

**APPLICATION OF
BEST PRACTICE PROCEDURES
FOR FRESH MEAT PRODUCTS
WITHIN THE FOOD SERVICE
INDUSTRY**

By

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DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

A handwritten signature in black ink, appearing to read 'R. Floz', is written over a horizontal dotted line.

Dated 22/4/196.

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ABSTRACT

In the commercial food service industry of Australia there is strong competition between end user companies, in particular to the marketing concepts and development of product ranges that lead to increase patronage, improved customer satisfaction and profitability to the business. The proportion of red meat products being used in this market segment has declined. This thesis examines the use of a management process called best practice and its success of responding to consumer requirements in commercial food service companies.

Because best practice procedures are initiated by customer satisfaction, this thesis outlines a continuum of commercial research that was initiated by customer complaints of red meat meals in the airline industry, through the identification of how consumers perceptions of degree of doneness was identified as a major cause of these complaints, how the pH of meat and other specifications affect degree of doneness, the identification of the variation of pH and other objective assessments being supplied to the food service industry within Australia and finally how the effect of delivering the incorrect degree of doneness impacts on the consumers perception of the sensory characteristics of taste, tenderness, overall satisfaction, value for money and repurchase intent in a variety of food service outlets throughout Australia.

Over the first two year period of the meat enhancement program initiated at Qantas Flight Catering Limited (Q.F.C.L.) complaints from consumers on red meat meals have been reduced by 96 percent. However, consumers perceived a wide variation in the delivered degree of doneness of red meat meals.

The program results weren't commercially significant till the purchasing process of tendering to a defined specification was

initiated. The results after twelve months duration demonstrate a 36%, 24% and 34% improvement in the sensory characteristics of tenderness, taste and overall satisfaction respectively. Over this same period meat colour and meat pH decreased significantly with only a slight increase in cooking loss which was not significant.

Beef and lamb fresh products had significantly improved sensory scores for tenderness, taste and overall satisfaction when compared to frozen products. The cooking loss from fresh beef product was significantly less than frozen product.

There was a large significant variation between suppliers of beef but not lamb for tenderness, taste, overall satisfaction and pH values. 18.5% of beef assessed was above 5.7 pH and 3.4% above 5.9 pH. When beef samples were grouped above or below 5.8 pH, there was a significant difference for overall satisfaction in favour of the lower pH beef, however, in the lamb samples assessed, pH significantly affected the tenderness, taste and overall satisfaction. The relationship between pH and meat colour was significant ($P < 0.01$, $R^2 = 0.286$).

Under the commercial conditions of Q.F.C.L., accurate pH assessments of red meat products was the only objective technique that affected overall satisfaction of beef and tenderness, taste and overall satisfaction of lamb.

The impact of pH on sensory scores and the identification by Trout (1989) of the effect pH has on degree of doneness lead to assessing the relationship in beef tenderloins under commercial airline cooking conditions. These results identified that for a 1 unit increase in pH results in a decrease in 1.8 doneness scores, an increase of 10mm in steak thickness results in a decrease in 0.5 doneness scores and an increase in 10 degrees Celsius in cooked temperature resulted in a decrease of 1.3 doneness scores.

The pH affected the thaw and cooking loss with 1 pH unit increase resulting in an 8% and 6% unit decrease respectively. A 10 degree Celsius increase in internal cooking temperature resulted in 4% units increase in cooking loss.

High pH steaks will be less done at the same internal cooked temperature and will require

further cooking to attain the desired degree of doneness. This further cooking will increase protein hardening and loss of juiciness.

The relationship between pH and tenderness for beef tenderloin was linear, the effect of pH on degree of doneness reported in this research may explain some of the variation in other reported relationship where the beef has been cooked to a standard internal temperature. The variation may also be affected by the inability of the tenderloin to shorten during chilling, compared to the longissimus dorsi muscle commonly used in a number of other studies.

Because of the important effect pH has on the commercial consumer's sensory scores and the associated effect through the relationship with degree of doneness, it was now important to ascertain the variation in objective and subjective meat traits that were being sourced for the Australian food service industry.

A 15 month beef audit carried out in commercial wholesale premises found a large variation of meat pH, meat colour, marbling % and texture and firmness. 44% of beef failed to meet a recognised food service specification, the variation between Ausmeat cipher categories ranged from 83% for prime down to 43% for "A" categories. However, 44% of beef processors assessed achieved above 70% of product within specification, while 11% attained no product in specification. 22% of all product failed to be below pH 5.7, 9.5% of product was darker than a 3 Ausmeat meat colour score and 10% failed on having a texture and firmness score that related to coarse soft meat. The mean pH value for beef over the 15 month period was 5.64, with minimum of 5.38 and a maximum of 6.61. The pH of Ausmeat cipher category "A" beef was significantly higher than the other categories.

It was of interest that 33% of grainfed and 43% of grassfed beef failed to meet the specification. There was no significant difference between the pH levels of the grainfed and grassfed beef, however, the grainfed beef was significantly lighter in meat colour.

The older Ausmeat cipher categories of "A", prime and ox had significantly higher marbling percentages than the younger categories. Only 4.2% of beef tenderloins assessed had a marbling percentage above 2.8% or above the equivalent Ausmeat marbling chip 2.

With the high variation of pH beef being supplied to the food service industry there was now a need to investigate what percentage of beef meals were being cooked to the consumers desired degree of doneness and did this have any detrimental effect on their sensory assessment, value for money and repurchase intent of beef products supplied across a range of market segments within the food service industry.

In this commercial food service industry survey of 3,780 consumers, 69% of consumers received (consumers perception) the beef to their ordered degree of doneness, with 17% receiving the beef under done and 14% receiving the beef over done.

The sensory assessments for tenderness, taste and overall satisfaction were all significantly affected by whether the beef was cooked to the right degree of doneness. Table 0.1 demonstrates the means and percentage of responses for those rating the beef poor or very poor for the sensory characteristics assessed.

Table 0.1 Mean* palatability scores and poor/very poor ratings for beef assessed as cooked as ordered or "under" or "over" done.

Assessed Characteristic	Cooked right	Under done	Over done
Tenderness	4.5	3.9	3.4
Taste	4.6	3.9	3.6
Overall satisfaction	4.5	3.7	3.4
Value for money	4.2	3.5	3.3
<u>Poor and Very Poor Responses</u>			
Tenderness	4.7%	11.7%	22.9%
Taste	2.2%	7.7%	12.0%
Overall satisfaction	3.0%	14.0%	19.6%
* Scale of 1 to 6, with 1 = very poor, 2 = poor, 3 = average, 4 = good, 5 = very good and 6 = excellent.			

The repurchase intent was significantly influenced by the taste, tenderness, overall satisfaction and value for money assessments.

If the product was cooked to the ordered degree of doneness there was no significant difference between the various degrees of doneness and overall satisfaction. The only significant difference between the various degrees of doneness and tenderness was between the medium/rare and medium/well done. Those consumers who order their beef at higher degrees of doneness are more tolerant of tenderness and overall satisfaction attributes than

those that order beef at a lower degree of doneness.

These results indicate that food service outlets should identify the perceived ordered degree of doneness and ensure this is delivered to the consumers satisfaction, if this is done then the poor and very poor ratings decrease and the sensory satisfaction, value for money and repurchase intent increase significantly.

In the commercial food service industry, consumers perception of taste, tenderness and overall satisfaction are highly correlated, this may indicate that consumers aren't able to discriminate the finer differences of taste and tenderness. These results may explain the poor relationships reported between trained sensory panels, objective tenderness assessments and the commercial consumer in some papers.

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