final report

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Testing extreme sires and selected cuts x cook options using the Information Nucleus flocks at Katanning and Kirby

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Abstract

Sensory testing of extreme sire
432 cuts were collected and prepared as sensory samples ready for testing – 40% of these have been sensory tested with the remainder to be completed by approximately March, 2014. This new data will be used, along with existing data, for developing the new cuts based eating quality algorithms in collaboration with the Sheep CRC.

New cuts to be considered as compliant for the MSA trade

1. Topside: The smart shape/stretch grilled topsides showed a considerable improvement in sensory scores compared to controls, resulting in an overall liking of 54 consumer points. The MSA lamb program could consider this as an approved method to allow isolated topsides to be approved as a specific cut x cook option, remembering that currently isolated topsides only meet MSA standards as a stir fry.

2. Fabricated leg roasts: There was no significant differences found for the bone in leg roasts indicating that the leg fillet end and leg shank end roasts can be added to approved MSA lamb cuts. The outside/topside boneless roast tended to have lower scores then the whole boneless roast but was still of good eating quality. Accordingly all new roasting cuts tested could be added to approved MSA lamb cuts.

Executive Summary

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1 Project objectives

1.1 Document the eating quality of grilled short loin and topside in sires showing extremes in the Sheep Genetics carcase ASBV's (PWWT, PFAT, PEMD)

The Sheep CRC has shown a –ve correlation between the Sheep Genetics carcase breeding values and the eating quality of the grilled loin and topside. However relatively few cuts have been tested in progeny from sires extreme for these breeding values (PEMD >+3; PFAT <-2). Accordingly extra progeny from extreme sires needs to be tested to better understand the genetic and phenotypic relationships to assist (i) Sheep Genetics to develop eating quality indexes and (ii) the future development of carcase grading algorithms for predicting the eating quality. 216 progeny from sires with industry average and extremes for PEMD and PFAT have been chosen across the Kirby and Katanning Information Nucleus sites and at slaughter the loin and topside will be collected and sent to Cosign for preparation into frozen steaks (=432 cuts to frozen grilling steaks).

1.2 Contrast grilled topside as 'normal' versus smart shaped and smart stretched

Smartshape and Smartstretch are related technologies which have been developed by MLA to improve both the eating quality and presentation/shape of the final product. Traditional meat science theory would argue that the ability of Smartstretch to improve tenderness can only happen if the stretching is undertaken pre-rigor (= hot boning). However it has been proposed that Smartstretching post rigour in reality will improve the eating quality performance of the lamb topside allowing this cut x cook to grade under MSA lamb. To test this an extra 36 topsides will undergo smart stretch/shape and be compared under a grill protocol to control or normal topsides. Carcases from the progeny used in 1. above will be chosen to compare control versus Smartshape/stretch topsides. Mal Boyce and Alan Gee have undergone training from David Carew on 18th April 2013 and Mal Boyce will prepare the Smartshape/Stretch topsides 48 hours after one of the Katanning slaughters before sending to Cosign for preparation of all topsides into frozen grilling steaks.

1.3 Test the eating quality of roasted full boneless leg versus the full leg cut in half

The retail sector has expressed the desire to use MSA lamb to underpin the eating quality of half leg roasts. Full leg roasts as either bone in or bone out have previously been tested and approved under the previous commercial cuts program. However no data is available for half roasted legs. It is important to test the half legs as the cooking time to medium will be affected by the mass of the product and in particular this may vary the eating quality performance of the topside within the half leg. The experimental design will be to test (i) the boneless leg versus outside/topside roast from paired legs within one body and (ii) bone in leg versus 2 'half' legs as a roast. This will require sampling lamb carcases from the Information Nucleus progeny (different progeny to the extreme sires in 1. above).

Milestones

Achievement Criteria		Due Date
1	All grill & roast cuts collected and sent to Cosign	31 Aug, 2013
2	Final report	30 Sept 2013

2 Results and discussion

2.1 Document the eating quality of grilled short loin and topside from extreme sires

All 432 cuts were collected and sent to Cosign before 31st August, 2013. 180 cuts have been sensory tested to date (5 picks) and consolidated into a spreadsheet for uploading into the Sheep CRC Information Nucleus (INF) data base. There are still 252 cuts to be tested (7 picks). The delay in sensory testing was due to factors outside of the control of the project. However the testing should be completed by March, 2014 and all data uploaded into the INF data base. The new data will be used, along with existing data, for developing the new cuts based eating quality algorithms.

