. Accordingly, hot carcass weight was the highest in Ossimi ram lambs (26.1 kg) followed by Barki ones (25.8 kg). Whereas, Rahmani ram lambs produced significantly ($P < 0.05$) the lowest hot carcass weight (24.3 kg). Hence, the highest dressing percentage was significantly ($P < 0.05$) found in Ossimi carcass (56.2%) which was over Barki (53.3%) and Rahmani (53.1%) carcasses. However, the highest weights of carcass cuts (round, loin, thoracic region, shoulder, neck and flank) were recorded in Barki carcass compared with those of Ossimi and Rahmani ones.

One the other hand, body weight of ram lamb exerted a positive and highly significant ($P < 0.01$) effect on all body measurements and weights of all internal offals (except spleen), hot carcass and all carcass cuts. Meanwhile, neither breed of sheep nor body weight of ram lamb had a significant effect on *Longissimus dorsi* area.

It could be deduced that Barki ram lambs raised under intensive production system had the best carcass traits with less fat content.

Key words: *Ossimi, Barki, Rahmani, body and carcass measurements, internal offals, fat tail, carcass cuts, eye muscle area.*

INTRODUCTION

Mutton is considered the second source of red meat in Egypt. There are three major breeds of sheep, Ossimi, Barki and Rahmani. Previous studies on mutton **(Omar and Houria, 1994 and Houria, 1995)** were concerned with just one or two breeds at a time. Other researchers studied the impact of crossing exotic with local breeds on mutton production **(Galal *et al.*, 1975; Abou Amou and Shehata, 1996 and Hassan *et al.*, 1996)**.

It seems reasonable to compare meat characteristics of the three breeds of Egyptian sheep in one experiment. Yet, the present work aimed to compare body measurements and carcass traits of the three major Egyptian breeds (Ossimi, Barki and Rahmani) raised under intensive production system till slaughtering age of one year which is customary practiced. The influence of body weight of ram lamb on body measurements and carcass traits was also examined.

MATERIALS AND METHODS

1. Animals:

Thirty male lambs, 10 of each of Ossimi, Barki and Rahmani breeds, born in the sheep farm of Cairo University during four weeks of autumn 2003. Body weight at slaughtering (12 months of age) averaged 46.4 kg ±1.7 kg, 48.4 ± 1.3 kg and 45.5 ± 2.3 kg for Ossimi, Barki and Rahmani, respectively.

2. Management and feeding :

During the suckling period (12 weeks), ewes and lambs of each breed were kept in a semi – opened pen (4 m × 5 m) attached with a 5m × 8m yard. To enhance their growth rate, the following feeding schedule was adopted:

a. Pre – weaning period:

From three weeks of age up to weaning at three months of age, lambs suckled their mothers freely. A green fodder, Barseem (*Trifolium alexandrinum),* was available all the time to both lambs and dams. To enhance growth rate of lambs an average allowance of 100 g/ day/head of a ground grain mixture was given as a creep feeding. The grain mixture consisted of 35% yellow corn, 35% barley and 30% soybean meal.

b. Post – weaning period:

i) From 3 to 6 months of age :

Lambs continued eating liberal amounts of the green clover for nearly one month, followed by either sorghum (*Sorghum bicolor)* or clover hay according to availability. In the same time, each lamb received a daily allowance of the ground grain mixture at rate of 10 g/kg body weight.

ii) From 6 to 10 months of age:

The roughage feeding mentioned before was continued. A daily allowance of a concentrate mixture (40% yellow corn, 30% undecorticated cotton seed meal, 25% wheat bran, 3% limestone and 2% common salt) was given to each lamb at rate of 13 g/kg body weight. Additionally an extra amount of barley (6.5 g/kg body weight) was provided daily to each lamb.

iii) From 10 months to 12 months of age:

The daily amount of the concentrate mixture given to each lamb increased to the rate of 16.5 g/kg body weight plus 5.5 g/kg body weight of barley. Clover hay was also available.

Animals had free access to water.

3. Experimental procedure:

At 12 months of age, ram lambs of the three studied breeds were fasted for about 18h before slaughtering. Pre – slaughtering body weight and body measurements were recorded just before bleeding the animal. Body measurements were estimated using a measuring tape. The following body measurements were estimated:

1- Body length: the distance between the point of shoulder and the pinbone,

2- Height at withers: vertical distance from the withers to the floor,

3- Heart girth: circumference of the body just behind the fore legs,

4- Chest depth: vertical distance from the withers to the chest bottom ,

5- Chest width: width of the body at the withers,

6- Round circumference : circumference of the round just under the body floor,

7- Paunch girth: circumference of the body just before the hind legs, and

8- Pelvis width: distance between the two hocks.

Slaughtering was carried out according to the Islamic way by severing the throat and major blood vessels in the neck at the allanto – occipital joint.

Antemortem and postmortem examination of live animals and their carcasses did not show any marked abnormality.

Each carcass was deskinned and decapitated. External offals (head, skin and feet) were removed. Internal offals (heart, lung and trachea, liver, kidneys, spleen and testis) were separated from the dressed carcass and weighed. Also, full digestive tract was removed. Heart, kidney and gut fats were separated and weighed. Carcasses were weighed hot (about 1h after slaughtering). Fat tail was removed from carcass and weighed. Dressed carcass was then longitudinally split into approximately two equal halves. Carcass measurements were taken on the left half side as suggested by **Cunningham *et al.* (1967) and Houria (1995).** These measurements were carcass width at the 3rd rib (CrW3), carcass width at the 7th rib (CrW7), round length (CrRL), round circumference (CrRc), loin length (loinL) and carcass length (CrL).

