

## **The Effect of Slaughter Age on Carcass Traits and Chemical Composition of Buffalo Meat**

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**ABSTRACT.** Four groups of 10 animals each of the domestic buffalo (*Bubalus bubalis*) were slaughtered at the ages of 9, 14, 21, and 26 months of age, respectively. The chemical composition of each of the *longissimus dorsi* and the *semitendinosus* muscles of these animals was determined and compared with various other carcass traits. Intramuscular fat has significantly increased when the animals were 21 months old. Carcass side had no significant effect on the chemical composition of the comparable muscles. The only significant differences in the chemical composition of the 2 muscles were in moisture and protein contents. The carcass weight has correlated significantly fat deposition and musculature of the carcass, but the correlations with the chemical composition were those of fat percent with caudal fat weight, kidney fat weight with moisture percent and those of protein percent with moisture percent.

The domesticated water buffalo (*Bubalus bubalis*) is common in Iraq as well as in several other countries (Hatt 1959, Honacki *et al.* 1982). Experience has shown that this animal is of a high potential in utilizing low quality feeds and converting them into body gain including muscle. Nevertheless, little attention has been paid to these animals as meat producers. However, some studies have been undertaken on the meat quality and production of these animals (Alps *et al.* 1981, Creta *et al.* 1982).

The present study has been undertaken to evaluate the composition of buffalo lean meat in correlation to age of the animal at slaughter, as well as to the side of the carcass and to the location of the particular muscles. Also, body fat contents,

carcass lean measurements and lean chemical composition were estimated and correlated to carcass weight.

### Materials and Methods

Data were obtained from carcasses of a total of 40 domestic buffalo bulls (*Bubalus bubalis*) divided into 4 groups of 10 each and slaughtered at 9, 14, 21 and 26 months of age. Body and carcass fat measurements were recorded, as well as caudal and kidney fat weights. Also, subcutaneous fat thickness at the 12th. rib was measured together with the cross sectional area of the rib-eye muscle. Moreover, the 7-12 rib region of the left side of each carcass was dissected into components of lean, fat and bone. Two muscles, the *longissimus dorsi* and the *semitendinosus* were taken from both right and left sides of the carcass. The former was separated from the 7-12 rib and the latter from the leg. They were wrapped in polyethylene bags and deep frozen ( $-20^{\circ}\text{C}$ ) for later chemical analysis. Moisture, ash, fat and protein were determined on minced and homogenized samples of each muscle according to the methods of Anonymous (1970).

Comparisons between means and correlation coefficients between the different characteristics were computed according to the statistical methods of Steel and Torrie (1960).

### Results and Discussion

Lean meat of 14 months old buffaloes had significantly higher moisture contents than either of those of 9, 21 or 26 months old ones (Table 1). This is reflected on the percent of crude protein, which was lowest in these animals compared to that of younger as well as of older ones. While the age of the animal at slaughter proved to have no significant effects on either mineral or fat contents. However, the latter has increased significantly in 14 and 21 months old animals, but the increase was not significant in 26 months old ones (Table 1). This is in line with the observations of Charles (1982). Moreover, the chemical composition (moisture, ash, fat and proteins) of lean meat did not show any significant variations between the right and left sides of the carcass.

On the other hand, the moisture contents of the *semitendinosus* muscle (74.3%) was significantly higher than that of the *longissimus dorsi* (72.7%). While the percentages of ash and fat did not differ significantly between the 2 muscles. On the other hand, similar to the observations of Creta *et al.* (1982), the protein contents of the latter was significantly higher than that of the former.

**Table 1.** The effect of animal age, carcass side and type of muscle on chemical composition of buffalo lean meat

Trait	No examined	Moisture %	Ash %	Fat %	Protein %
Overall mean	40	72.82 $\pm$ 0.211	1.05 $\pm$ 0.3	0.56 $\pm$ 0.46	24.99 $\pm$ 0.193
Age in months					
9	10	72.3 <sup>a</sup> $\pm$ 0.422	1.09 $\pm$ 0.06	0.38 <sup>a</sup> $\pm$ 0.093	25.2 <sup>a</sup> $\pm$ 0.386 <sup>a</sup>
14	10	74.3 <sup>b</sup> $\pm$ 0.422	1.06 $\pm$ 0.06	0.39 <sup>a</sup> $\pm$ 0.093	22.4 <sup>b</sup> $\pm$ 0.386
21	10	72.35 <sup>a</sup> $\pm$ 0.422	1.09 $\pm$ 0.06	0.70 <sup>b</sup> $\pm$ 0.093	24.95 <sup>a</sup> $\pm$ 0.386
26	10	72.31 <sup>a</sup> $\pm$ 0.422	0.97 $\pm$ 0.06	0.76 <sup>b</sup> $\pm$ 0.093	25.42 <sup>a</sup> $\pm$ 0.386
Side of carcass					
Right	20	72.7 $\pm$ 0.322	1.09 $\pm$ 0.043	0.6 $\pm$ 0.066	24.73 $\pm$ 0.273
Left	20	72.94 $\pm$ 0.298	1.01 $\pm$ 0.043	0.52 $\pm$ 0.066	24.25 $\pm$ 0.273
Muscle					
<i>Longissimus dorsi</i>	20	72.72 <sup>a</sup> $\pm$ 0.322	1.09 $\pm$ 0.047	0.6 $\pm$ 0.045	24.73 <sup>a</sup> $\pm$ 0.365
<i>Semitendinosus</i>	20	74.29 <sup>b</sup> $\pm$ 0.322	1.09 $\pm$ 0.047	0.49 $\pm$ 0.054	23.51 <sup>b</sup> $\pm$ 0.365

<sup>a,b</sup>: Different superscripts in each column within the same class of comparison are significantly different.