2.2 Contrast grilled topside of 'normal' versus smart shaped/stretched

All lambs/carcases were treated to normal Sheep CRC/Information Nucleus protocols with a maximum of 24 hours off feed between paddock to stunning. Slaughtering was undertaken at WAMMCO International and all carcases received mid voltage electrical stimulation. 24 hours post slaughter paired topsides where collected at boning – one was vacuum packed and kept at 1°C. The other was subjected to manual smart shape/stretch preparation. This involved a topside being wrapped in a plastic sheet (30cm x 30cm) and rolling/massaging the muscle into a 'log' shape for approximately 1 minute. After this the 'log' shaped muscle was squeezed into a plastic sleeve (6cm diameter; 'flat lay' sourced from Viper Packaging Ltd, NSW) – see Figure 1. All topsides were then airfreighted to Cosign (at 1°C) and prepared into grilling steaks (15mm thick) and after 5 days of aging were frozen in readiness for sensory testing. A short loin was also collected for sensory testing.

Figure 1: Preparation of the smart shaped/stretched topside

The mean (sem) HCW, GR and C fat of the carcases was 22.9 kg (0.3), 15mm (0.7) and 3.1mm (0.1) respectively.

The results of the sensory testing are shown in Table 1.

Table 1. Sensory scores for grilled topsides and short loin

	Tender	Juicy	Flavour	O/Liking
Control topside	38.6	42.5	48.7	46.1
Smart/stretch topside	50.7 (12.1)*	50.9 (8.4)	54.1 (5.4)	53.8 (7.7)
Short loin	68.2 (17.5)	64.6 (13.7)	67.8 (13.7)	68.8 (15)

* values in brackets represent significant differences (P<0.001) when compared to the control topside

The control topside grilled steaks scored below the current 'in/out' threshold for MSA lamb of 50 overall liking points while the short loin scored highly – this is consistent with previous work under the initial SMEQ program. The smart shape/stretch topsides showed a considerable improvement in sensory scores resulting in an overall liking of 54 consumer points. The MSA lamb program could consider this as an approved method to allow isolated topsides to be approved as a specific cut x cook option, remembering that currently isolated topsides only meet MSA standards as a stir fry.

2.3 Eating quality of roasted full leg versus the leg fabricated into smaller portions

An additional 15 carcases (HCW, GR, C fat = 25.0kg (0.2), 15mm (1), 3 mm (0.1)) where used to prepare (i) a bone in leg (HAM 4805, shank off = whole leg with chump, shank and aitch bone removed) and (ii) the other paired leg was prepared into a bone in (aitch bone removed) leg fillet end roast (HAM 4822) plus a leg shank end roast (HAM 4823). The cuts were aged for 5 days before freezing in readiness for sensory testing under a roast protocol. Slices of the roast (4mm think) were prepared across the length of the roast sample.

A further 14 carcases (HCW, GR, C fat = 24.6kg (0.4), 16mm (1), 3 mm (0.1)) where used to prepare (i) one boneless leg (chump, shank off = HAM 5070) and (ii) the other leg was prepared as a HAM 5070 but then fabricated into an outside/topside roast by isolating the outside (HAM 5075) and then opposing the butterflied topside (HAM 5073), tied and rolled as shown in Figure 2.

Figure 2. Fabricated outside/topside (left) and whole boneless leg (right) roasts.

The sensory data for the roasting samples is shown in Table 2.

Table 2. Whole leg roasts vs fabricated part leg roasts

	Tender	Juicy	Flavour	O/Liking
Leg fillet end RST	58.9	61.8	59.8	61.9
Bone in whole leg RST	61.0	61.1	58.2	61.7
Leg shank end RST	57.0	61.3	59.0	59.8
Boned whole leg RST	61.3	58.6	63.7	63.6
Outside/topside RST	57.8	56.8	58.0 (5.7)**	58.2 (5.4)*

** Significantly different to boned whole leg roast (P = 0.048)
* Significantly different to boned whole leg roast (P = 0.057)

There was no significant differences found for the bone in leg roasts indicating that the leg fillet end and leg shank end roasts can be added to approved MSA lamb cuts.

There was a tendency for a reduction in eating quality when the outside/topside was compared to the boneless whole leg roast. The depression associated with the outside/topside roast was in the order of 5-6 consumer points for flavour and overall liking – this difference is typically the limit of statistical difference that can be detected when this number of cuts are used, based on the previous SMEQ work.

The reason to test roast cooking for the smaller fabricated legs was that the topside, in particular, will have a reduced cooking time to reach the standard degree of doneness (based on internal temperature of 70°C) and so the tenderisation of the topside (or indeed other muscles) might have been problematical. This is clearly not a major issue for the cuts tested above, even though there was a tendency for this effect in the outside/topside. Accordingly all cuts can be considered as approved for the current MSA lamb system. However a new cuts based system might re-evaluate this conclusion particularly if the star rating is altered.