

EFFECT OF THE AGE OF SLAUGHTERED BUFFALO'S BULLS ON SOME MEAT QUALITY PARAMETERS

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INTRODUCTION

Quality of meat is associated with the chemical and physical changes which occur after death of the animal and convert its muscles to meat. The nature of these changes and their rate affects directly the quality of produced meat (Gerrard, 1971; Wilson et al., 1981 and Boccard, 1986).

Age of slaughtered animals is one of the most important ante-mortem factors which can influence the carcass quality.

It is worthy mentioning that many livestock produced nowadays specifically for meat are slaughtered at a young age. The average age of slaughtered cattle has decreased considerably over the years and this appears to be an increasing proportion to semi-intensive fed cattle of about 18-24 months.

The effect of nutrition and age on the quality of meat was studied by Grosse and Papstein (1983) and they found that meat quality was good to very good at least up to 18 months of age, irrespective to plane of nutrition.

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Therefore this work was, based on the detection of deviation in substantial quality of meat during post-mortem inspection depending on the measurement of meat quality parameters which included measurement of carcass temperature, rigor value, initial and ultimate pH-values and free liquid water.

MATERIAL AND METHODS

36 buffalo's bulls comprising three groups (A,B & C) each of 12 animals. The animals were grouped according to the age. Group "A" animals of 12 months old, group "B" animals of 18 M. old and group "C" animals of 24 M. old.

The longissimus dorsi muscle (LD) and M. adductor (M. add). of slaughtered animal in each group were subjected separately to the following examinations:

1. Measurements of carcass temperature (t-value) using: Digital sekunden Thermometer (Sasse & Reuter, 1979).
2. Measurements of rigor mortis (ri-value), using: Rigor meter (Institute Schoonoord, Nederlande) (Sybesma, 1966).
3. Measurements of both initial and ultimate pH-values using: Digital pH- meter (Reuter, 1982).
4. Measurements of free liquid water of the muscle (Q-value) (Reuter, 1984).

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RESULTS

Table (1): Statistical analytical results of t_1 -value of LD and M.add in the examined 3 groups

	Group "A"		Group "B"		Group "C"	
	LD	M.add	LD	M.add	LD	M.add
Min.	35	39	35	34	33	35
Max.	40	42	40	41	40	42
Mean	37.83	39.83	38.16	39.33	39.80	39.90
S.E.M. \pm	0.26	0.17	0.42	0.60	0.14	0.14

Table (2): Frequency distribution of the examined 3 groups of bulls based on t_1 -value of both LD & M.add.

	A				B				C			
	LD		M.add		LD		M.add		LD		M.add	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Low < 38°C	4	33.33	0	0	1	8.33	1	8.33	2	16.67	2	16.67
Normal 39.5 > t_1 > 38	6	50.00	6	50	10	83.34	9	75.00	8	66.66	7	58.33
High > 39.50	2	16.67	6	50	1	8.33	2	16.67	2	16.67	3	25.00
Total	12	100	12	100	12	100	12	100	12	100	12	100

Table (3): Statistical analytical results of ri -values of LD & M.add in the examined 3 groups.

Time after slaughter	Group "A"		Group "B"		Group "C"	
	LD	M.add	LD	M.add	LD	M.add
ri_1 -value						
Min. hr	4	2	4	5	4	6
Max.	7	6	8	9	6	8
Mean	5.33	3.83	6	6.33	4.83	6.83
S.E.M. \pm	0.20	0.22	0.29	0.17	0.11	0.15
ri_{24} -value						
Min. hr	10	10	9	8	9	9
Max.	11	12	10	11	11	12
Mean	10.16	11	9.67	9.83	9.66	10.5
S.E.M. \pm	0.06	0.13	0.07	0.15	0.12	0.16
ri_{48} -value						
Min. hr	9	10	10	9	10	12
Max.	13	13	13	12	12	13
Mean	11.5	11.66	11.5	11	11.33	12.33
S.E.M. \pm	0.20	0.18	0.19	0.17	0.12	0.08

Table (4): Statistical analytical results of pH-values of LD and M.add in the examined 3 groups.

