

## A COMPARATIVE STUDY ON GROWTH, CARCASS TRAITS AND BODY COMPOSITION OF AWASSI AND KARADI LAMBS RAISED UNDER TWO LEVELS OF FEEDING AND SLAUGHTERED AT DIFFERENT WEIGHTS: 2- BODY COMPOSITION AND CARCASS TISSUE DISTRIBUTION

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### ABSTRACT

A total of 32 weaned (3.5-4 months) of Awassi (16) and Karadi (16) lambs were randomly allocated into two equal groups to be fed either *ad libitum* or 3% of their body weight concentrate, and to be slaughtered at 36 and 44 kg body weight. After chilling at 4°C for 24h, the carcass was split along the vertebral column into two halves by electric saw, and the left side was separated into eight whole sale cuts and were physically dissected into lean, fat and bone and weighed. Results reveal that the overall mean of lean, fat, bone, lean: fat and lean: bone ratio were 60.31±0.25%, 17.05± 0.69%, 22.63 ± 0.59%, 3.78 ±0.20 and 2.71 ± 0.06, respectively. It was noticed that Karadi lambs surpass significantly (P<0.01) Awassi lambs in the content of lean (61.32±0.29 vs. 59.30±0.21%) and bone (24.72±0.85 vs. 20.53±0.35%) and had lower content of fat (13.94±0.75 vs. 20.15±0.39%). Neither lambs fed *ad libitum* nor 3% concentrate had a significant effect on composition of the carcasses. Lambs slaughtered at 44 kg had significantly (P<0.01) higher content of fat and lower bone content. Awassi lambs and those slaughtered at 44 kg had significantly (P<0.01) higher total body fat than did Karadi lambs and those slaughtered at 36 kg.

Keywords: body composition, carcass tissue distribution, awassi, karadi.

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دراسة مقارنة النمو وصفات الذبيحة وتركيب الجسم للحملان العواسية والكرادية والمغذاة على مستويين من التغذية ومذبوحة عند وزنين مختلفين: 2-تركيب الجسم وتوزيع انسجة الذبيحة.

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### المستخلص

تم توزيع 32 حملاً مفطوماً من كل من العواسي (16) والكرادي (16) عشوائياً إلى مجموعتين لتتغذى احدهما بصورة حرة و الثانية على 3% من وزن جسمها و تذبح عند اوزان 36 و 44كغم. بعد تبريد الذبائح (4م) ولمدة 24 ساعة ثم قطعها الى نصفين، و تم تقطيع الجانب الأيسر الى ثمانية قطع رئيسية تجارية ومن ثم فصل اللحم والدهن والعظم فيزيائياً لكل قطعة ووزنها. تشير النتائج الى ان المعدل العام للحم والدهن والعظم ونسبة اللحم:الدهن ونسبة اللحم:العظم قد بلغ 60.31±0.25% و 17.05±0.69% و 22.63±0.59% و 3.78±0.20 و 2.71±0.06. كما وجد تفوق الحملان الكرادية معنوياً (P<0.01) في محتوى اللحم (61.32±0.29 مقارنة ب 59.30±0.21%) والعظم (24.72±0.85 مقارنة ب 20.53±0.35%) و اقل محتوى من الدهن (13.94±0.75 مقارنة ب 20.15±0.39%). كما لوحظ بان الحملان المذبوحة عند وزن 44 كغم قد تفوقت معنوياً (P<0.01) في محتواها من الدهن وانخفض محتواها من العظام مقارنة بالحملان المذبوحة بوزن 36 كغم. كما تفوقت الحملان العواسية والحملان المذبوحة بوزن 44 كغم معنوياً (P<0.01) في محتوى الدهن على نظيراتها الكرادية والمذبوحة بوزن 36 كغم.

الكلمات المفتاحية: تركيب الجسم، انسجة الجسم، العواسي، الكرادية.