Carcass measurements were taken using a measuring tape to the nearest 0.5 cm. The left side of carcass was then cooled at 4 °C for 24h. The chilled half of each carcass was weighed and divided into six cuts according to **Atti and Ben Hamouda (2004).** These carcass cuts were round, loin, shoulder, neck, flank and thoracic region (ribs and brisket).

Dressing percentage, based on pre – slaughter body weight, was calculated. *Longissimus dorsi* area at 10^{th} rib was measured in cm^2 using a digital planimeter.

4. Statistical analysis:

The SAS statistical package **(SAS, 1998)** was utilized for date analysis. Data of body measurements of ram lambs and their carcass characteristics were analyzed using the following model:

$$Y_{ij} = \mu + g_i + b(x_{ij} - \bar{x}_{ij}) + e_{ij}$$

Where :

Y_{ij} = Eexperimental observation,

μ = Overall mean,

g_i = Fixed effect of breed (i=1 : Ossimi, 2: Barki and 3: Rahmani),

b = Partial linear regression of the dependent variable Y on body weight of ram lamb,

x_{ij} = The independent continuous variable for body weight of ram lamb,

$\bar{x}_{ij}$ = The mean of body weight of ram lamb ,

e_{ij} = Random error and was assumed as NID $(0, \sigma_e^2)$

Significant differences among means were detected using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

1. Body measurements of ram lambs:

No significant differences were found among the three studied breeds in body length, height at withers and round circumference (Tables 1 and 2). These traits are commercially important in judging sheep in local markets. Hence, it may not be favourable to fatten a specific local breed to meet the augmented visual requirements of sheep purchasing especially at certain occasions such as Eid Al Adhaa. Meanwhile, breed differences were found in the other five body measurements studied (Tables 1 and 2). Barki yearlings had significantly ($P < 0.05$) the highest heart girth (Table 1). **Galal *et al.* (1975)** found no significant difference in heart girth of Barki, Merino and Awassi yearling rams and their crosses. Ossimi yearling had significantly ($P < 0.05$) the least chest depth (Table 1). Meanwhile, the chest width of Rahmani yearling was significantly ($P < 0.05$) smaller than that of Barki and Ossimi ones (Table1). Paunch girth was significantly highest (Tables 1 and 2) for Barki ram lambs and pelvis width was significantly least for Rahmani yearlings (Tables 1 and 2). Results of other studies

concerned with growth rate and body measurements in Barki as well as some other foreign breeds are in harmony with the present findings. **Fahmy *et al.* (1964) and Mowafy (1968)** reported that Barki males, in the first year of age, grow at a more accelerated rate than the Merinos. **Galal *et al.* (1975)** found that differences among Barki, Merino, Awassi and their crosses were highly significant in body length , depth at chest, width at hook and width at loin. Nevertheless, under fattening conditions Merino excelled the other breeds in performance. While Barki yearling rams were generally the poorest, where they were the shortest, shallowest, narrowest and thinnest.

Table 1. The effect of breed and body weight of ram lambs on body measurements (cm) before slaughtering.

Classification / Traits	Breed						Reg. on body weight (Kg)	
	Ossimi (N=10)		Barki (N=10)		Rahmani (N=10)			
	$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.	b	S.E.
Body length	71.5 **a**	0.94	72.7 **a**	0.95	72.3 **a**	0.95	0.46**	0.10
H. at withers[1]	73.0 **a**	0.75	74.1 **a**	0.76	72.6 **a**	0.76	0.31**	0.08
Heart girth	86.1 **b**	0.97	96.6 **a**	0.98	86.8 **b**	0.98	0.64**	0.10
Chest depth	36.7 **b**	0.47	39.8 **a**	0.48	38.9 **a**	0.47	0.22**	0.05
Chest width	22.6 **a**	0.43	23.7 **a**	0.44	20.7 **b**	0.44	0.10*	0.05
R. circumfer.[2]	42.2 **a**	0.99	42.1 **a**	1.01	43.5 **a**	1.00	0.41**	0.11
Paunch girth	90.5 **b**	1.19	100.8 **a**	1.21	91.1 **b**	1.20	0.57**	0.13
Pelvis width	22.2 **a**	0.34	21.6 **ab**	0.34	20.8 **b**	0.34	0.12**	0.04

Within breeds, means of each trait not followed by the same letter differ significantly from each other ($P < 0.05$).

* $P < 0.05$ ** $P < 0.01$

1.=Hight at withers, 2.=Round circumference

On the other hand, the partial linear regression coefficients of body length, height at withers, heart girth, chest depth , round circumference, paunch girth and pelvis width on body weight of ram lamb were 0.46 cm, 0.31cm, 0.64 cm, 0.22 cm, 0.41cm, 0.57 cm and 0.12 cm, respectively and were statistically highly significant ($P < 0.01$) (Tables 1 and 2). Furthermore, a positive (0.10 cm.) and significant ($P < 0.05$) regression coefficient of chest width on body weight was found (Tables 1 and 2). All these significant regression coefficients indicate that one can count on any of them for

Table 2. Analysis of variance for the effect of breed and body weight of ram lambs on body measurements before slaughtering.

