# QUALITY CHARCTERISTICS OF MEAT FROM AWASSI LAMBS AS AFFECTED BY SLAUGHTER WEIGHT AND FEEDING LEVEL .

NAWFAL H . RASHID AND ARFAN A .FAIDHI

Animal Science Dept., College of Agric., Univ.of Baghdad , Abu Ghraib , Baghdad , Iraq .

SUMMARY : A series of experiments were initiated at the Animal Sci.Dept.,College of Agric.to optimize the slaughter weight of Awassi lambs. The present experiment was undertaken to cover part of this research project. Hence, the aim of this paper is to investigate the effect of slaughter weight (30,37.5 and 45 Kg) and feeding level (low and high) on chemical compsition and quality characteristics of Awassi lamb muscles. Fourty-two animals were slaughtered at their pre-desiyned live weight and dressed according to commerial practice followed in Iraq. Carcasses were chilled at 2-3 C for 48 hrs. After chilling, three muscles, namely, LD, SM, and IS were completely excised from the right side of the carcasses, and consequently subjected to the following analyses: 1. chemical composition for moisture, protein, fat and ash, 2.pH, 3. cooking loss and 4. myoglobin concentration.The fat contents of LD, SM and IS muscles were significantly ($P< 0.05$) increased with the increasing slaughter weight and feeding level. However, protein and moisture percents decreased ($P<0.05$) by increasing slaughter weight, but they were increased ($P< 0.05$) by feeding level. Simillar trends were observed on cooking loss ofLD and SM muscles. Moreover, significant differences in cooking loss were observed due to different muscle locations at a given slaughter weight. No significant differences in pH values of LD, SM and IS muscles were noticed. It was observed that slaughter weight attributed to increase myoglobin conc.of the three muscle.It is concluded that chemical composition and quality traits of the three muscles are substantialy influenced by experimental parameter. The present result suggest ,along with the combination of previous data focused on meat production and carcass quality, that slaught-

ering Awassi lambs at 37.5 kg or a bit more might be recommended for practical application .

INTRODUCTION :In Iraq , where lambing usualy occurs during November and December, Lambs are weaned during March and April and male lambs are slaughtered between weaning and one year old (Al-Mahmood,et al., 1976) .slaughtering is usualy controlled by demand rather than following an efficient system for producing meat from lambs.Under such condition.slaughtering the lambs for a relatively heavier weight is not usual .Consequently, the sheep Iraqi industry is being advised to increase the efficiency of lamb production and the availability of lamb products by increasing slaughter weight (Rashid etal, 1987). However, it has been shown that, from the stand point of feed efficiency, the production of heavey weight lambs fed on high energy diet is profitable (Harrison and Crouse, 1978).

Therefore, a series of experiments were initiated at the Animal Sci.Dept., College of Agriculture, Univ. of Baghdad to evaluate: 1.fattening performance, 2. carcass composition and 3. quality characteristics of meat from Awassi lambs as affected by slaughter weight and feeding level .

This experiment was conducted to investigate the effect of slaughter weight and feeding level on chemical composition and some quality characteristics of Awassi lamb muscles .

MATERIALS AND METHODS: Fourty-Two Awassi ram lambs,25 kg in average live weight,were used in this study.lambs were randomly allocated into three slaughter weight groups,namely,30,37.5 and 45 kg. Animals within each group were then randomly divided equally into two subgroups which were given a concentrate diet at the level of 1.5 and 3.0% of their live weight. The concentrate mixture contained 76.8% TDN and 17.2% CP.Green alfalfa was given to all animals ad-lib .

Upon reaching the pre- desiyned slaughter weight,each animal was fasted for 12 hr, slaughtered and dressed according to commercial practice followed in Iraq at the college abattoir.

Carcasses were chilled at 2-3 C for 48 hr. After chilling, Three muscles, namely,Longissimus dorsi (LD) , Semimembranosus (SM) and Infraspinatus (IS), were completely excised from the right side of the carcass.They were frozen in an airtight polyethylene bags for subsequent physical and chamical analyses as described below : Muscle sampling procedure: a selected part from LD, SM and IS muscles was taken and subjected to a specified analysis undertaken in this study.