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## INTRODUCTION

Meat production depends on several environmental factors and management practices. Meat animal carcasses vary in composition through genetic, age and sex of animal, nutritional, and environmental effects (12). Moreover, growth and development are the basis for meat production, whereas, distribution of carcass tissues are significant in determining carcass quality. Lean muscle and to a lesser extent fat, are the major edible tissue of the carcass (18). Thus, a high proportion of muscle with a low proportion of bone and an optimum level of fat represent a superior carcass (23). It is known that the distribution of muscle, bone and fat is largely a function of maturity (25), and as animal become older and heavier the proportion of fat in their carcasses increases and the proportion of muscles and bones decreases (12). Also, it was recognized that diet have been shown to be one of the main factors affecting the carcass yield, composition and qualities in many species (33, 35). Thus the objectives of this study is to evaluate Awassi and Karadi lambs for carcass composition and tissue distribution raised under two levels of feeding and carcass slaughtered at two different weights.

## MATERIALS AND METHODS

### Animals and experimental design

Sixteen weaned (3.5-4 months) entire male lambs from each of Awassi and Karadi with an average initial weight of  $25.62 \pm 0.57$  and  $25.56 \pm 0.73$  kg, respectively maintained at Grdarasha field, College of Agricultural Engineering Sciences, Salahaddin University were used in the current investigation. Full detail of management, feeding and slaughtering was described in our previous study (5). In brief, lambs from each breed were divided equally into two subgroups (8 lambs) to be fed concentrate either *ad lib* concentrate or 3% concentrate of their body weights, and to be slaughtered at 36 and 44kg (4 lambs). Animals were slaughtered when each individual lamb reached its designated body weight. After chilling the carcass at 4°C for 24h, the carcass was split along the vertebral column into two halves.

### Physical dissection

Eight cuts of the left half carcasses were weighed and dissected completely into lean,

fat and bone. The three components were weighed separately to determine their percentages. Non-carcass fat was the sum of the omental, mesenteric, pelvic, kidney, scrotal and cardiac fat. Carcass fat including subcutaneous and intermuscular fat was separated from each cut.

### Statistical analysis

General Linear Model within SAS (31) was used to study the effect of breed, feeding level and slaughter weight on studied traits. Significant difference between means were assessed using Duncan multiple range tests (9).

## RESULTS AND DISCUSSION

### Tissue distribution in the carcass

The proportion of separable carcass tissue of cuts and carcass side of Karadi and Awassi lambs fed either *ad lib* or 3% concentrate and slaughtered at 36 and 44 kg are given in Tables (1 and 2). It seems from Table (1) that lean percentage of Karadi lambs surpass significantly ( $P < 0.01$ ) Awassi lambs in the leg, loin and flank cuts. On the other hand, the proportion of lean in the fore shank cut only was significantly higher ( $P < 0.01$ ) in Awassi. Moreover, lean percent is almost similar in rack, shoulder, neck and breast cuts. With respect to percent fat in the different cuts, results reveal that with the exception of fore shank, the proportion of fat in the remaining cuts of Awassi lambs excelled significantly ( $P < 0.01$ ) Karadi lambs. Also, with the exception of neck cut, the proportion of bone in all carcass cuts was significantly ( $P < 0.01$ ) higher in Karadi lambs as compared to Awassi carcasses. Thus as it appears from Table (2) that whole side of the carcass of Karadi lambs as compared with Awassi lambs contain significantly ( $P < 0.01$ ) higher proportion of lean (61.32 vs. 59.30%), bone (24.72 vs. 20.53%) and lean to fat ratio (4.61 vs. 2.96) and lower proportion of fat (13.94 vs. 20.15%) and lean to bone ratio (2.52 vs. 2.90). Similarly, Ormari et al (24) found that Awassi lambs had higher fat and lower bone content as compared with Hamdani lambs. Also, several authors found breed differences in carcass composition (6, 20, 34). Additionally, muscle content varied according to its location in the carcass. For example, the higher muscle content was in the leg (66.50%), whereas the

