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Chemical Composition of Meat of Buffaloes and Cattle

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CHEMICAL analyses of meat of cattle and buffaloes were performed using Longissimus dorsi muscles of 81 males representing the pure Baladi and their crosses with Red Angler(RA), Braunvieh(BV), Deutsches Braunvieh (DBV), Grauvieh (GV) and Friesian (FR) slaughtered at 12, 15 and 18 months of age beside 35 buffalo males slaughtered all at 18 months of age.

The overall mean percentages of moisture, dry matter, protein, fat and ash in cattle meat were 76.12, 23.88, 20.73, 2.28 and 0.87, in their respective order. In buffalo the percentage of moisture in meat was 79.25 and that of dry matter was 20.75 ; 19.20% protein, 0.84 % fat and 0.71 % ash. The comparable figrues for cattle slaughtered at this age (18 months) were 74.46%, 25.54 %, 21.91%, 2.67%, and 0.96%.

In cattle, genotype influenced significantly the percentage of fat which was highest in pure Baladi (3.89%) , followed by FR, DBV, and RA crosses (Ca 2.2 %) (the crosses of the dairy breeds). Differences among genotypes in percentages of dry matter, protein and ash were insignificant. Percentages of dry matter, protein and faf tended to increase with advancement in age while percentage ot moisture decreased. Differences due to age were significant only for percentages of moisture and dry matter.

Weight gain, efficiency of feed utilization, dressing percentage and carcass composition are the most important traits considered in evaluating breeds for meat production. Chemical analysis of meat has its economical significance for both producer and consumers.

This work aims at investigating the chemical composition of meat in buffaloes and in Baladi breed of cattle and its crosses with some European breeds.

Material and Methods

A research program for genetic improvement of meat and milk in buffaloes and Baladi cattle started in South Tahreer by the Faculty of Agriculture, Cairo University. It was financed by the Egyptian Academy of Science and

the Deutsches Forschungsgemeinschaft (DFG) of the Federal Repulic of Germany. Detailed description of the scheme of work and managerial conditions were reported by Mostageer *et al.* (1981) and Mostageer *et al.* (1982).

A total of 81 males representing the pure Baladi and their crosses with the Red Angler(RA), Braunvieh(BV), Deutsches Braunvieh(DBV=BV x Brown Swiss), Grauvieh (GV) and Friesian (FR) were slaughtered at 12, 15 and 18 months of age. The numbers of animals slaughtered from each genotype at the ages determined are shown in the following table :

Genotype / Age (month)	BAL	RA	BV	DBV	GV	FR	Total
12	6	6	6	6	3	3	30
15	6	5	4	6	3	1	25
18	5	4	5	6	4	2	26
TOTAL	17	15	15	18	10	6	81

The calves of the pure Baladi and the crosses were raised in Omar Makram farm in South Tahreer on whole milk and growing concentrate mixture beside available green fodder (mainly *Trifolium alexandrinum*) and rice straw till weaned at 16 weeks of age. At six months males were placed on feeding troughs under open sheds and were fed on standard concentrate mixture and clover hay till slaughtered. With respect to buffaloes, 35 males were slaughtered at the age of 18 months. These were raised in a different farm in South Tahreer (Om Saber) but treated the same as cattle calves.

Samples from Longissimus dorsi musle of the *9th*, *10th* and *11th* ribs were used to determine the chemical composition of the meat. Moisture, protein, intramuscular fat and ash were determined according to A.O.A.C. methods (1975).

Data on cattle were analysed using the least squares program developed by Harvey (1960) with a statistical model including the main effects of genotype and age at slaughter. Differences among means were tested using Duncan Multiple Range Test (Duncan, 1955).

Results and Discussion

Least squares means and standard errors of the chemical analysis of meat of the Baladi and its crosses are shown in Table 1. Table 2 represents the analyses of variances of chemical analysis traits. It can be seen that differences due to genotype were statistically insignificant and that for the percentage of fat in the Longissimus dorsi muscle was significant. Pure Baladis had the lowest moisture and the highest dry matter percentages (73.45 and 26.55%, respectively) while the BV crosses scored the highest moisture percentage and the lowest dry matter (77.52 and 22.48%, respectively). Among crossbreds, the GV crosses scored the highest dry matter percentage, 2% over that of the BV crosses.

