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Lean meat yield and eating quality producer demonstration sites – Western Australian sites carcass measurement

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Abstract

Four Producer Demonstration Sites (PDS) were undertaken in Western Australia to demonstrate the value of research breeding values (RBVs) for lean meat yield (LMY) intramuscular fat (IMF) and shear force (SF5) in prime lamb and Merino production systems. Lambs from three sites were finished according to normal on-farm practices and processed across two plants. In addition, intramuscular fat and shear force samples from WA have been analysed along with IMF samples from other Australian sites.

Data collected from these PDS will be aggregated with data from other sites and analysed under the national coordination project, B.SCC.0144, to determine the value of RBVs for LMY and eating quality traits to ram breeders, lamb producers and processors.

Executive summary

This project is providing data to the MLA project B.SCC.0144 - Proof of Concept of Lean Meat Yield and Eating Quality Producer Demonstration Sites. The overarching purpose of these projects is to deliver “proof of concept” for lean meat, eating quality and human health attributes within major lamb and sheep meat supply chains by facilitating, empowering and developing a common focus and normal trading mechanisms on these future key industry profit drivers right along the supply chain.

Twenty Producer Demonstration Sites were established to demonstrate the impact new research breeding values (RBVs) for lean meat yield (LMY) and eating quality, particularly intramuscular fat (IMF) and shear force (SF5), will have on lamb production along the supply chain. Four of these sites were in Western Australia.

The lambs were processed through two supply chains/processors. Sufficient lambs were produced from three sites to provide carcass and eating quality data to determine the value of RBVs along the supply chain.

In addition, intramuscular fat (IMF) and shear force (SF5) samples from WA have been analysed along with IMF samples from other Australian sites.

Data collected from these PDS will be aggregated and analysed in B.SCC.0144 to determine the value of RBVs for LMY and eating quality traits to ram breeders, lamb producers and processors.

Understanding of the value of LMY and EQ along the lamb supply chain has been boosted by the involvement of the producers hosting the sites in the processing and measurement of their lambs carcasses.

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1 Background

The aim of this project is to deliver “proof of concept” for lean meat yield, eating quality and human health attributes within major lamb and sheep meat supply chains by facilitating, empowering and developing a common focus and normal trading mechanisms on these future key industry profit drivers right along the supply chain. From the Sheep Genomics Program and the Information Nucleus Flock of the Sheep CRC, Poll Dorset, White Suffolk and Merino sires have been identified that have divergent research breeding values (RBVs) for dressing percent, lean meat yield (LMY) and eating quality, particularly intramuscular fat (IMF) and shear force (SF5). Proof of concept Producer Demonstration Sites were established to demonstrate the impact these new RBVs will have on lamb production along the supply chain.

Twenty Producer Demonstration Sites (PDS) were established across Australia involving 8 sires (2 high and 2 Low by 2 traits) per site, with the target of producing 200 lambs for measurement & processing and allowing 80 lambs to be sampled for eating quality determination. The data from each site will be aggregated for analysis, validation of the RBVs and used in major communications programs with Sheep Genetics, MLA and the Sheep CRC.

The data will contribute to the overall outcomes of the LMY & EQ Proof of Concept project (B.SCC.0144), which include:

1. Determining the value of 6 or more new research breeding values for ram breeders, lamb producers & processors at 20-30 sites.
2. Developing suitable measurement technology and feedback mechanism for these breeding values at processing.
3. Initiating a common focus and foster the development of normal trading mechanisms including potential Value Based Trading on these future key industry profit drivers right along the supply chain.

This project details the slaughter of three of the four PDS located in Western Australia and sample analysis of Shear Force and Intramuscular Fat.

2 Project objectives

- Coordinated the slaughter and collection of carcass data in-plant for up to 590 lambs.
- Collected loin samples on up to 300 lambs for IMF and SF5 measurement – up to 80 lambs from the group of up to 200 from each site (8 sires x 10 progeny/sire).
- Conducted measurement of shear force at day 5 on up to 300 lambs from the WA sites.
- Conducted measurement of IMF on up to 300 lambs from the WA sites.
- Conducted measurement of IMF on up to 400 lambs from the Victorian sites. Samples provided by DEPI Victoria.

- Submitted all data in the standard data template to the LM&EQ PDS National Coordinator within six weeks of the final slaughter group from each site.

3 Methodology

Four producers in Western Australia agreed to host producer demonstration sites. At four commercial properties between February and March 2013, ewes were artificially inseminated with semen from rams that were identified to have divergent RBVs for Lean Meat Yield, Shear Force and Intramuscular fat.

Artificial insemination was unsuccessful at one site (PD17) resulting in only 40 lambs from the 330 ewes inseminated. At the three other sites; termed PD03, PD04 and PD18; AI successfully produced enough lambs to continue the trial. The number of lambs marked at PD03 and PD04 was 288 and 138 lambs respectively. The number of lambs marked at PD18 site was 242.