lowest was in the breast (54.44%) and fore shank (47.53%) in Karadi lambs. In the Awassi lambs, the highest lean content was in the shoulder (65.66%) and the lowest in the breast (54.76%) and the fore shank (53.07%) (Table 1). Such variation in muscle mass is primarily due to differences in the total number of muscle fiber. Possibly the evolutionary increases in muscle fiber size is limited by physiological status in that normal cell function is maintained only as long as certain limit in cell size is not exceeded (27). As slaughter weight increases from 36 to 44 kg, the lean proportion increased either numerically or significantly ( $P<0.01$ ) in the rack, neck and fore shank cuts. However, a decrease in lean percent was noticed in the loin, breast and flank cuts (Table 1). Such result could be attributed mainly to the fact that muscle distribution is affected by the differential rate of growth in individual muscle and muscle groups on the carcass (7). With the exception of the neck cut, the fat content in all cuts in the carcass as well as the whole carcass side increased with the increases of slaughter weight from 36 to 44 kg (Table 1 & 2). It is well known that the fat is a late growing body tissue and therefore proportions in the carcass greatly changed with the progress of growth (7). A significant ( $P<0.01$ ) decrease in the proportion of bone was noticed of all cuts and the whole side in lambs slaughtered at 44 kg compared to those slaughtered at 36 kg. It is well known that bone is an early maturity carcass component so it grows at slower rate during post-natal life, and consequently

decreasing with increasing body weight (17, 21). In general, the proportion of lean and fat in the half carcass increased by 0.80 and 23.70%, respectively. This increase was associated in a decrease in bone content by 20.16%. Several investigators noted that as slaughter weight increased, there is mainly an increase in fat and a decrease in bone proportion of the carcass (2, 10, 24, 32). From the results given in Table (1), it appears that lambs slaughtered at 36 kg had higher lean: fat ratio ( $4.29\pm 0.35$  vs.  $3.28\pm 0.13$ ) and lower lean: bone ratio ( $2.47\pm 0.08$  vs.  $2.95\pm 0.04$ ) as compared with lambs slaughtered at 44 kg. Since the proportion of fat increasing and bone content is decreasing, therefore, the result is expected. Previous workers also reported decreasing carcass lean: fat ratio (16, 36) and increasing lean: bone ratios (8, 30). It appears from Tables 1 and 2 that the effect of level of feeding on carcass composition either on all cuts or the whole side was not significant except that lambs fed *ad lib* had lower bone proportion in the leg cut and a higher bone in the neck cut. However, it is generally agreed that animals full-fed high concentrate diet usually produce more-carcass fat, and consequently, are less efficient in converting feed to lean meat than an animals fed slightly below *ad libitum* energy intake, even though the *ad libitum* fed animals would be more efficient in total feed energy retention. This is particularly evident in the late stage of growth, as muscle and bone approach their mature size (12).

**Table 1. Effect of breed, level of feeding and slaughter weight on lean, fat, and bone percentage of Karadi and Awassi lambs**

| Effects       | No.           | Total %           |                  |                  | Lean:Fat Ratio  | Lean:Bone Ratio |
|---------------|---------------|-------------------|------------------|------------------|-----------------|-----------------|
|               |               | Lean              | Fat              | Bone             |                 |                 |
| Overall mean  | 32            | 60.315 ± 0.254    | 17.054 ± 0.696   | 22.631 ± 0.590   | 3.789 ± 0.207   | 2.715 ± 0.063   |
| Breed         | Karadi        | 61.325 ± 0.290 a  | 13.949 ± 0.751 b | 24.726 ± 0.853 a | 4.618 ± 0.285 a | 2.528 ± 0.094 b |
|               | Awasi         | 59.305 ± 0.217 b  | 20.159 ± 0.391 a | 20.536 ± 0.358 b | 2.960 ± 0.062 b | 2.902 ± 0.054 a |
| L. of Feeding | 3%            | 60.108 ± 0.319 a  | 17.273 ± 1.108 a | 22.619 ± 0.951 a | 3.807 ± 0.352 a | 2.718 ± 0.097 a |
|               | <i>ad lib</i> | 60.523 ± 0.3998 a | 16.836 ± 0.877 a | 22.642 ± 0.733 a | 3.771 ± 0.229 a | 2.712 ± 0.083 a |
| Slaughter Wt. | 36kg          | 60.050 ± 0.284 a  | 15.247 ± 1.064 b | 24.703 ± 0.870 a | 4.295 ± 0.352 a | 2.474 ± 0.083 b |
|               | 44kg          | 60.580 ± 0.421 a  | 18.862 ± 0.660 a | 20.558 ± 0.333 b | 3.283 ± 0.137 b | 2.956 ± 0.042 a |