With respect to percentage of protein,the GV crosses mean(21.93%)excelled those of all other crosses and also the mean of the pure Baladi. However, differences among genotypes in protein percentage were not signifignificant. The same picture appeared also in the percentage of ash (Table 1). The BV crosses scored the highest ash percentage (1.01%) and the DBV had the lowest percentage (only 0.76 %), differences being also statistically insignificant. These results agree with those reported by Broadbent *et al.* (1976) working on Aberdeen Angus, Ayrshire, British Friesian and their crosses and by McAllister *et al.* (1976) on Charolais, Limousin, Simmental and Polled Hereford where type of breed did not show any significant effect on chemical composition of the Longissimus dorsi muscle.

On the contrary, percentage of fat showed highly significant influence of genotype ($P \leq 0.01$). The pure Baladi scored the highest percentage (3.89%), significantly different from all crossbred genotypes. Among the crosses, the Friesian scored the highest (2.22%) followed by the DBV (2.16%) and the RA (2.10%), the three are of dairy origin. These estimates, though higher, were not, however, significantly different from those of the two genotypes of dual purpose origin GV and BV (1.76 and 1.54%, respectively). Mostageer *et al.* (1982) studying the carcass traits of these crosses found that the percentage of fat from empty body weight was the highest in the pure Baladi (6.22%), significantly different from 5.10, 4.96 and 4.68% scored by the FR, RA and DBV crosses, repectively, The BV crosses scored only 3.68%. The authors attributed the differences in carcass composition among crosses to the degree of dairy type in their genetic make up.

TABLE 1. **Chemical analysis of meat of the Baladi and its crosses slaughtered at different ages (Percentages from fresh weight).**

Trait	N	% moisture		% dry matter		% protein		% fat		% ash	
		$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	ES	$\bar{X}$	SE	$\bar{X}$	SE
Overall	81	76.12	0.50	23.88	0.50	20.73	0.54	2.28	0.18	0.87	0.05
Genotype:											
BAL . . .	17	73.45a	1.00	26.55a	1.00	21.71a	1.09	3.89	0.36	0.95a	0.10
RA	15	76.74b	1.07	23.26a	1.07	20.25a	1.17	2.10b	0.38	0.92a	0.11
BV	15	77.52b	1.07	22.48a	1.07	19.94a	1.17	1.54b	0.38	1.01a	0.11
DBV . . .	18	76.77b	0.98	23.23a	0.98	20.31a	1.06	2.16b	0.35	0.76a	0.10
GV	10	75.52ab	1.31	24.48a	1.1	21.9a	1.4	1.76b	0.46	0.79a	0.13
FR	6	76.72ab	1.70	23.28a	1.70	20.25a	1.85	2.22b	0.60	0.81a	0.17
Age :											
12months	30	77.44a	0.77	22.56a	0.77	19.38a	0.84	2.24a	0.27	0.93a	0.08
15months	25	76.46ab	0.86	23.54ab	0.86	20.50ab	0.94	1.92a	0.31	0.73a	0.09
18months	26	74.46b	0.83	25.54b	0.83	21.91b	0.90	2.67a	0.29	0.96a	0.09

Within each classification means not followed by the same letter differ significantly from each other at the 5% level.

TABLE 2. **Analysis of variance of chemical composition of meat of the Baladi and its crosses slaughtered at different ages.**

Source of variance	d.f	% moisture	% dry matter	% protein	% fat	% ash
Genotype	5	NS 33.61	NS 33.61	NS 9.59	** 11.01	NS 0.14
Age	2	63.09*	63.09*	NS 45.11	NS 3.68	NS 0.40
Residual	73	17.11	17.11	20.33	2.14	0.18

* Significant at the 1% level
Significant at the 5% level
NS = Not significant

Effects of age at slaughter on chemical composition of meat in Baladi and their crosses are shown in Tables 1 and 2.It is clear that age affected only the percentages of moisture and dry matter. In general, with the advancement of age, the percentages of dry matter and protein tended to increase while the percentage of moisture decreased. Percentages of dry matter were 22.56, and 25.54 for animals slaughtered at 12 ; 15 and 18 months of age, in their respective order. Protein percentages averaged 19.38, 20.90 and 21.91 at the three forementioned ages. These results agree with those of Ragab *et al.* (1966) on buffalo meat who reported that percentages of dry matter, protein and ether extract tended to increase with advancement in age from 50 days to 24 months. Salem *et al.* (1982) using animals of different ages ranging from 5 to 24 months reported highly significant effect of slaughter age on percentages of moisture and protein in buffaloes and Friesian meat. However, the effects of age on fat and ash percentages were statistically insignificant.