Traits	Source of variation					
	Breed		Reg. on body weight		Residual	
	df	M.S.	*df*	M.S.	*df*	M.S.
Body length	2	3.93	1	187.24**	26	8.83
Height at withers	2	1.01	1	85.55**	26	5.68
Heart girth	2	241.77**	1	364.58**	26	9.40
Chest depth	2	21.50**	1	43.15**	26	2.21
Chest width	2	18.54**	1	8.00*	26	1.87
Round circumference	2	16.20	1	146.33**	26	9.87
Paunch girth	2	241.95**	1	287.28**	26	14.14
Pelvis width	2	4.30*	1	11.66**	26	1.15

* $P < 0.05$ ** $P < 0.01$

evaluation of body weight of the three domestic breeds. Similar result was obtained by **Seker and Kul (2001)** who found that the phenotypic correlation coefficients between body weight and measurements of Awassi yearling lambs were positive and significant. It is worthy to note that live body measurements (body length, rump height, thoracic perimeter, shank perimeter and rump length and width) together with live weight were positively correlated with the carcass weight and traits **(Marshall *et al.*, 2005 and Yaprak *et al.*, 2008).**

2. Weight of some internal offals and fat stores:

The mean weights of each edible organ i.e. heart, liver, kidney, lung and trachea, spleen and testis are shown in Table 3. Differences due to breed of ram lambs were highly significant ($P < 0.01$) in all studied offals weight, except those of spleen and testis weights, (Table 4). It is interesting (Table 3) that Ossimi ram lambs had significantly ($P < 0.05$) heavier weights of heart and kidney than either Barki or Rahmani ones. Additionally, lung and trachea weight were approximately similar in Ossimi and Rahmani ram lambs and it was significantly ($P < 0.05$) the lightest in Barki ones (Table 3). Apparently, liver weight was significantly ($P < 0.05$) heavier in Barki ram lambs than in Ossimi and Rahmani ones (Table 3). The significant differences in weights of internal organs due to breed of lamb were also found by **Galal *et al.* (1975).** The authors reported that Barki yearling rams had the lightest weights of internal offals compared with Awassi, Merino and their crosses.

It is interesting to speculate that breed differences in weight of internal offals may be attributed to different rates of development or the amount of accumulated fat **(Galal *et al.*, 1975).**

It is apparent from the results in Tables 3 and 4 that the partial linear regression coefficients of each of the heart, liver, kidney, lung and trachea and testis weight on body weight of ram lamb were positive and highly significant ($P < 0.01$). In the

meantime, a positive but insignificant regression coefficient of spleen weight on body weight of ram lamb was found (Tables 3 and 4). The attained results might indicate that the heavier the lamb, the bigger its offals are. This result contradicts with the finding of **Galal *et al.* (1975)** who reported that differences in organ weights among breeding groups are not due to their different body weights.

Table 3. The effect of breed and body weight of ram lambs on weight of some internal offals and fat stores after slaughtering

Classification / Traits	Breed						Reg. on body weight(Kg)	
	Ossimi (N=10)		Barki (N=10)		Rahmani (N=10)			
	$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.	b	S.E.
Heart weight, g	175.0 **a**	3.12	158.0 **b**	3.16	152.0 **b**	3.15	2.81**	0.33
Liver weight, g	658.5 **b**	19.34	789.5 **a**	19.60	630.0 **b**	19.49	9.50**	2.05
Kidney weight, g	124.0 **a**	2.51	110.5 **b**	2.54	101.5 **c**	2.53	1.66**	0.27
Lung and trachea wt., g	595.0 **a**	27.20	494.5 **b**	27.57	593.0 **a**	27.42	8.84**	2.89
Spleen weight, g	74.0 **a**	5.04	80.0 **a**	5.11	89.0 **a**	5.08	0.51	0.54
Testis weight, g	316.5 **a**	16.48	330.0 **a**	16.71	283.5 **a**	16.62	11.98**	1.75
Total fat stores, kg	4.2 **a**	0.21	2.2 **c**	0.21	2.9 **b**	0.21	0.08**	0.02
Heart fat wt., g	77.5 **a**	4.87	85.0 **a**	4.94	77.0 **a**	4.91	1.53**	0.52
Kidney fat wt., g	93.5 **b**	17.36	227.5 **a**	17.87	109.5 **b**	17.77	4.92*	1.87
Gut fat wt., g	197.5 **b**	37.08	488.5 **a**	37.59	206.0 **b**	37.38	8.57*	3.94
Fat tail wt., kg	3.9 **a**	0.22	1.4 **c**	0.22	2.5 **b**	0.22	0.07**	0.02

Within breeds, means of each trait not followed by the same letter differ significantly from each other ($P < 0.05$).