The fat contents determined in this study (caudal and kidney fat weight, as well as subcutaneous fat thickness and dissected fat percent) have all correlated significantly with each other, as well as with chilled carcass weight (Table 2). Moreover, rib-eye muscle area, as an indicator to carcass musculature has correlated significantly with carcass weight, as well as with the fat contents of the carcass. On the other hand, the percentage of dissected lean meat has correlated negatively with carcass weight, as well as with most of the other carcass traits determined, and so did the moisture contents. However, the last mentioned trait has correlated positively with that of dissected bone and ash percentages of lean meat (Table 2). Similar to the observations of Alps *et al.* (1981), the highest positive correlation of protein contents was with the rib-eye area and the highest negative correlation was with the moisture contents.

The present results clearly indicated that the increase in buffalo bulls carcass weight with age has lead to a significant deposition of fat, but the increase in intramuscular fat was not significant. Moreover, the results indicate that the moisture contents of lean meat decreases with the increase in carcass weight, but the fat and protein contents both increase.

**Table 2.** Correlations between carcass characteristics and chemical composition of the left *longissimus dorsi* muscle

Character	1	2	3	4	5	6	7	8	9	10	11	12
1. Chilled carcass wt.	1.000											
2. Caudal fat wt.	0.772**	1.000										
3. Kidney fat wt.	0.795**	0.716**	1.000									
4. Fat thickness	0.597**	0.811**	0.715**	1.000								
5. Rib-eye area	0.858**	0.678**	0.709**	0.453**	1.000							
6. Dissected lean %	-0.220	-0.277	-0.201	-0.282	-0.058	1.000						
7. Dissected fat %	0.760**	0.691**	0.699**	0.619**	0.699**	0.597**	1.000					
8. Dissected bone %	-0.747**	-0.612**	-0.689**	-0.520**	-0.773**	-0.131**	-0.718**	1.000				
9. Moisture %	-0.226	-0.261	-0.255	-0.113	-0.383	-0.040	-0.062	0.111	1.000			
10. Ash %	-0.272	-0.272	-0.313	-0.357	-0.392	0.104	-0.368	0.362	-0.353	1.000		
11. Fat %	0.361	0.481*	0.541*	0.218	0.364	-0.183	0.373	-0.302	-0.457*	0.207	1.000	
12. Protein %	0.327	0.385	0.257	0.198	0.512	0.104	0.111	-0.225	-0.815**	0.035	0.230	1.000

\* Significant at 5% level

\*\* Significant at 1% level

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## تأثير العمر عند الذبح على صفات الذبائح والتركيب الكيماوي للحوم الجاموس

محارب عبد الحميد طاهر و سمير اسطيفان حنا و صفاء كامل الأمين  
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لقد تم في هذه الدراسة ذبح أربعة مجاميع من ذكور الجاموس عند أعمار ٩، ١٤، ٢١، ٢٦ شهراً ولقد تمت دراسة التركيب الكيماوي لكل من العضلة الطولية الظهرية والعضلة نصف الوترية من تلك الذبائح. وتمت مقارنة تلك التراكيب مع خصائص الذبائح الأخرى مثل الدهن بين العضلات وعمر الحيوان عند الذبح ونسبة الرطوبة وتأثير شق الحيوان الذي اخذت منه العضلة.

وقد أوضحت النتائج أن الدهن بين العضلات قد ازداد بدرجة معنوية في الحيوانات التي ذبحت في عمر ٢١ شهراً. كما ولم يكن لشق الذبيحة الأيمن أو الأيسر أي تأثير معنوي على التركيب الكيماوي للعضلتين، وأن الفروق الوحيدة في التركيب الكيماوي للعضلتين كانت في نسبة الرطوبة والبروتينات. هذا ولقد كان لوزن الذبيحة تأثير معنوي على معظم قياسات ترسيب الدهن في الذبيحة والبناء العضلي لها، إلا أن الوزن لم يكن له تأثير معنوي على التركيب الكيماوي للذبيحة. كما أن معاملات الارتباط المعنوية الوحيدة للتركيب الكيماوي لعضلات الذبائح فلقد كانت بين نسبة الدهن في العضلات ووزن دهن الاحشاء وبين وزن الدهن الكلي ونسبة الرطوبة، وكذلك بين نسبة البروتين ونسبة الرطوبة في العضلة. ولم تكن معاملات الارتباط معنوية فيما بين الصفات الأخرى سواءً في الذبيحة أو في العضلات.