Lambs were processed at WAMMCO (PD18 and PD03) and V & V Walsh (PD04). All processors were extremely accommodating resulting in the slaughter and collection of carcass measurements going smoothly.

The PD18 lambs were processed over two slaughters and the PD03 and PD04 sites were killed on one day. For the PD03 and PD04 slaughters, all eating quality samples were collected at Kill 1. However, the eating quality samples were collected over 2 kills for the PD18 site.

All lambs were bought into yards for curfew by 5pm ahead of loading between 7-8 am the following morning. Lambs were weighed just prior to being loaded onto the truck. All lambs were slaughtered as the first consignment of the day - by 8am the following day.

The following carcass measurements and samples were collected at slaughter:

1. HCWT and GR depth (knife; mm), cFAT, EMD, EMW at the 12th rib
2. Measurement of pH ultimate and fresh colour (L^* , a^* , b^*) of the loin and pH ultimate of the topside
3. Collection and processing of the lamb loin samples for Shear Force (5 day aged) on up to ten progeny per sire per WA site (up to 80 lambs per site).
4. Collection and processing of the lamb loin samples for Intramuscular fat (5 day aged) on up to ten progeny per sire per WA site (up to 80 lambs per site).

The intramuscular fat and shear force analysis of the WA samples and the IMF samples from other Australian sites were analysed according to the Sheep CRC protocols (Pearce, 2010).

A number of unidentified progeny were slaughtered at all 3 sites and the DNA match up is currently being completed by the National Coordinator.

Animal use in the project was approved by the Murdoch University Animal Ethics Committee (AEC R2536).

4 Results and discussion

4.1 Lamb slaughter

The project has successfully slaughtered lambs from three sites in Western Australia. The producers involved have been diligent in ensuring the project protocols have been met.

All data has been collected and submitted to the National Coordinator for analysis in B.SCC.0144.

Table 1. Slaughter details and number lambs processed for Eating quality (EQ) and Lean Meat Yield (LMY).

Producer	Date of slaughter	Processor	No. Lambs slaughtered	LMY & EQ	LMY only
PD03 (Heggaton)	24/10/13	WAMMCO	155	74	139
PD04 (Manton)	19/11/13	V&V Walsh	120	83	120
PD18 (Murdoch)	5/3/14	WAMMCO	107	73	107
PD18 (Murdoch)	12/5/14	WAMMCO	92	25	92

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Table 2. Sire average values for hot carcass weight, GR fat and eye muscle area

SIRE	No	Average of HCWT (kg)	Average of HGRFAT (mm)	Average of CEMA
PD03 (Heggaton)				
Sire 1	1	25.1	11	17.7
Sire 2	18	22.3	12	16.6
Sire 3	33	23.7	16	15.3
Sire 4	30	23.0	14	16.4
Sire 5	25	22.6	12	16.0
Sire 6	25	22.7	11	16.5
Sire 7	7	22.9	12	15.5
NOT PRESENT*	16	23.6	14	14.8
	155	23.0	13	15.9
PD04 (Manton)				
Sire 1	6	23.0	11	12.2
Sire 2	12	23.5	14	13.9
Sire 3**	8	21.0	13	11.0
Sire 4	10	23.3	14	11.4
Sire 5	16	24.3	11	13.3
Sire 6	18	23.5	12	13.4
Sire 7	16	23.5	12	12.9
Sire 8**	9	25.2	14	13.7
Sire 9	13	22.5	10	12.0
NOT PRESENT**	12	22.0	14	10.1
	120	23.3	13	12.5
PD18 (Murdoch)				
Sire 1	19	20.7	9	13.5
Sire 2	12	20.8	11	13.4
Sire 3	20	21.8	12	14.4
Sire 4	29	20.7	10	13.7
Sire 5	35	20.1	9	13.3
Sire 6	23	20.2	11	12.8
Sire 7	13	19.8	10	13.2
Sire 8	28	19.6	12	13.2
NOT PRESENT***	16	21.0	11	12.7
	199	20.4	10	13.3

* DNA extraction not complete at time of slaughter

** To be confirmed.

*** These lambs were resampled as original DNA samples were contaminated but results not returned by time of slaughter

4.2 Shear force and Intramuscular fat Analysis

Intramuscular fat and shear force samples from WA have been analysed along with IMF samples from other Australian sites. Data has been sent to the National Coordinator. 416 samples have been received for IMF analysis from other sites in the eastern states.

4.3 Relationships with Supply chain / processor

Relationships were developed with two supply chains – WAMMCO (Katanning) and Walshes (Bunbury).

Rod Davidson from WAMMCO was a joint project investigator on this project and provided a significant in-kind contribution.

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