Chemical composition : a chosen part from LD , SM and IS muscles was taken and ground twice using laboratory meat grinder, A diplicate samples from each muscle were analyzed for moisture, nitrogen, ether extract and ash by the AOAC (1975) methods. protein was determined as N X 6.25 .

pH determination : sample cores (1.27 in diameter) were taken from LD. SM and IS muscles. A 10 gm samples taken from the center of the core were homogenized with 50 ml deionized water for 30 seconds. The pH of the slurry were measured with TOA Electronic pH meter.

Cooking loss: a 200 gm of meat from LD and SM muscles was weighed by a Metler balance, type PL 400, and used for cooking loss determination following the procedure as described by Boutan etal (1978) .

Myoglobin concentration: samples from LD, SM and IS muscles were obtained and analyzed for myoglobin concentration following the procedure of Zessin etal (1961) using Spectronic 20 .Absorbancy readings were measured at 525 nm .

Data were analyzed with Harvey's (1960) least-squars programm. Differences between means were tested according to Duncan (1955) .

RESULTS AND DISCUSSION : Least sguares means for the effect of slaughter weight and feeding level on chemical composition of SM ,LD and IS muscles are presented in table,1,2 and 3, respectively .

Table 1- Least squares means for the chemical composition of SM muscle

| Chemical composition ( % ) | Slaughter weight (Kg) | | | Feeding level | | Overall means ± S.E |
|---|---|---|---|---|---|---|
| | 30 | 37.5 | 45 | Low | High | |
| Moisture | 70.6[a] | 66.9[b] | 62.3[c] | 66.2[a] | 67.0[b] | 66.6±0.3 |
| Protien | 18.2[a] | 16.9[b] | 15.6[b] | 16.9[a] | 17.2[b] | 16.9±0.4 |
| Fat | 5.8[a] | 9.9[b] | 13.7[c] | 9.4[a] | 10.3[b] | 9.8±0.4 |
| Ash | 4.5 | 4.0 | 3.7 | 4.6 | 4.9 | 4.7±0.3 |

Means within each raw with different letters are significantly different (P< 0.05 ).

Table 2- least squares means for the chemical composition of L D muscele

| Chemicl composition ( % ) | Slaughter weight ( Kg ) | | | Feeding level | | Overall means ± S.E |
|---|---|---|---|---|---|---|
| | 30 | 37.5 | 45 | Low | High | |
| Moisture | 68.2[a] | 64.9[b] | 62.3[b] | 64.6[a] | 65.6[b] | 65.1± 0.3 |
| Protein | 18.4[a] | 18.0[a] | 17.3[b] | 17.6 | 18.2 | 17.9± 0.4 |
| Fat | 6.7[a] | 11.3[b] | 15.1[b] | 10.6[a] | 11.5[b] | 11.0± 0.4 |
| Ash | 4.3 | 3.4 | 3.2 | 3.4 | 3.9 | 3.6± 0.3 |

Means within each raw with different letters are significantly different (P<0.05) .

Table 3- Least squares means for the chemical composition of IS muscle.

| Chemicl composition ( % ) | Slaughter weight( Kg ) | | | Feeding level | | Overall means |
|---|---|---|---|---|---|---|
| | 30 | 37.5 | 45 | Low | High | ± S.E |
| Moisture | 70.0[a] | 65.8[b] | 62.2[b] | 65.6 | 66.4 | 66.0± 0.3 |
| Protein | 17.9[a] | 17.8[a] | 16.9[b] | 17.2 | 17.8 | 17.5± 0.4 |
| Fat | 5.6[a] | 9.9[b] | 13.9[b] | 9.2[a] | 10.4[b] | 9.8± 0.4 |
| Ash | 4.6 | 4.3 | 3.9 | 4.7 | 4.9 | 4.8± 0.4 |

Means within each raw with different letteres are significantly different (P< 0.05) .

With regard to saulghter weight,the data revealed that fat contents of the three muscles increased significantly as the slaughter increase from 30 to 45 kg . Despite the fact that lambs tend to deposit most of the carcass fat in the tail region ,the results indicated that this breed has also showed a good capability in the deposition of intramuscular fat . However moisture and protein contents significantly decreased as the slaughter weight increased. This could be explained due to the negative relationship between percents moisture and fat in muscle tissues ;so as percent fat increased , percent moisture decreased.These data are in agreement with findings of lambuth etal (1970),Ray and krowman (1971)and Drew and Ried (1975). With respect to feeding level, percent fat of the three muscles increased ( P < 0.05 ) as the energy level in the diet increased . This was accompanied with the decreasing ( P < 0.05 ) of miosture percent . Simillar results has been observed by Crouse etal (1978). There were no significant differences in ash by experimental treatments .

