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Lean meat yield & eating quality producer demonstration sites – Western Australian sites facilitation

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Abstract

Three Producer Demonstration Sites (PDS) were undertaken in Western Australia to demonstrate the value of research breeding values (RBVs) for lean meat yield, intramuscular fat and tenderness (shear force) in prime lamb and Merino production systems. Ewes were artificially inseminated with semen from Poll Dorset, White Suffolk and Merino rams selected to have divergent RBVs for the key traits. Ewes were managed to Lifetime Ewe targets and achieved excellent lamb survival rates (at least 85% lambs marked to lambs scanned). Lambs were individually identified with electronic tags and weighed at monthly intervals. Lambs were finished according to normal on-farm practices and processed at two plants.

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.

Ewes inseminated with semen from Poll Dorset, White Suffolk or Merino rams with divergent RBVs for LMY, IMF and SF5 were managed according to Lifetime Ewe Management recommendations on four PDS in Western Australia.

One of the sites had poor conception rate and only 40 lambs were produced from 300 ewes mated. This trial at this site did not continue. The remaining three sites marked 288 crossbred lambs from 504 ewes mated, 138 crossbred lambs from 320 ewes mated and 242 Merino lambs from 291 ewes mated. The lambs were weighed monthly until target slaughter specifications were achieved. The lambs were processed through two supply chains/processors. Sufficient lambs were produced from three sites to provide carcase and eating quality data to determine the value of RBVs along the supply chain. Data collected from these PDS will be 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 lamb’s carcases. In addition, over 100 producers attended information sessions/workshops associated with the PDS site at Craig and Liz Heggaton’s to increase their awareness of the value of LMY and EQ to the lamb supply chain.

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1 Background

The aim of this project 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. 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 significant differences in 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 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 encompasses the four PDS located in Western Australia.

2 Project objectives

1. To professionally and efficiently co-ordinate and oversight Producer Demonstration Sites to ensure the approved key activities are achieved, activities are aligned and integrated and all measurement, monitoring and evaluation is carried out according to the project plan.
2. To ensure that rigorous timely measurement occurs on all animals and that they reach target slaughter specifications.
3. To ensure the ewes are run in accordance with Lifetime Ewe Management (LTEM) targets.
4. To ensure 20-50 producers are actively engaged per site.
5. To coordinate up to 3 field days / workshops per site.

3 Methodology

Four producers in Western Australia agreed to host producer demonstrations sites. All producers managed the ewes to LTEM targets at mating and through pregnancy. Ewes were condition scored prior to AI and light ewes were removed from the flock. Subsamples of ewes (30-50) were condition scored at scanning and marking to monitor ewe condition.

Each of the four sites prepared ewes for a two day artificial insemination (AI) program – PD03 in December 2012, PD04 in January 2012 and PD18 in February, 2013. The fourth WA site (PD17) was inseminated in December 2012 (N=302), but didn't progress due to poor AI performance. Commercial AI operators were engaged to undertake the process. Merino ewes at PD03 (N=504) and PD04 (N=320) were inseminated with semen from terminal sires (Poll Dorset and White Suffolk). Merino ewes (N=291) at PD18 were inseminated with semen from Merino rams. Rams were selected for divergent RBVs for LMY, IMF and SF5.

Sheep Genetics sourced all of the semen and arranged delivery to the AI operators. Sires were given equal opportunity with ewes randomised for weight and CS.

Pregnancy scanning was undertaken by commercial scanning operators approximately 60-70 days after the AI program at each site, to identify ewes carrying single, twins or triplets to AI rams. Lambs were tagged with electronic tags and visual identification tags at marking. A small blood sample was collected from the ear of each lamb at marking and sent to a commercial provider for parentage testing (sire only). Lambs were weighed at monthly intervals from marking until slaughter. A final liveweight was recorded after a curfew period, prior to loading onto trucks for slaughter.

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

4 Results and discussion

4.1 Ewe performance

As per LTEM guidelines, average ewe condition scores (CS) were recorded at mating, scanning, and marking (Table 1). The successful management of ewes to achieve LTEM targets is reflected in the survival rates of the lambs (Table 2).

Table 1: Ewe breed and ewe condition scores at mating, scanning and marking.

Site	*Ewe breed*	*Mating*	*Scanning*	*Marking*
PD03	Merino	4.0	3.6	3.2
PD04	Merino	3.5	2.9	2.4
PD17	Merino	2.8	2.5	2.5
PD18	Merino	3.1	2.9	3.1

Condition scores were recorded for approximately 50 ewes as a representation of the entire mob.

Pregnancy and conception rates were variable across the four sites (Table 2). There appeared to be a high level of anoestrus occurring in PD03, PD04 and PD17 sites (Merino ewes). Ewes were inseminated in early December at PD03 and PD17 sites however no obvious anoestrus was reported by the AI technician. Nevertheless, it is

recommended that seasonal ewes involved in research programs utilising AI procedures are not inseminated until after day-length begins to decrease.

Two weeks following AI at the PD17 and PD03 sites - during the implantation period - these sites experienced unseasonally high amounts of rain and 2 weeks of above 40^{o}C temperatures. This weather would have stressed the ewes and potentially resulted in the poor lambing rate. The AI conducted at PD04 site was done during this period of high temperatures and this could have affected the ewes cycling and conception rate.

