

COMPARISONS OF THE EATING QUALITY OF MEAT FROM  
YOUNG BULLS AND YOUNG STEERS

K. BRYCE JONES

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by

K. BRYCE JONES, Ph. D.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD

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Imports of young bull beef from Yugoslavia have stimulated interest among British farmers in trials of the production of young bulls for beef.

Wierbicki *et al* <sup>(1,2)</sup> in an investigation of bulls and steers, with and without hormone treatment, found that there was less fat in the meat of young bulls and that it tended to be tougher than that of comparable steers particularly with a short conditioning period after slaughter. They thought economic considerations would usually outweigh the slight difference in tenderness. They were mainly concerned with chemical and physical characteristics, with the *longissimus dorsi* muscle and with its tenderness.

This paper gives a short account of comparisons between bull beef and steer beef derived from three British farm trials. Roast joints from ribs and silversides were assessed for tenderness, juiciness and flavour, and from two of the trials stewed shins were assessed for tenderness, flavour and 'body' of liquor.

The first trial was on animals from the Rowett Research Institute comprising ten sets of twins, mostly Friesians. One of each pair was castrated when very young. Slaughter was at about 400 kg, at an age of about 12 to 15 months. Rib joints from the 7-8 ribs and the 9-10th ribs were roasted and the *longissimus dorsi* muscles were tasted. Silversides were roasted and the *semitendinosus* and *biceps femoris* muscles were tasted separately. Details of procedure have been published <sup>(3)</sup> and the full results are in course of publication. <sup>(4)</sup>

The second trial was on animals reared at Barr Hill Farm, (Messrs. Silcocks Ltd.). This trial included 6 bulls, 6 steers castrated at 3 months, (3M), and 6 steers castrated at 6 months, (6M). Slaughter was at market readiness at about the same weight and age as in the previous trial. These animals were Friesians. The same joints were used and additionally tests were carried out on stewed shins.

The third trial was on Herefords fattened on the Rosemaund Experimental Husbandry Farm. This included 8 bulls and 8 steers castrated at about 8 months. All were slaughtered at about the same weight and age as in the previous trials.

In all these trials the bulls on average reached slaughter weight a little earlier than the steers.

## Results

The essential features of the results on roast joints are shown in Table 1 which records which group of animals came out best for the qualities, flavour, juiciness and tenderness, in the various joints from each trial. Significance was assessed not from group means but by the method of matched differences.

Significance of the  $p = 0.05$ ,  $0.01$  or  $0.001$  levels is indicated by \*, \*\*, or \*\*\*, respectively. Also included in the table, but with no asterisks, are the groups with relatively high mean scores but in which the matched differences fell a little short of the  $0.05$  level of significance.

A similar system has been used in Table 2 which refers to the findings on the stewed shins from the two later trials.

In tabulating the Barr Hill results since there were two steer groups for comparison with one bull group, Table 1 quotes those instances where not only both the steer groups were superior to the bull group, or the bulls superior to both the steer groups, but in addition the difference was significant or very nearly so as regards the steer group nominated.

The results, on the three series together, showed that in general steers consistently received higher marks for tenderness and tended to have higher marks for flavour. The evidence on juiciness is conflicting and no consistent trend is apparent. Differences attributable to the effects of castration were more favourable to steers in the *biceps femoris* and *longissimus dorsi* than in the *semitendinosus* muscle.

Group means for intramuscular fat and for pH are quoted in Table 3. They provide a rough standard of comparison of the degrees of finish reached in the three trials and also show that there is a small but fairly consistent variation between bull meat and steer meat in pH.

TABLE 1

## ROAST JOINTS. GROUP SUPERIORITY AND DEGREE OF SIGNIFICANCE OF DIFFERENCES

Joint	Flavour	Juiciness	Tenderness
<b>Rowett Animals</b>			
7-8th Rib	Steers**	Steers	Steers**
9-10th Rib	-	-	Steers***
Semitendinosus	-	Bulls	Steers**
Biceps femoris	Steers	Bulls	Steers**
<b>Barr Hill Animals</b>			
7-8th Rib	-	-	Steers (3M*)
9-10th Rib	Steers (6M)	-	Steers (6M*)
Semitendinosus	Bulls (*over 6M)	-	Bulls (**over 6M)
Biceps femoris	Steers (3M**)	Steers (3M*)	Steers (6M*)
<b>Rosemaund Animals</b>			
7-8th Rib	-	Steers	Steers
9-10th Rib	-	Bulls	Steers***
Semitendinosus	Steers	Bulls	Steers*
Biceps femoris	Steers	Bulls	Steers*

TABLE 2

## STEWED SHINS. GROUP SUPERIORITY AND DEGREE OF SIGNIFICANCE OF DIFFERENCES

Source	Meat Flavour	Meat Tenderness	Liquor Flavour	Liquor Body
Barr Hill	Steers (3M)	Steers (3M)*	Steers (3M)*	Steers (3M)*
Rosemaund	Steers	-	-	Steers*

TABLE 3

## GROUP MEANS. INTRAMUSCULAR FAT CONTENT AND pH

		8-9th Rib		Semitendinosus		Shin
		% Fat	pH	% Fat	pH	pH
Rowett	Bulls	2.1	6.00	1.3	5.96	-
	Steers	3.2	5.83	2.6	5.70	-
Barr Hill	Bulls	1.5	5.62	0.8	5.71	6.00
	Steers (6M)	2.4	5.56	2.0	5.66	5.91
	Steers (3M)	2.9	5.54	1.8	5.56	5.88
Rosemaund	Bulls	2.4	5.82	1.8	5.88	6.12
	Steers	4.2	5.58	4.6	5.52	5.94

## Discussion

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It was necessary to freeze the meat to hold it during the interval between slaughter and examination, except for three pairs in the Rowett series. There is no evidence that this invalidates the fairness of the comparison.