Means with different letters within each column differ significantly ( $P<0.05$ ) according to Duncan's test

**Table 2. Effect of breed, level of feeding and slaughter weight on lean, fat, and bone percentage in carcass cuts of Karadi and Awassi lambs**

| Effects    |      | Overall  | Breed    |          | L. of Feeding |          | Slaughter Wt. |          |
|------------|------|----------|----------|----------|---------------|----------|---------------|----------|
| %          | No.  | mean     | Karadi   | Awassi   | 3%            | Ad lib   | 36kg          | 44kg     |
|            |      | 32       | 16       | 16       | 16            | 16       | 16            | 16       |
| Legs       | Lean | 64.473±  | 66.504 ± | 62.443 ± | 64.079 ±      | 64.868 ± | 64.821 ±      | 64.126 ± |
|            |      | 0.558    | 0.278 a  | 0.813 b  | 0.930 a       | 0.634 a  | 0.738 a       | 0.853 a  |
|            | Fat  | 14.665±  | 10.903 ± | 18.428 ± | 14.396 ±      | 14.935 ± | 12.039 ±      | 17.291 ± |
|            |      | 0.903    | 0.741 b  | 0.967 a  | 1.435 a       | 1.142 a  | 1.049 b       | 1.163 a  |
|            | Bon  | 20.861±  | 22.593 ± | 19.129 ± | 21.526 ±      | 20.197 ± | 23.139 ±      | 18.583 ± |
|            |      | 0.578    | 0.818 a  | 0.559 b  | 0.880 a       | 0.742 b  | 0.700 a       | 0.448 b  |
| Loin       | Lean | 58.813±  | 61.087 ± | 56.539 ± | 57.474 ±      | 60.153 ± | 59.666 ±      | 57.960 ± |
|            |      | 0.794    | 0.826 a  | 1.112 b  | 1.055 b       | 1.121 a  | 0.846 a       | 1.340 a  |
|            | Fat  | 20.690 ± | 16.139 ± | 25.241 ± | 20.874 ±      | 20.505 ± | 17.493 ±      | 23.886 ± |
|            |      | 1.165    | 1.411 b  | 0.925 a  | 1.935 a       | 1.364 a  | 1.682 b       | 1.191 a  |
|            | Bon  | 20.497±  | 22.773 ± | 18.221 ± | 21.653 ±      | 19.341 ± | 22.839 ±      | 18.154 ± |
|            |      | 0.979    | 1.554 a  | 0.925 b  | 1.326 a       | 1.422 a  | 1.513 a       | 0.970 b  |
| Rack       | Lean | 55.114±  | 56.323 ± | 53.906 ± | 55.339 ±      | 54.889 ± | 54.486 ±      | 55.742 ± |
|            |      | 0.699    | 0.892 a  | 1.014 a  | 0.820 a       | 1.157 a  | 1.269 a       | 0.596 a  |
|            | Fat  | 17.603±  | 13.156 ± | 22.049 ± | 17.678 ±      | 17.528 ± | 15.648 ±      | 19.558 ± |
|            |      | 1.069    | 1.327 b  | 0.576 a  | 1.486 a       | 1.587 a  | 1.829 b       | 0.933 a  |
|            | Bon  | 27.284±  | 30.521 ± | 24.047 ± | 26.986 ±      | 27.582 ± | 29.867 ±      | 24.701 ± |
|            |      | 0.910    | 0.981 a  | 1.031 b  | 1.305 a       | 1.307 a  | 1.224 a       | 1.017 b  |
| Shoulder   | Lean | 65.534±  | 65.406 ± | 65.661 ± | 65.541 ±      | 65.527 ± | 65.643 ±      | 65.424 ± |
|            |      | 0.335    | 0.407 a  | 0.544 a  | 0.435 a       | 0.524 a  | 0.432 a       | 0.525 a  |