Conception at the Merino site (PD18) was excellent (Table 2). Lamb survival was excellent across all three WA sites from conception to marking and from marking to weaning (Table 2).

Table 2. Number of ewes inseminated (AI) and scanned pregnant, number of foetus scanned and number of lambs marked and weaned.

Site	*PD03*		*PD04*		*PD18*		*PD17*	
	N	%	N	%	N	%	N	%
No. ewes AI	504		320		291		302	
No. ewes pregnant	263	52%	98	30%	179	61%	51	17%
No. foetus at scanning	400	79%	144	45%	273	93%	65	21%
Lambs marked	288	57%	138	43%	242	83%	55	18%
Lambs weaned	270	53%	126	39%	237	81%	45	15%

From artificial insemination to pregnancy scanning all ewes at each site were run together after which time the ewes identified as pregnant from artificial insemination were then run separately. At PD03, from AI to lambing, ewes were run in paddocks containing dry stubble with an estimated FOO of 1000kg DM/ha. The ewes were supplemented with hay twice weekly. For PD04 ewes were run in paddocks containing dry stubble with an estimated FOO of 600kg DM/ha. The ewes were supplemented with hay twice weekly and had access to a self-feeder with pellets.

For site PD18 lambing occurred between 1st and 7th June, 2013, which saw a period of very inclement weather and losses of lambs. However, lamb numbers at marking showed exceptional survival. During the period from AI to lambing ewes were run in paddocks containing dry stubble with an estimated FOO of 600kg DM/ha. The ewes were supplemented with hay and barley twice weekly.

At all sites the ewes maintained a condition score of 2.5 and above. Between AI and lambing no significant health problems or deaths were recorded.

4.2 Lamb growth

Lamb weights and growth rates are detailed in Table 3 and Appendix 1.

Table 3: Weaning weight and pre-slaughter weights (PSWT1 first draft; PSWT2 second draft) at each of the three Producer Demonstration Sites in Western Australia.

Site	*PD03*		*PD04*		*PD18*	
	Age	Wt	Age	Wt	Age	Wt
Weaning	96d	34.6kg	78d	28.6kg	100d	29kg
Growth mark to wean						
PSWT 1	162d	46.3kg	164d	47.2kg	234d	46.6kg
Growth from wean		177g/d		216g/d		130g/d
PSWT 2					309d	48.9kg
Growth from wean						95g/d

4.3 Lamb slaughter

Lambs were processed at WAMMCO (PD03 and PD18) and Walshes (PD04). However, the lambs from PD17 were not slaughtered as the AI program did not achieve more than 40 lambs. (Table 4)

All lambs were bought into yards for curfew by 5pm ahead of loading between 7-8am 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.

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

A number of unidentified progeny were slaughtered at all 3 sites and the DNA sire identification is being investigated.

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

4.4 Field Days

A field day conducted was conducted on the 13/09/2013 at Craig and Liz Heggaton's to showcase the WA LMY & EQ PDS Project. The day was held in conjunction with the Heggaton's "Breeders Best" annual field day. It was a very successful day with over 100 attendees. Sire groups (anonymous) were on display and there was a 'fun' taste test of WAMMCO meat that was expected to vary in eating quality. An update on the project will be presented at this years field day on the 9 September 2014.

4.5 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.

5 Acknowledgements

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6 Appendice

Summary of key dates and raw liveweight data from three WA producer demonstration sites – PD03, PD04 & PD18

PD03	**Date**	**Age (d)**	**Count**	**Min (kg)**	**Max (kg)**	**Ave. (kg)**
AI	13/12/2012					
Scanning	4/2/2013					
DOB	9/5/2013					
MWT	7/6/2013	28				
WT	5/7/2013	56	276	9.5	31.5	21.9
WWT	15/8/2013	96	270	15.5	48.5	34.6
EPWT2	5/9/2013	116	273	21	53	37.0
EPWT1	4/10/2013	145	266	25	59	41.8
PSWT2	21/10/2013	162	270	29.5	62.5	46.3
PD04						
AI	5/01/2013					
Scanning	1/3/2013					
DOB	1/6/2013					
MWT	15/7/2013	44				
WWT	19/08/2013	78	128	12	38	28.6
EPWT1	08/10/2013	127	128	28	65	42.4
EPWT2	28/10/2013	147	128	33.5	62	47.3
PWWT1	15/11/2013	164	120	25.5	62	47.2
PD18						
AI	15/02/2013					
Scanning	1/3/2013					
DOB	1/7/2013					
MWT	15/8/2013	44				
WWT	11/10/2013	100	237	12.2	41	29.9
EPWT1	14/11/2013	133	236	20.3	45.3	33.9
EPWT2	19/12/2013	168	236	22.3	48.6	35.7
PWWT1	06/01/2014	185	233	24	51.2	38.2
PWWT2	24/01/2014	203	233	28.9	57.2	42.9
PWWT3	07/02/2014	216	222	28.7	58.2	43.9
PWWT4	13/03/2014	252	124	33.5	55.5	43.9
PWWT6	11/04/2014**	280	126	36	57.5	46.6
PSWT1	25/02/2014**	234	234	31.6	62.4	46.5
PSWT2	10/05/2014	309	128	37	64.5	48.9

**note dates - some lambs weighed on the 25/2/2014 were not sent to slaughter. These are averages across the group.