The bull meat contained less intramuscular fat than the steer meat, as was expected. The pH values of the bull meat were on average higher than those of the steers. Two of the bulls from Rosemaund were 'dark-cutting'. The correlation between individual results for fat content, or pH, with eating qualities, is poor.

The system of evaluation depended on an analytical taste panel and not on consumer preference tests. Nevertheless, as tenderness is usually considered to be the eating quality most prized by most consumers it is likely that the strong evidence of the superiority of the steers in this quality is a fair indication that although consumers may like to buy bull meat because of its leanness they may doubt its value when they eat it.

Rib roasts, silversides and shin may not completely represent the whole of the carcass but they are three of the different kinds of meat available. There seems no obvious reason to think that tests on other joints or muscles would materially change the direction of the conclusions regarding eating quality.

As the meat of older bulls is expected to be dark and is sometimes strongly flavoured there was a possibility that this young meat would also be darker than steer meat and have more flavour. These results do not support the idea that bull meat might have an advantage in flavour to off-set its greater toughness. However, it should be pointed out that these tests are concerned with intensity of flavour and not with flavour preferences.

Wierbicki *et al*<sup>(1,2)</sup> found that the difference between bulls and steers in tenderness was less marked after 15 days conditioning than after 3 days conditioning. The meat from the Barr Hill and Rosemaund trials was kept in a chill room for 5-7 days before freezing. The Rowett material was frozen 2 days after slaughter and kept for two or three days in a domestic refrigerator for thawing. The more conclusive nature of the Rowett results is however attributed to the more closely comparable material from twins rather than to differences in reaction to conditioning.

If it proves cheaper to produce young bull meat, and if butchers find that its leanness commends it to the public, it would seem desirable to study more closely the means available to overcome its potential toughness when eaten.

## References

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## COMPARISONS OF THE EATING QUALITY OF MEAT FROM YOUNG BULLS AND YOUNG STEERS

### SUMMARY:

Meat from bulls and steers, 12 to 15 months old, has been evaluated by taste panel. Roast ribs and silversides from 10 bull and steer twins were examined in one trial; ribs, silversides and shins from 6 bulls, 6 steers castrated at 3 months, and 6 steers castrated at 6 months in another; and 8 bulls and 8 steers castrated at about 8 months in a third trial.

In all trials steer meat was found significantly more tender and tended to have more flavour. Semitendinosus muscle from the silverside was less consistently favourable to steers.

Steer meat had more intramuscular fat and a lower mean pH.

## COMPARAISON DES QUALITES COMESTIBLES DES VIANDES DES JEUNES BOEUF ET DES JEUNES TAUREAUX

### SOMMAIRE:

La qualité de la viande de jeunes boeufs et de jeunes taureaux âgés de 12 à 15 mois a été évaluée par des expériences organoleptiques suivantes:-

1. Côtelettes et gîtes à la noix de 10 taureaux et de 10 boeufs.
2. Côtelettes, gîtes à la noix et jarrets de 6 taureaux, et 6 boeufs, châtés à 3 mois, et de 6 boeufs châtés à 6 mois.
3. Côtelettes, gîtes à la noix et jarrets de 8 taureaux, et 8 boeufs.

Dans toutes les expériences les viandes de boeuf se revelaient nettement plus tendres et savoureuses, mais les differences n'étaient pas invariablement si prononcées en ce qui concerne le muscle semitendinosus.

Les viandes de boeuf contenaient plus de graisse intramusculaire, et le pH moyen, en était plus bas.

## VERGLEICHE DER QUALITÄT DES FLEISCHES VON JUNGEN BULLEN UND JUNGEN OCHSEN

### ZUSAMMENFASSUNG:

Fleisch von Bullen und Ochsen im Alter von 12 - 15 Monaten wurde in einer Reihe von Geschmacksproben bewertet.

Untersucht wurden:

1. Gebratene Rippen und Schwanzstücke ("Silverside") von 10 Bullen und 10 Ochsen.
2. Rippen, Schwanzstücke und Vorderhesse ("shin") von 6 Bullen und 6 Ochsen die im Alter von 3 Monaten kastriert wurden, und 6 Ochsen, die im Alter von 6 Monaten kastriert wurden.
3. Die gleichen Körperteile von 8 Bullen und 8 Ochsen, die im Alter von ungefähr 8 Monaten kastriert wurden.

Jeder Versuch ergab, dass das Fleisch der Ochsen wesentlich zarter und schmackhafter war, aber der Unterschied war teilweise weniger ausgeprägt bei dem semitendinosus Muskel.

Das Ochsenfleisch hatte mehr intramuskuläres Fett und, im Durchschnitt, einen niedrigeren pH Wert.