Buffaloes

Results of chemical composition of the meat of buffalo males slaughtered at 18 months of age are presented in Table 3.

TABLE 3. Chemical analysis of meat of the 35 buffalo bulls slaughtered at 18 months of age (%'s from fresh weight).

Trait	% moisture	% dry after	% protein	% fat	% ash
Mean	79.25	20.75	19.20	0.84	0.71
SE	.71	.71	.67	.08	.03

The overall means of percentages of moisture, dry matter, protein, fat and ash were 79.25, 20.75, 19.20, 0.84 and 0.71, in their respective order.

Ragab *et al.* (1966) working on six male buffaloes 18 months old, reported percentages of 77.06, 22.94, 19.00 1.30 and 1.10 for percentages of moisture, dry matter, protein, fat and ash. The comparable figures obtained by Salem *et al.* (1982) who used two animals of this age were 77.49, 22.51, 20.55, 1.12 and 0.85, respectively. As could be easily seen, these estimates are very close to those obtained in this study. When compared with the results obtained for cattle slaughtered at 18 months in the present study (Table 1), it could be observed that cattle meat has less moisture and higher dry matter, protein and fat percentages. The difference in moisture comes to 5%, and most of this difference appears as an increase in protein percentage of cattle meat. The high percentage of moisture in buffalo meat compared to cattle meat could be a reason for the known fact that buffalo meat is more perishable than cattle meat.

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التركيب الكيماوى للحوم الجاموسى والبقرى

على عطيه نجم ، احمد مستجير ، محمد عبد العزيز مرسي ، محمد على ابراهيم سالم وفرانز بيرخنر

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أجريت هذه الدراسة على التركيب الكيماوى للحوم الجاموسى والأبقار البلدية وهجنها باستخدام العضلة العينية لعدد ٨١ عجل بقرى تمثل البلدى وهجنه من الانجلر الأحمر والبراوتفيه الألمانى والجراوفيه والفريزيان والتى ذبحت عند أعمار ١٢ ، ١٥ ، ١٨ شهرا ، وعند ٣٥ عجل جاموس ذبحت جميعا عند عمر ١٨ شهرا ٠

كانت المتوسطات العامة لنسب الرطوبة والمادة الجافة والبروتين والدهن والرماد فى لحوم ذكور العجول البقرى ٧٦ر١٢٪ ، ٨٨ر٢٣٪ ، ٧٣ر٢٠٪ ، ٢٨ر٢٪ ، ٨٧ر٠٪ على الترتيب بينما كانت هذه النسب فى لحوم الجاموس ٧٩ر٢٥٪ ، ٧٥ر٢٠٪ ، ٢٠ر١٩٪ ، ٨٤ر٠٪ ، ٧١ر٠٪ وكانت النسب المقابلة فى لحوم الذكور البقرى التى ذبحت عند عمر ١٨ شهرا ٤٦ر٧٤٪ ، ٥٤ر٢٥٪ ، ٩١ر٢١٪ ، ٦٧ر٢٪ ، ٩٦ر٠٪ ٠

فى الابقار ، أثر التركيب الوراثى تأثيرا معنويا على نسبة الدهن فى اللحم والتى كانت أعلى مايمكن فى لحم البلدى النقى ٨٩ر٣٪ وتبعه هجن الفريزيان والبراونفيه الالمانى والانجلر الاحمر (٢ر٢٪) (وهى هجن أنواع اللبن) ٠ كانت الفروق بين الانواع فى نسب المادة الجافة والبروتين والرماد غير معنويه ٠ مالت نسب المادة الجافة والبروتين والدهن الى الزيادة مع التقدم فى العمر بينما نقصت نسبة الرطوبة وكانت الفروق بين الاعمار معنويه فقط فى نسب الرطوبة والمادة الجافة ٠