Time after slaughter	Group "A"		Group "B"		Group "C"	
	LD	M.add	LD	M.add	LD	M.add
pH_1 -value						
Min.	6.00	6.04	6.10	6.06	6.10	6.10
Max.	6.82	6.67	6.72	6.60	6.40	6.30
Mean	6.38	6.29	6.34	6.32	6.21	6.17
S.E.M. \pm	0.04	0.04	0.03	0.03	0.02	0.01
pH_{24} -value						
Min.	5.40	5.30	5.70	5.72	5.73	5.72
Max.	5.98	5.80	5.85	5.95	5.82	5.80
Mean	5.73	5.63	5.76	5.80	5.79	5.75
S.E.M. \pm	0.03	0.03	0.05	0.01	0.03	0.05
pH_{48} -value						
Min.	5.49	5.52	5.43	5.60	5.56	5.45
Max.	6.22	6.10	5.92	5.95	5.72	5.62
Mean	5.75	5.73	5.59	5.75	5.63	5.55
S.E.M. \pm	0.04	0.03	0.03	0.02	0.05	0.01

Table (5): Statistical analytical results of Q-values of LD and M.add in the examined 3 groups.

Time after slaughter	Group "A"		Group "B"		Group "C"	
	Ld	M.add	LD	M.add	LD	M.add
Q ₁ -value						
Min. ^{hr}	0.44	0.42	0.47	0.44	0.50	0.47
Max.	0.56	0.58	0.54	0.54	0.54	0.58
Mean	0.51	0.51	0.50	0.50	0.52	0.52
S.E.M. \pm	0.04	0.04	0.03	0.03	0.01	0.03
Q ₂₄ -value						
Min. ^{hr}	0.42	0.42	0.40	0.42	0.42	0.42
Max.	0.47	0.52	0.47	0.47	0.47	0.44
Mean	0.45	0.45	0.44	0.44	0.44	0.43
S.E.M. \pm	0.02	0.04	0.03	0.02	0.02	0.03
Q ₄₈ -value						
Min. ^{hr}	0.34	0.32	0.35	0.42	0.40	0.40
Max.	0.44	0.47	0.44	0.44	0.44	0.42
Mean	0.38	0.42	0.41	0.42	0.42	0.41
S.E.M. \pm	0.04	0.05	0.03	0.03	0.01	0.01

Table (6): Frequency distribution of the examined 3 groups of bulls based on Q₁-value of both LD and M.add

Time after slaughter	A				B				C			
	LD		M.add		LD		M.add		LD		M.add	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
< 0.50	5	41.66	4	33.33	2	16.66	2	33.33	1	8.33	2	16.66
0.60 > Q ₁ > 0.50	7	58.34	8	66.67	10	83.34	10	83.34	11	91.67	10	83.34
Total	12	100	12	100	12	100	12	100	12	100	12	100

DISCUSSION

The obtained results of t_1 -values of the examined three groups of slaughtered buffalo's bulls (Table 1) showed that mean t_1 -value of group A was higher than that of both groups B & C. On the other hand the t_1 -values of the examined animals were lower than that recorded by Schilling (1986) and El-Sherif (1988).

Measurement of initial temperature of meat carcasses has been required by the meat hygiene regulations where the temperature plays an additional role on the apparent meat quality as pale soft exudative and dark cutting beef conditions (Van Der Wal, 1978 and Sasse & Reuter, 1979).

In the examined animals of group (A) 50% of the M.add samples showed t_1 -value within the normal range, while 50% were in the high range, but 33.33% of the examined LD showed low t_1 -value ($< 38^\circ\text{C}$) and 16.67% had high t_1 -value ($> 39.5^\circ\text{C}$).

In group (B) 83.34% and 75% of both LD and M. add respectively showed normal t_1 -value. Group (C) 66.66% of the examined LD and 58.33% of the examined M.add had normal range of t_1 -value (Table, 2). The quick loss of temperature in the examined carcasses may be due to rapid cooling and cold weather at the time of slaughter.