pH measurement is usualy used to assess the quality of muscles and its suitability for various processing methods.In the present study ,the pH values of SM ,LD and IS muscles were unaffected by neither slaughter weight nor feeding level (Table 4)

Table 4- Least squares means for the ultimate pH values of SM,LD and IS muscles .

| Type of muscle | Slaughter weight ( Kg ) | | | Feeding level | | Overall means |
|---|---|---|---|---|---|---|
| | 30 | 37.5 | 45 | Low | High | ±S.E. |
| SM | 5.74 | 5.75 | 5.78 | 5.78 | 5.90 | 5.75±0.1 |
| LD | 5.77 | 5.75 | 5.80 | 5.79 | 5.74 | 5.78±0.1 |
| IS | 5.93 | 5.80 | 6.07 | 5.90 | 5.96 | 5.84±0.1 |

However , ultimate pH value seems to be higher in IS muscles than SM and LD muscles.These differences could be due to metabolic activities among muscles. Simillar conclusion has been drawn by Dutson (1983).

There were significant differences in cooking loss percents of SM and LD muscles as affected by slaughter weight and feeding level ( Table 5 ) .

Table 5- Least squares means for the cooking loss percent of SM and LD muscles .

| Type of muscle | slaughter weight ( Kg ) | | | Feeding Level | | Overall means |
|---|---|---|---|---|---|---|
| | 30 | 37.5 | 45 | Low | High | ± S.E |
| SM | $19.8^{a}$ | $21.5^{b}$ | $24.0^{c}$ | $22.3^{a}$ | $21.2^{b}$ | 21.4±0.1 |
| LD | $26.1^{a}$ | $28.1^{b}$ | $31\ 0^{c}$ | $29.1^{a}$ | $28.1^{b}$ | 28.8±0.1 |

Means within each raw with different letter are significantly different (P< 0.05) .

Cooking loss increased (P< 0.05) with the increasing slaughter weight from 30 to 37.5 kg and from 37.5 to 45kg . It was also increased with increasing feeding level from low to high energy die-

This could be mostly due to differences in fatness .Fatter muscles should have , most likely , more drip loss than leaner muscles. .Kemp etal (1976) reported that total cooking losses increased as slaughter weight increased. It can be also noticed that cooking loss values were higher in LD muscle than SM muscle .Location of muscles in the carcass seems to have great influence on total cooking losses .

The color of muscle is mainly due to myoglobin and its drivatives. Myoglobin concentration of SM ,LD and IS muscles in the present experiment significantly increased as slaughter weight increased (Tabl 6 ) .

Table 6- Least squares means for the myoglobin conc.(mg/gm)of SM, LD and IS muscles .

| Type of muscle | Slaughter weight(kg) | | | Feeding Level | | Overall means ±S.E. |
|---|---|---|---|---|---|---|
| | 30 | 37.5 | 45 | Low | High | |
| SM | 4.14[a] | 5.39[b] | 6.75[c] | 5.53 | 3.31 | 5.64±0.1 |
| LD | 2.41[a] | 3.78[b] | 4.84[c] | 3.73 | 3.61 | 3.81±0.1 |
| IS | 3.06[a] | 4.60[b] | 5.75[c] | 4.54 | 4.39 | 4.72±0.1 |

Means within each raw with different letters are significantly different ( P< 0.05 ).

This can be interpreted due to increasing number of red fibers which are usualy consisted high level of myoglobin . Namerous workers have been reported simillar results in sheep (ledward and Shorthose 1971 ) and in pig (Morito etal 1970 ) . However, myoglobin conc. was not affected by feeding level .In addition color values are greatly influenced by muscle location , being lighter in LD (muscle of support ) than SM ( muscle of locomotion) with an intermediate color in IS muscle .

No interaction between slaughter weight and feeding level

was observed among all experimental parameters .

On the whole, it is concluded that meat quality as assessed by chemical composition,some physical and processing characteristics is substantialy influened by slaughter weight and feeding level . The present results suggest,along with the combintion of previous data focused on meat production and carcass composition,that slaughtering Awassi lambs at 37.5 kg or a bit more might be recommanded for practical applications .

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