* $P < 0.05$ ** $P < 0.01$

On the other hand, results in Table 3 showed that carcasses of Ossimi ram lambs had significantly ($P < 0.05$) the highest total fat stores (4.2 kg), followed by Rahmani carcass (2.9 kg). Whereas Barki ram lambs produced significantly ($P < 0.05$) least total fat content in their carcasses (2.2 kg). Meanwhile, breed of ram lamb had a highly significant ($P < 0.01$) influence on total fat stores (Table 4). It is clear that the superiority of Ossimi in total fat stores was mainly due to its excessive fat tail (3.9 kg) versus 2.5 kg for Rahmani and 1.4 kg for Barki (Table 3). Furthermore, differences in fat tail weight among breeds were highly significant ($P < 0.01$) (Table 4). Comparable result was reported by **Atti and Ben Hamouda (2004)** who found that weight of tail fat in Barbarine lambs was positively correlated with total body fat ($r = 0.91$, $P < 0.01$). Several studies confirmed the significant effect of breed on fat contents in carcasses of sheep **(Galal *et al.*, 1975; Mc Clelland *et al.*, 1976; El-Shahat *et al.*, 1986:**

Table 4. Analysis of variance for the effect of breed and body weight of ram lambs on weight of some internal offals and fat stores after slaughtering

Traits	Source of variation					
	Breed		Reg. on body weight		Residual	
	df	M.S.	*df*	M.S.	*df*	M.S.
Heart weight	2	1541.61**	1	6989.48**	26	97.33
Liver weight	2	48714.87**	1	79835.27**	26	3734.22
Kidney weight	2	1232.65**	1	2432.77**	26	62.78
Lung and trachea wt.	2	69223.96**	1	46604.13**	26	7386.87
Spleen weight	2	615.00	1	227.82	26	253.93
Testis weight	2	1231.20	1	127067.06**	26	2713.00
Total fat stores	2	12.15**	1	6.13**	26	0.45
Heart fat wt.	2	55.59	1	2059.50**	26	237.04
Kidney fat wt.	2	42889.00**	1	21405.29*	26	3103.16
Gut fat wt.	2	227390.91**	1	64975.11*	26	13731.92
Fat tail wt.	2	16.83**	1	4.11**	26	0.49

* $P < 0.05$ ** $P < 0.01$

Hassan *et al.*, 1996 and Ermias and Rege, 2003). El-Shahat *et al.* (1986) found that carcasses of Rahmani lambs were fatter than those of Ossimi ones.

It is worthy to note that the weights of kidney fat and gut fat were significantly ($P < 0.05$) higher in Barki carcasses compared with those in Ossimi or Rahmani carcasses (Table 3). Moreover, breed of ram lamb had a highly significant ($P < 0.01$) influence on weights of kidney fat and gut fat (Table 4). Presumably, being Barki sheep a light tailed breed, encourage fat deposition internally round kidney and gut. In this respect, **Burke and Apple (2007)**, in comparable study, found that kidney fat weight and percentage were greater ($P < 0.001$) in carcasses from Katahdin and St.Croix than Dorper and Suffolk wethers. In this context, it was found that heart fat weight did not significantly differ among the present studied breeds (Tables 3 and 4).

It is shown in Tables 3 and 4 that there were positive and significant regression coefficients for weights of total fat stores ($P < 0.01$), heart fat ($P < 0.01$) , kidney fat ($P < 0.05$), gut fat ($P < 0.05$) and fat tail ($P < 0.01$) on body weight of ram lambs. These results are in harmony with those previously reported by **Vatankhah and Talebi (2008)** who found positive and significant genetic correlations among body weight of lambs and various fat-tail measurements.

3. Carcass weight and measurements:

The heaviest carcasses were those of Ossimi ram lambs followed respectively by those of Barki and Rahmani ones (Table 5). Differences in hot carcass weight due to breed were highly significant ($P < 0.01$) (Table 6). However, carcasses of Ossimi and Barki did not differ significantly but both were significantly ($P < 0.05$) heavier than that

of Rahmani carcass (Table 5). This result is in accordance with those reported by **Galal *et al.* (1975), Hassan *et al.* (1996) and Burke and Apple (2007)** whom found significant differences due to breed of sheep in carcass weight. **Galal *et al.* (1975)** found that carcass weight of Barki yearling rams was the lightest among the breeding groups (Merino, Awassi and their crosses). Whereas, Ossimi lambs had the highest carcass weight compared with Chios and crossbred **(Hassan *et al.*, 1996). Burke and Apple (2007)** found that Suffolk lambs produced heavier ($P < 0.001$) hot carcass weight than carcasses of hair-sheep breeds.

Table 5. The effect of breed and body weight of ram lambs on carcass weight and measurements.

Classification / Traits	Breed						Reg. on body weight (Kg)	
	Ossimi (N =10)		Barki (N =10)		Rahmani (N =10)			
	$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.	b	S.E.
Hot carcass wt., kg	26.1 **a**	0.33	25.8 **a**	0.33	24.3 **b**	0.33	0.59**	0.03
Dressing (%)	56.2 **a**	0.70	53.3 **b**	0.71	53.1 **a**	0.70	0.11	0.07
CrW3 (cm)	17.9 **a**	0.34	17.2 **a**	0.34	17.0 **a**	0.34	0.03	0.04
CrW7 (cm)	21.5 **a**	0.41	21.0 **a**	0.42	20.7 **a**	0.42	0.05	0.04
CrRL (cm)	21.6 **a**	0.38	21.2 **ab**	0.38	20.4 **a**	0.38	0.06	0.04
CrRC (cm)	41.4 **b**	0.45	45.1 **a**	0.46	41.7 **b**	0.46	0.32**	0.05
LoinL (cm)	21.4 **ab**	0.40	20.3 **b**	0.41	21.9 **a**	0.40	0.09*	0.04
CrL (cm)	54.0 **a**	0.56	53.0 **a**	0.57	52.8 **a**	0.56	0.40**	0.06

Within breeds, means of each trait not followed by the same letter differ significantly from each other ($P < 0.05$).