|            | Fat  | 12.162±  | 9.999±   | 14.325 ± | 12.474 ±      | 11.849 ± | 11.104 ±      | 13.219 ± |
|            |      | 0.557    | 0.591 b  | 0.555 a  | 0.969 a       | 0.573 a  | 0.869 b       | 0.613 a  |
|            | Bon  | 22.305±  | 24.596 ± | 20.013 ± | 21.984 ±      | 22.625 ± | 23.253 ±      | 21.356 ± |
|            |      | 0.578    | 0.496 a  | 0.661 b  | 0.924 a       | 0.718 a  | 0.916 a       | 0.650 b  |
| Neck       | Lean | 64.506±  | 65.059 ± | 63.954 ± | 66.084 ±      | 62.929 ± | 60.110 ±      | 68.903 ± |
|            |      | 1.356    | 2.366 a  | 1.401 a  | 2.243 a       | 1.496 a  | 1.554 b       | 1.616 a  |
|            | Fat  | 9.720±   | 8.704 ±  | 10.736 ± | 9.606±        | 9.834 ±  | 9.987 ±       | 9.453±   |
|            |      | 0.465    | 0.539 b  | 0.682 a  | 0.278 a       | 0.903 a  | 0.819 a       | 0.462 a  |
|            | Bon  | 25.774±  | 26.238 ± | 25.311 ± | 24.311 ±      | 27.238 ± | 29.904 ±      | 21.644 ± |
|            |      | 1.268    | 2.287 a  | 1.178 a  | 2.242 b       | 1.154 a  | 1.487 a       | 1.470 b  |
| Fore shank | Lean | 50.304±  | 47.537 ± | 53.073 ± | 50.028 ±      | 50.581 ± | 47.260±       | 53.349 ± |
|            |      | 1.004    | 1.045 b  | 1.432 a  | 0.921 a       | 1.818 a  | 1.283 b       | 1.132 a  |
|            | Fat  | 6.529±   | 5.388 ±  | 7.669 ±  | 6.723 ±       | 6.335 ±  | 5.700 ±       | 7.358 ±  |
|            |      | 0.631    | 0.656 a  | 1.020 a  | 0.692 a       | 1.077 a  | 1.122 a       | 0.543 a  |
|            | Bon  | 43.168±  | 47.076 ± | 39.259 ± | 43.249 ±      | 43.086 ± | 47.039 ±      | 39.296 ± |
|            |      | 1.104    | 1.293 a  | 1.151 b  | 1.382 a       | 1.767 a  | 1.307 a       | 1.153 b  |
| Breast     | Lean | 54.686±  | 54.442 ± | 54.930 ± | 54.761 ±      | 54.611 ± | 56.399±       | 52.973 ± |
|            |      | 0.873    | 1.234 a  | 1.271 a  | 1.231 a       | 1.278 a  | 0.640 a       | 1.532 b  |
|            | Fat  | 24.159±  | 21.551 ± | 26.767 ± | 23.993 ±      | 24.325 ± | 22.022 ±      | 26.296 ± |
|            |      | 0.836    | 1.072 b  | 0.913 a  | 1.066 a       | 1.322 a  | 1.120 b       | 1.013 a  |
|            | Bon  | 21.155±  | 24.008 ± | 18.303 ± | 21.247 ±      | 21.064 ± | 21.578 ±      | 20.733 ± |
|            |      | 0.729    | 0.798 a  | 0.689 b  | 1.114 a       | 0.977 a  | 1.159 a       | 0.911 a  |
| Flank      | Lean | 69.091±  | 74.246 ± | 63.935 ± | 67.557 ±      | 70.624 ± | 72.016 ±      | 66.166 ± |
|            |      | 1.522    | 1.410 a  | 2.010 b  | 2.546 a       | 1.666 a  | 2.241 a       | 1.847 b  |
|            | Fat  | 30.909 ± | 25.754 ± | 36.064 ± | 32.443 ±      | 29.375 ± | 27.984 ±      | 33.834 ± |
|            |      | 1.522    | 1.410 b  | 2.010 a  | 2.546 a       | 1.666 a  | 2.241 b       | 1.847 a  |