The recorded ri_1 -values of the examined LD and M.add of the three group of bull carcasses (Table 3) were nearly similar and showed normal ri_1 -value.

The end-rigor values were recorded after 48 h.p.m in the examined muscles of the three groups.

Higher (accelerated) ri_1 -values were recorded by El-Sherif (1988). Measurement of initial and ultimate pH-values are widely practised and pH standards vary considerably to meet particular production and

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marketing circumstances as there is general agreement on the relation between meat pH and intrinsic characteristics such as darkness, keeping quality and consistency (Tarrant, 1981). pH is also a decisive factor in determining the suitability of meat for manufacture into good quality products (Hofmann, 1987).

From the results achieved in Table (4), it can be concluded that, the mean pH₁-values of LD muscles of the examined 3 groups of bulls were nearly similar 6.38, 6.34 and 5.21 respectively as well as that values of M.add in the same examined carcasses. The obtained results were in agreement with Schilling (1986) and El-Sherif (1988).

Mean pH-ult. -values of the examined 3 groups of bulls were nearly similar. The obtained results were higher than those recorded by Schilling (1986).

The ultimate pH-values of all examined LD and M.add of bull carcasses in group "C" reached after 48. h.p.m. while in group "A" and "B" exceptional, some samples showed pH-ult. after 24 h.p.m. which is in agreement with the findings of Hofmann (1987).

Measurement of free liquid water (Q-value) using the more accurate pressure in the filter paper pressing method which evaluated and modified by the use of a pressure handle compressorium (Braunschweiger apparatus). This method is recommended as a standardized system for routine examination and a practice corresponding evaluation method for measurement of free liquid water of meat (Reuter, 1984).

Although all the examined muscle samples of the 3 groups showed nearly similar results of the mean Q_1 - Q_{24} - and Q_{48} -values (Table 5), comparison of the obtained results of Q_1 -values with the official ones indicate that most of the examined LD and M.add in both groups B&C had Q_1 -values within the normal limits

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(Table 6). In contrary to group "A" where 41.66% lie within the low value which indicate increased loss of free liquid water. These findings are in agreement with Schilling (1986) and El-Sherif (1988). The same prescription considers $Q_1 < 0.50$ and $Q_{24} < 0.35$ of M.add in beef as an indication of increased loss of water (PSE-meat tendency), most of the examined samples of group "A" showed high free liquid water (Q_1 -value) obtained in this study may be due to young age of this group which indicate in complete maturation of the examined bulls as their age was about 12 months only.

From the a forementioned results, it can be concluded that some meat quality parameters of buffaloe's bulls were affected by the age at which animals are slaughtered.

With the applied techniques for the determination of the substantial quality of meat, measurement of t_1 -value showed a significant difference between the examined samples of group A and those of both groups B and C, as well as measurement of free liquid water of meat (Q -value) showed little variation between group A and the other two groups.

In general from the obtained results of meat quality parameters the recommended age for slaughtering of buffaloe's bulls was found to be 18 months. old.

In Egypt usually buffalo's bulls slaughtered while still young resulting great economical losses in addition to the low quality produced meat. Therefore it is very important to be taken in consideration the suitable slaughtering age which mentioned before.

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SUMMARY

36 buffaloe's bulls in comprising three equal groups according to the age each of 12 animals (A,B, & C). The LD and M.add of each animal in the examined three groups were subjected to the measurement of some meat quality parameters (temperature-value, rigormortis, both initial and ultimate pH-values and the free liquid water (Q-values).

The mean value of t_1 -value in the examined LD and M.add of the three groups were 37.23, 39.83, 38.16, 39.33, 39.80 and 39.90 respectively.

Measurement of the initial and end rigor-value were recorded as well as the initial pH-value and the ultimate pH-value in both LD and M.add in the examined three groups of animals.

Measurement of the free liquid water (Q-value) was applied in the examined muscles of each group. The samples of group A (12 months old showed increased in loss of water (Q-value).

The variations in the meat quality parameters between the three groups were discussed.

The recommended slaughtering age of buffaloe's bulls was 18 months old.

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