CrW3: Carcass width at the 3rd rib, CrW7: Carcass width at the 7th rib, CrRL: Round length of carcass, CrRC: Round circumference of carcass, LoinL: Loin length of carcass and CrL: Carcass length

* $P < 0.05$ ** $P < 0.01$

It is well established that the regression coefficient of hot carcass weight on body weight of ram lamb was positive and highly significant ($P < 0.01$) (Tables 5 and 6). This might mean that we can depend on live weight of the native breed when selecting for higher carcass weight. Similarly, **Ermias and Rege (2003)** found that live weight had strong positive genetic and phenotypic correlations with hot and cold carcass weight in Menz and Horro sheep.

Dressing percentage, measured as the percent of hot carcass weight to live body weight, was significantly ($P < 0.05$) higher in Ossimi ram lambs than in Barki and Rahmani ones (Table 5), indicating that dressing percentage was significantly ($P < 0.01$) affected by breed (Table 6). The highest dressing percentage of Ossimi ram lamb might be partially attributed to its heavy tail which outweigh those of the other two breeds. A significant influence of breed of sheep on dressing percentage was found by

several investigators **(Galal *et al.*, 1975; Abou Amou and Shehata, 1996; Hassan *et al.*, 1996; Burke and Apple, 2007 and Al-Sabbagh *et al.*, 2008).** On the contrary, few investigators reported that breed of lamb had no significant effect on dressing percentage **(El – Asheeri *et al.*, 2006, and Pérez *et al.*, 2007). El-Asheeri *et al.* (2006)** found that the dressing percentage was approximately similar for Rahmani (49.1%) and Ossimi (49.8%) ram lambs.

Table 6. Analysis of variance for the effect of breed and body weight of ram lambs on carcass weight and measurements.

Traits	Source of variation					
	Breed		Reg. on body weight		Residual	
	df	M.S.	*df*	M.S.	*df*	M.S.
Hot carcass weight	2	5.93**	1	311.94**	26	1.07
Dressing (%)	2	30.90**	1	9.79	26	4.90
CrW3	2	2.25	1	0.93	26	1.14
CrW7	2	1.59	1	1.99	26	1.72
CrRL	2	3.25	1	3.59	26	1.42
CrRC	2	26.22**	1	87.84**	26	2.06
LoinL	2	8.21*	1	7.07*	26	1.59
CrL	2	7.68	1	138.43**	26	3.12

CrW3: Carcass width at the 3rd rib, CrW7: Carcass width at the 7th rib, CrRL: Round length of carcass, CrRC: Round circumference of carcass, LoinL: Loin length of carcass and CrL: Carcass length

* $P < 0.05$ ** $P < 0.01$

On the other side, a positive but insignificant regression coefficient of dressing percentage on body weight of ram lamb was found. This result agrees with the finding of **Seker and Kul (2001)** who reported that the phenotypic correlation coefficient between body weight and dressing percentage was positive but insignificant.

Concerning carcass measurements, results showed no significant differences in width of carcass at 3rd rib and 7th rib and carcass length (Tables 5 and 6). Similar result was reported by **El-Asheeri *et al.* (2006)** who found that carcass length of Ossimi and Rahmani lambs did not significantly differ. On the contrary, **Marino *et al.* (2008)** pointed out that carcass of Trimeticcio lambs had significantly higher width of chest and pelvis than carcass of Altamurana lambs. In this context, **Galal *et al.* (1975)** reported that carcass length, carcass width at shoulder, carcass width at loin and heart girth were significantly higher in Merino than in Barki and Awassi. Whereas carcass measurements did not significantly differ between Awassi and Barki.

It is apparent (Table 6) that breed of ram lamb exerted a significant effect on round circumference of carcass ($P < 0.01$) and loin length ($P < 0.05$). In the meantime, it is interesting to notice that while round length did not significantly differ in carcasses

of the studied breeds, round circumference differed significantly ($P < 0.01$) among them (Table 6). Round circumference of Barki carcass was significantly ($P < 0.05$) higher than those of both Ossimi and Rahmani (Table 5). Such finding might reflects the relatively good quality of Barki mutton compared to those of Ossimi or Rahmani. It is well established that barrel shaped carcasses are considered far better than the shallow shaped ones. Meanwhile, loin length of Rahmani carcass was significantly ($P < 0.05$) longer than that of Barki carcass, whereas loin length of Ossimi carcass did not significantly differ from that of Barki or Rahmani carcass (Table 5).

On the other hand, the relationship of body weight of ram lamb with round circumference of carcass, loin length of carcass and carcass length was significant (Table 6). Each increase of 1kg in body weight of ram lamb resulted in an increase of 0.32 cm ($P < 0.01$), 0.09 cm ($P < 0.05$) and 0.40 cm ($P < 0.01$) in round circumference, loin length and carcass length, respectively (Table 5). Hence, body weight of ram lamb appeared to be an important factor affecting some carcass measurements.