Means with different letters within each row differ significantly ( $P<0.05$ ) according to Duncan's test

#### Partition of fat

It is well documented that fat is the most variable tissue in the carcass, and it varies not in its total amount but also in its distribution between the various deposits which alter markedly during growth, and the proportion

and location of fat in the body are important in meat animals (19). In the present work, weight of carcass fat, non-carcass fat, fat tail and total body fat averaged  $2.51\pm 0.15$ ,  $0.77\pm 0.04$ ,  $2.38\pm 0.15$  and  $5.67\pm 0.30$  kg, respectively (Table 3). Thus, the relative contribution of

different fat depots to the total body fat was in the order carcass fat ( $43.87 \pm 1.16\%$ ), fat tail ( $42.00 \pm 1.53\%$ ) and non-carcass fat ( $14.12 \pm 0.86\%$ ). Moreover, the relative contribution of subcutaneous fat and intermuscular fat are  $32.60 \pm 0.86\%$  and  $11.27 \pm 0.47\%$ , respectively, and the relative contribution of non-carcass fat are omental ( $5.58 \pm 0.35\%$ ), mesenteric ( $3.05 \pm 0.25\%$ ), kidney and pelvic fat ( $2.90 \pm 0.68\%$ ), cardiac ( $1.15 \pm 0.05\%$ ) and scrotal ( $1.42 \pm 0.09\%$ ) (Table 3). Similarly, Alkass and Kak (4) indicated that the relative contribution of carcass fat, non-carcass fat and fat tail was 46.66, 12.66 and 40.67% in Awassi and Karadi lambs. Result of the present work reveal that Awassi as compared with Karadi lambs had significantly ( $P < 0.01$ ) higher carcass fat (3.02 vs. 2.00 kg) and non-carcass fat (0.95 vs. 0.59 kg) but not fat tail (2.45 vs. 2.31 kg). Moreover, it seems from Table (3) that relative contribution of different fat depots differ significantly ( $P < 0.01$ ) between breeds. While carcass fat and fat tail contribute 47.34% and 37.28% in Awassi, whereas in Karadi the proportion are 40.40 and 46.72% respectively.

This finding is similar to those noticed by Koyuncu (15), Mustafa et al (22) and Alkass and Hassan, (3). However, Kempster et al. (14) reviewed knowledge on fat partitioning in sheep and pointed out, just as it has been recorded by Hammond (11) that sheep differed considerably in the manner in which they partitioned their body fat. Such difference may be related to environmental origin of breed. It appears from Table (3) that lambs fed *ad libitum* as compared with those fed 3% concentrate had numerically higher total body fat (5.88 vs. 5.47 kg), carcass fat (2.53 vs. 2.49 kg) and significantly ( $P < 0.05$ ) higher fat tail (2.60 vs 2.17kg) and lower non-carcass fat (0.74 vs. 0.80 kg). This result was similar to those noticed by Jones and Megarritty (13) and Abouheif et al (1). Lambs slaughtered at 44 kg had significantly ( $P < 0.01$ ) higher carcass fat, fat tail and total body fat, but not non-carcass fat compared with lambs slaughtered at 36 kg. As the animal grew up, and fat is a late maturing tissue therefor the deposition increased. These results are in agreement with those reported earlier by Santos et al (29), Rodrigues et al (28) and Rajkumar et al (26).

