

STUDIES ON PALATABILITY IN LAMB MEAT BY SENSORY EVALUATION: COMPARISON BY AGE IN MONTHS OF SHEEP PRODUCED IN NEW ZEALAND AND JAPAN

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Background

In Japan, mutton consumption is approx 50,000 tons per year but this is only a fraction compared to the consumption of beef, pork and chicken. On average, 0.42kg of mutton is consumed per head in Japan but is small compared to beef (32 times more), chicken (37 times more) and pork (45 times more). One can say that mutton consumption in Japan pales into significance to other countries such as America (0.5 kg per head), China (2kg per head), Saudi Arabia (12.5kg per head), Australia (17.6kg per head) and New Zealand (28.9kg per head). Consumption in Saudi Arabia is high because of the religious factor. In Australia and New Zealand where the Worlds largest producers of mutton are located, a higher consumption level can be expected. Almost 99% of the mutton eaten in Japan is imported from Australia and New Zealand. Essentially, the importation of mutton from sheep from Australia started after the 2nd World War to feed the population. It was cheap, plentiful and covered the daily protein intake. However, mutton in Australia was a secondary product, as wool was the main reason Australia bred sheep.

So far we Japanese people have eaten mutton mainly as sheep meat with feeling the characteristic strong odor. The meal style is Mongolian mutton barbecue, and it is called "Jinghis Khan in Japan. However, in recent years, the tendency which looks for the lamb (Misock *et al.*) with the change (for example, soft one, little smell one) of the palatability of the consumer however strengthened.

Objectives

An examination was made relating to the tenderness and age of the meat. Mutton can be classed as meat between 2-7 years of age, whilst lamb meat is 1 year or younger. The age of the meat reflected in the taste and demand of the consumer. As lamb meat faired very favorably with the consumer, a comparison of imported and domestic lamb was made by a sensory evaluation whether a difference in the palatability existed.

Methods

The test consisted of 2 trials. Trial 1 evaluated the taste of lamb meat at 4 different time intervals (4, 6, 8 and 12 months) of loin and ham meat. Trial 2 was the comparison of palatability of lamb meat of Japanese production from Hokkaido and an import from New Zealand of loin meat. Trial 1 was carried out by 40 girl students, aged 19.1 as panel. Trial 2 was carried out by 28 girl students, aged 18.9 as panel. The meat was evaluated after dipping into boiling water for 10-15 seconds (traditional cooking in Japan called "Shabushabu"). The sensory evaluation was performed according to the method of Scheffé. The checking points were color, odor, tenderness, flavor and total points evaluations.

Results and discussion

Trial 1; In the loin meat, there was no significant difference on the desirable among the four different test samples. However, there are significant difference on color and odor of the ham (Table 1 and 2). On the color, it was found that the panels were separated into groups of different preference, namely one group preferred the ham with a pale color such as 4 months old, while the other group preferred with a dark color such as 12 months old. On the odor of the ham, the youngest lamb was the most acceptable.

Trial 2; There were significant differences between the domestic sample and the New Zealand sample in color and total point evaluations (Table 3 and 4). The color of the domestic lamb appealed more to the test candidates although the odor, tenderness, and flavor were very similar. However, the domestic lamb did receive more points in general for the categories stated previously.

The first evaluation by the consumer to purchase meat is the color and in most cases (Shibuya *et al.*), this determines the end cost. Next, is the "tenderness" which can only be determined in the home when the product is cooked. Lastly, the odor which was mostly ignored and can only be appreciated when the meat is eaten. After all these factors have been taken into account, the learning experience is that the consumer will purchase again the same product.

In the comparison of palatability by the age of the month, as for the ham, it separated into the group to like a dark color and the group to like a pale color. The coloring and the age of the meat seemed to be important factors which both test groups found appealing. The color and the odor gave a distinct character and image to lamb meat. The older the meat, the more stronger the odor became. It admitted significant difference about the odor of the loin, too, but this was not a main effect and was in the order effect.

The two test group findings between Japanese and New Zealand lamb meat found that the color was the most important factor and the total point evaluations indicated also a preference to the domestic sample. The conclusion was that Japanese people preferred domestic lamb to New Zealand, and a survey of New Zealand people of similar age also found their own domestic lamb more appealing. In other words, each country found their own domestic meat products to be the most acceptable.

Pertinent literature

Misock, J.P., D.R. Campion, R.A. Field and M.L. Riley (1976): Palatability of heavy ram lambs. *J. Anim. Sci.* 42, 1440-1444.

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Table 1 Analysis of variance for Trial 1
(Color of the ham)

Factor	Sum of squares	d.f.	Mean squares	F value
Main effects	37.20	3	12.40	7.67**
Combination effects	1.75	3	0.58	0.36
Order effects	8.75	6	1.46	0.90
Error	175.30	108	1.62	
Total	223.00	120		

Table 2 Analysis of variance for Trial 1
(Odor of the ham)

Factor	Sum of squares	d.f.	Mean squares	F value
Main effects	6.63	3	2.21	2.72**
Combination effects	5.68	3	1.89	2.33
Order effects	4.10	6	0.68	0.84
Error	87.60	108	0.81	
Total	104.00	120		

Table 3 Analysis of variance for Trial 2
(Color of the loin)

Factor	Sum of squares	d.f.	Mean squares	F value
Main effects	12.893	1	12.893	9.519**
Order effects	0.893	2	0.893	0.659
Error	35.214	26	1.354	
Total	498.000	28		

Table 4 Analysis of variance for Trial 2
(Total point evaluations of the loin)

Factor	Sum of squares	d.f.	Mean squares	F value
Main effects	6.036	1	6.036	7.498**
Order effects	0.036	2	0.036	0.044
Error	20.928	26	0.805	
Total	27.000	28		