4. Carcass cuts and eye muscle (*Longissimus dorsi*) area :

Table 7 shows that weight of the left side cold carcass of Barki significantly ($P < 0.05$) excelled that of Ossimi and Rahmani carcasses. It is interesting to observe that heaviest hot carcass weight of Ossimi (Table 5) might arise from its comparatively heaviest fat tail weight (Table 3). Hence, after removing fat tail of carcass, weight of the cold left side of Barki, being least in fat tail, outweighed those of the other two breeds. It was significantly ($P < 0.05$) heavier (Tables 7 and 8). Concerning breed differences in round weight (Table 7), the heaviest weight was that of Barki followed by Rahmani then Ossimi. But differences due to breed were insignificant (Table 8). Furthermore, weight of loin was highest in Barki carcass (Table 7). It did not differ from that of Ossimi but both were significantly ($P < 0.05$) heavier than loin weight of Rahmani (Table 7). Breed difference in loin weight was significant ($P < 0.05$) (Table 8). Thoracic region weight was highest for Barki, least for Rahmani and intermediate for Ossimi (Table7). But no significant breed differences (Table 8) were observed.

It could be seen from Table 7 that Barki carcass significantly ($P < 0.05$) excelled both Ossimi and Rahmani carcasses in weights of shoulder, neck and flank. While, weights of shoulder, neck and flank did not significantly differ between Ossimi and Rahmani (Table7). Meanwhile, breed of carcass exerted a significant ($P < 0.05$) effect on only weight of neck and flank (Table 8).

It could be deduced that Barki carcasses outweigh both Ossimi and Rahmani in weights of carcass cuts. The obtained results nominate Barki breed to be the best breed among the three studied breeds. Various investigators showed that breed of sheep exerted a significant influence on carcass cuts (**Galal *et al.*, 1975; Hassan *et al.*, 1996 and Pérez *et al.*, 2007**). **Galal *et al.* (1975)** compared between carcasses of Barki, Awassi, Merino and their crosses in fore and hind quarter weights. The authors found

Table 7. The effect of breed and body weight of ram lambs on weight of carcass cuts and eye muscle area

Classification / Traits	Breed						Reg. on body weight (Kg)	
	Ossimi (N=10)		Barki (N=10)		Rahmani (N=10)			
	$\bar{x}$	S.E.	$\bar{x}$	S.E.	$\bar{x}$	S.E.	b	S.E.
Cold carcass left side wt. (kg)[1]	11.21 **b**	0.20	12.45 **a**	0.20	11.11 **b**	0.20	0.27**	0.021
Round wt. (kg)	2.94 **b**	0.09	3.32 **a**	0.09	3.06 **ab**	0.09	0.05**	0.010
Loin weight (kg)	1.42 **a**	0.08	1.63 **a**	0.08	1.17 **b**	0.08	0.04**	0.008
Thoracic region wt., kg	3.17 **a**	0.09	3.29 **a**	0.09	3.16 **a**	0.09	0.09**	0.010
Shoulder wt. (kg)	2.06 **b**	0.04	2.24 **a**	0.04	2.08 **b**	0.04	0.05**	0.004
Neck weight (kg)	1.08 **b**	0.05	1.34 **a**	0.05	1.14 **b**	0.05	0.03**	0.006
Flank weight (kg)	0.54 **b**	0.02	0.63 **a**	0.02	0.50 **b**	0.02	0.01**	0.002
Area at 10th rib, cm^2	16.5 **a**	0.90	14.7 **a**	0.90	16.9 **a**	0.90	0.03	0.095

Within breeds, means of each trait not followed by the same letter differ significantly from each other ($P < 0.05$).

** $P < 0.01$ [1] fat tail was removed

Table 8. Analysis of variance for the effect of breed and body weight of ram lambs on weight of carcass cuts and eye muscle area.

Traits	Source of variation					
	Breed		Reg. on body weight		Residual	
	df	M.S.	*df*	M.S.	*df*	M.S.
Cold carcass left side wt. [1]	2	1.53*	1	65.43**	26	0.40
Round weight	2	0.19	1	2.29**	26	0.09
Loin weight	2	0.29*	1	1.19**	26	0.06
Thoracic region wt.	2	0.04	1	7.21**	26	0.09
Shoulder weight	2	0.03	1	1.84**	26	0.02
Neck weight	2	0.10*	1	0.76**	26	0.03
Flank weight	2	0.02*	1	0.15**	26	0.005
Area at 10th rib	2	14.37	1	0.81	26	7.96

* $P < 0.05$ ** $P < 0.01$

[1] fat tail was removed

that Awassi and Barki showed the lightest weights in fore quarter. Whereas, Awassi had the heaviest hind quarters, mainly because of the inclusion of tail. Barki scored the lightest hind quarters, even with the tail included. **Hassan *et al.* (1996)** reported that Ossimi carcass had the highest hind quarter percentage over Chios and their crosses.

While, Chios carcass had the highest fore quarter percentage. Meanwhile, **Pérez *et al.* (2007)** reported that with exception of tail, there were significant ($P < 0.05$) differences in all commercial cuts (leg, chops, thorax, shoulder and neck) among the studied genotypes (Suffolk Down, Merino Precoz Aleman, Suffolk Dwon × corriedale and Suffolk Down × Merino Precoz Aleman). In this context, **Kashan *et al.* (2005)** found that the average weight of shoulder, brisket and loin did not significantly differ between Chaal lambs and Zandi ones. Whereas, carcass cuts were significantly ($P < 0.01$) higher in crossbred than pure breed lambs.