**Table 3. Effect of breed, level of feeding and slaughter weight on fat partitioning of Karadi and Awassi lambs**

| Effects       | No.    | (kg)              |                   |                  |                  | %                     |                    |                       |                       | %                  |                  |                  |                   |                  |                  |
|---------------|--------|-------------------|-------------------|------------------|------------------|-----------------------|--------------------|-----------------------|-----------------------|--------------------|------------------|------------------|-------------------|------------------|------------------|
|               |        | Non-Carcass Fat   | Carcass Fat       | Fat tail         | Total body Fat   | Non-Carcass Fat       | Carcass Fat        | Fat tail              | Subcutaneous          | Intermuscular      | Omental          | Mesenteric       | Kidney and pelvic | Heart            | Scrotal          |
| Overall mean  | 32     | 0.777±<br>0.048   | 2.511±<br>0.153   | 2.387±<br>0.159  | 5.675±<br>0.301  | 14.120<br>± 0.865     | 43.874±<br>1.160   | 42.005<br>± 1.531     | 32.604<br>±<br>0.864  | 11.272±<br>0.471   | 5.586±<br>0.352  | 3.053±<br>0.257  | 2.903±<br>0.687   | 1.152±<br>0.058  | 1.426±<br>0.099  |
| Breed         | Karadi | 0.598±<br>0.051b  | 2.003±<br>0.184b  | 2.315±<br>0.216a | 4.917±<br>0.367b | 12.876<br>±<br>1.398a | 40.401±<br>1.730b  | 46.723<br>±<br>2.035a | 30.357<br>±<br>1.341b | 10.045±<br>0.540b  | 4.484±<br>0.351b | 2.835±<br>0.360a | 2.925±<br>1.310a  | 1.118±<br>0.096a | 1.512±<br>0.166a |
|               | Awasi  | 0.955±<br>0.050a  | 3.020±<br>0.169a  | 2.459±<br>0.239a | 6.434±<br>0.403a | 15.364<br>±<br>0.964a | 47.349 ±<br>0.978a | 37.287<br>±<br>1.606b | 34.851<br>±<br>0.782a | 12.498 ±<br>0.652a | 6.688±<br>0.476a | 3.270±<br>0.371a | 2.880±<br>0.476a  | 1.186±<br>0.067a | 1.340±<br>0.109a |
| L. of Feeding | 3%     | 0.808±<br>0.076a  | 2.493±<br>0.228a  | 2.170±<br>0.139b | 5.471±<br>0.385a | 14.824<br>±<br>1.074a | 44.403 ±<br>1.736a | 40.773<br>±<br>2.350a | 32.252<br>±<br>1.317a | 12.152±<br>0.683a  | 6.116±<br>0.586a | 3.149±<br>0.246a | 2.701±<br>0.486a  | 1.283±<br>0.077a | 1.574±<br>0.177a |
|               | ad lib | 0.746±<br>0.058a  | 2.530±<br>0.211a  | 2.604±<br>0.281a | 5.880±<br>0.490a | 13.416<br>±<br>1.368a | 43.347±<br>1.584a  | 43.237<br>±<br>1.990a | 32.956<br>±<br>1.154a | 10.391±<br>0.590b  | 5.056±<br>0.360b | 2.956±<br>0.460a | 3.104±<br>1.305a  | 1.021±<br>0.076b | 1.278±<br>0.078a |
| Slaughter Wt. | 36kg   | 0.723±<br>0.076 a | 1.870±<br>0.147 b | 1.748±<br>0.123b | 4.341±<br>0.225b | 16.472<br>±<br>1.411a | 42.620 ±<br>1.892a | 40.908<br>±<br>2.532a | 30.779<br>±<br>1.363b | 11.843±<br>0.747a  | 6.232±<br>0.575a | 4.044±<br>0.347a | 3.988±<br>1.325a  | 1.028±<br>0.081b | 1.179±<br>0.110b |
|               | 44kg   | 0.830±<br>0.057a  | 3.153±<br>0.143a  | 3.026±<br>0.187a | 7.009±<br>0.293a | 11.768<br>±<br>0.603b | 45.130 ±<br>1.330a | 43.102<br>±<br>1.765a | 34.429<br>±<br>0.884a | 10.700±<br>0.562a  | 4.940±<br>0.353b | 2.061±<br>0.147b | 1.818±<br>0.179a  | 1.276±<br>0.073a | 1.673±<br>0.143a |

Means with different letters within each column differ significantly (P<0.05) according to Duncan's test

**CONCLUSION**

It can be concluded that carcasses of Karadi lambs contained more lean and bone, and lower fat than did Awassi. Also, as slaughter weight increased, the fat content increased and bone content decreased.

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