It should be pointed out that breed of carcass had no significant effect on area of eye muscle (*Longissimus dorsi*)(Tables 7 and 8). Similar results were obtained by **Galal *et al.* (1975) and Kashan *et al.* (2005). Galal *et al.* (1975)** showed that the width and depth of eye muscle were not significantly differed among Barki, Awassi and Merino breeds, being the least in Barki carcass. Moreover, **Kashan *et al.* (2005)** found that the eye muscle area in the Chaal, Zandi lambs and their crosses were similar ($P > 0.05$). On the contrary, **Burke and Apple (2007)** found that carcasses of Dorper and Suffolk lambs had significantly ($P < 0.001$) larger *Longissimus* muscle areas than those of Katahdin and St. Croix carcasses. In this context, it is worthy to note that **Edwards *et al.* (1989)** indicated that *Longissimus* muscle area was not correlated with carcass measurements.

On the other hand, it is shown in Tables 7 and 8 that positive and highly significant ($P < 0.01$) regression coefficients of weights of cold left side of carcass, round, loin, thoracic, shoulder, neck and flank on body weight of ram lambs were found. Accordingly, it could be concluded that live weight of ram lamb plays a major role in determining carcass characteristics. **Seker and Kul (2001)** found positive and significant correlation coefficients between body weight and carcass traits of Awassi yearling lambs. Nevertheless, it was found that the linear regression coefficient of eye muscle area on body weight of ram lambs was positive, but insignificant (Tables 7, and 8). In this respect. **Pérez *et al.* (2007)** reported that the high area of *Longissimus dorsi* among the different breeds of sheep, was remarkable considering the low slaughter weights.

CONCLUSION

Barki ram lambs raised and fattened under intensive production system exhibited the best carcass characteristics with less fat content over Ossimi and Rahmani ones. Positive and significant regression coefficients of all body measurements and carcass traits on body weight of ram lamb were found. Hence, it may be recommended to use live body measurements to predict different carcass traits. Neither breed of sheep nor body weight of ram lamb was significantly correlated with *Longissimus dorsi* area.

REFERENCES

Abou Amou, F.F. and E.I. Shehata (1996). Role of crossing Finnsheep with local breeds on carcass quality. Symposium on : use of exotic breeds in improving sheep production , Finnsheep as a case study . April 22-23, 1996, Egypt : 120-125.

Al- Sabbagh, T.; J. Dashti and T. Al – Abdulla (2008). A comparison of the carcass composition of straightbred and crossbred lambs. Egyptian Journal of Sheep and Goat Sciences, 3(2) : 15-18.

Atti, N. and M. Ben Hamouda (2004). Relationships among carcass composition and tail measurements in fat – tailed Barbarine sheep. Small Rumin. Res., 53 : 151-155.

Burke, J.M. and J.K. Apple (2007). Growth performance and carcass traits of forage – fed hair sheep wethers. Small Rumin. Res., 67: 264-270.

Cunningham, N.L.; Z.L. Carpenter; G.T. King; O.D. Butler and J.M. Shelton (1967). Relationship of linear measurements and certain carcass characteristics to retail value, quality and tenderness of ewe, wether and ram lambs. J. Anim. Sci., 26: 683-687.

Edwards, J.W.; R.C. Cannell; R.P. Garrett; J.W. Savell ; H.R. Cross and M.T. Longnecker (1989). Using ultrasound, linear measurements and live fat thickness estimates to determine the carcass composition of market lambs. J. Anim. Sci., 67: 3322-3330.

El – Asheeri, A.k.; Y.M. Hafez; M.A. Ibrahim; M.M. Ali and A.H. Barkawi (2006). Growth performance of Rahmani and Ossimi lamb breeds from birth to 12 months of age. In the 13th conference of the Egyptian Society of Animal Production, Cairo, Egypt. Egyptian J. Anim. Prod., 43 (Supplement Issue):31-42.

El – Shahat, A.A.; A.Z. EL – Basiony; G.A. Abd El-Rahman and H.M. Aly (1986). Effect of interaction between breed and plane of nutrition on sheep carcass tissues. Egyptian J.Anim. Prod., 26 (2) : 129-135.

Ermias, E. and J.E. O. Rege (2003). Characteristics of live animal allometric measurements associated with body fat in fat-tailed sheep. Livestock Production Science, 81:271-281.

Fahmy, M.H.; Y.S. Ghanem and H.F. El-Essawy (1964). A study of some body measurements in a cross between Merino and Barki sheep living under desert conditions, I. Growth rate. Bull. Egypt. Desert Inst., 14 (1) : 43-61.

Galal, E.S.E.; Y.S.Ghanem; M.A. Farid; M.H. Fahmy and A.E.M. Seoudy (1975). Carcass traits and feed-lot performance of Barki, Merino and Awassi breeds of sheep and some of their crosses. Egyptian J. Anim . Prod., 15 (1) : 33-46.

Hassan, A.H.; S.T.M. Fahmy; M.T. Mousa and A.I.A. Suliman (1996). The effect of crossbreeding between Chios and Ossimi sheep on growth performance and carcass characteristics of male lambs. In the 9th conference of the Egyptian Society of Animal Production, Shebin El-Kom, Menoufyia, Egypt. Egyptian J. Anim. Prod., 33 (supplement Issue): 61-70.

Houria, M.A. (1995). Studies on some behavioural aspects, body performance, wool and carcass traits of Ossimi ram lambs raised under closed stable or open shed. Egyptian. J. Anim. Prod., 32(1) : 33-49.

Kashan, N.E.J.; G.H. Manafi Azar; A. Afzalzadeh and A. Salehi (2005). Growth performance and carcass quality of fattening lambs from fat – tailed and tailed sheep breeds. Small Rumin. Res., 60: 267-271.

Marino, R.; M. Albenzio; G. Annicchiarico; M. Caroprese; A. Muscio; A. Santillo and A. Sevi (2008). Influence of genotype and slaughtering age on meat from Altamurana and Trimeticcio lambs. Small Rumin. Res., 78 : 144-151.

Marshall, W.; M. Collantes; A. Corchado; J.A. Bertot; F. Una; V. Torres and L. Sarduy (2005). Prediction of the carcass, tissue composition and regional traits in Pelibuey sheep supplemented with poultry litter and soybean meal. Cuban J. Agric. Sci.,39(1): 33-40.

McClelland, T.H.; B. Bonaiti and St C.S. Taylor (1976). Breed differences in body composition of Equally mature sheep. Anim. Prod., 23 : 281-293.

Mowafy, M.A. (1968). Comparative studies on the meat quality of the local and import breeds. M.Sc. thesis ,Fac. Agric., Ain Shams Univ., Cairo.

Omar, S.S. and M. A. Houria (1994). A study of some carcass and wool characteristics of culled Ossimi ewes. Egyptian J. Anim. Prod., 31(1): 125-136.

Pérez, P.; M. Maino; M.S. Morales; C. Köbrich; C. Bardon and J. Pokniak (2007). Gender and slaughter weight effects on carcass quality traits of suckling lambs from four different genotypes. Small Rumin. Res., 70 :124-130.

SAS (1998). SAS User's Guide : Statistics. SAS Inst. Inc., Cary, NC.,USA.

Seker, I. and S. Kul (2001). The relationships between live body weight, body measurements and some carcass characteristics at different ages of Awassi yearling ram lambs. Saglk Bilimleri Dergisi, Firat Universitesi, 15 (2) : 353- 360.

Vatankhah, M. and M.A. Talebi (2008). Genetic parameters of body weight and fat – tail measurements in lambs. Small Rumin. Res., 75 : 1-6.

Yaprak, M.; F. Koycegiz; M. Kutluca; E. Emsen and H.W. Ockerman (2008). Canonical correlation analysis of body measurements, growth performance and carcass traits of Red Karaman lambs. J. Anim. Vet. Adv., 7(2): 130-136.

خصائص الجسم والذبيحة لحوالى الأوسيمي والبرقي والرحماني المرباه تحت نظام الإنتاج المكثف

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استخدم 30 حولى من السلالات المحلية (10 حوالى من كل: الأوسيمي، والبرقي والرحماني)، عمرهم 12 شهر عند الذبح ، لدراسة تأثير السلالة ووزن الجسم على مقاييس الجسم وصفات الذبيحة.

كان محيط الصدر ومحيط البطن لحوالى البرقي أعلى معنوياً (احتمال أقل من 0.05) من تلك في حوالى الأوسيمي والرحماني. أما وزن الكبد فكان أثقل معنوياً (احتمال أقل من 0.05) في حوالى البرقي عنه في حوالي الأوسيمي والرحماني. تفوقت ذبائح الأوسيمي معنوياً (احتمال أقل من 0.05) على ذبائح البرقي والرحماني في مخزون الدهن الكلي. في حين كانت ذبيحة البرقي الأقل معنوياً (احتمال أقل من 0.05) في محتوى الدهن. يرجع تفوق سلالة الأوسيمي في مخزون الدهن الكلي إلى احتوائها أثقل ذيل دهني (لية). وطبقا لذلك، كان وزن الذبيحة الساخن أعلى في الحوالى الأوسيمي (26.1 كجم) يتبعها الحوالى البرقي (25.8 كجم). في حين أنتجت الحوالى الرحماني أقل وزن ذبيحة ساخن (24.3 كجم) بفارق معنوى (احتمال أقل من 0.05). وهكذا، فقد وجد أن نسبة التصافي كانت الأعلى (احتمال أقل من 0.05) لذبيحة الأوسيمي (56.2%) مقارنة بذبائح البرقي (53.3%) والرحماني (53.1%). ومع ذلك، سجلت أعلى أوزان لقطعيات الذبيحة لحوالى البرقي (الفخذ والقطن ومنطقة الضلوع والصدر والكتف والرقبة والخاصرة) مقارنة بأوزان نفس القطعيات في ذبائح الأوسيمي والرحماني.

من ناحية أخرى، كان لوزن جسم الحوالى تأثيراً ايجابياً وعالىً المعنوية (احتمال أقل من 0.01) على كل مقاييس الجسم وعلى أوزان كل الأعضاء الداخلية (باستثناء الطحال) وعلى وزن الذبيحة الساخن وعلى أوزان قطعيات الذبيحة جميعها. وفي غضون ذلك، لم يكن للسلالة ولا لوزن جسم الحولى أي تأثير معنوي على مساحة العضلة العينية.

يستنتج من ذلك أن حوالى البرقي المرباة تحت نظام الإنتاج المكثف تنتج أفضل الذبائح بأقل محتوى دهني.