ASBV's.

Using the Numbers to Improve Your Bottom Line

Australian Wool Innovation Limited

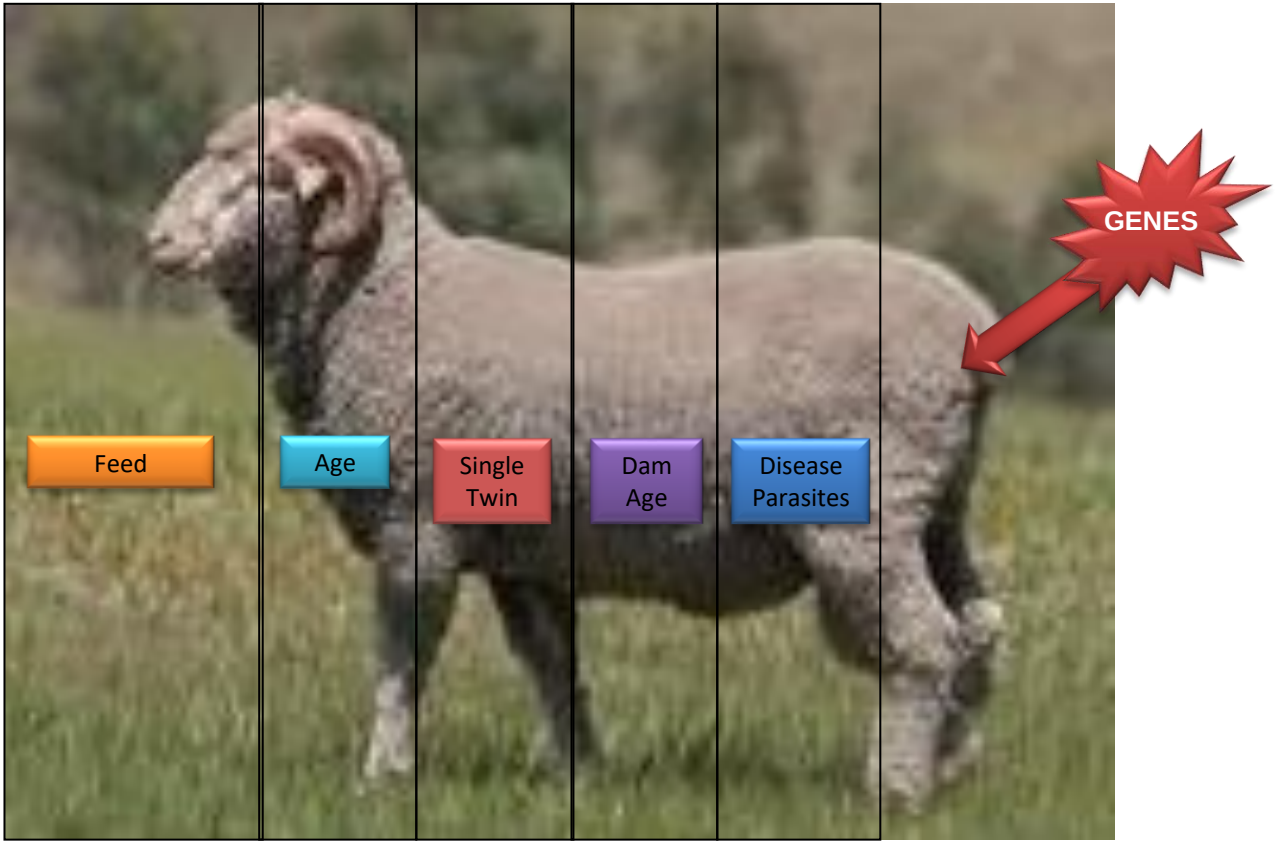
SA SHEEP INDUSTRY FUND

Government of South Australia
Department of Primary Industries and Regions

What are ASBV's

- An animal's breeding value is its genetic merit, half of which will be passed on to its progeny.
- The appearance and performance of an animal is a combination of its **genes** and the **environment** in which it is raised
- **Australian Sheep Breeding Values** (ASBV's) are generated from pedigree and performance data of a sire's progeny and family.

What influences an animal's performance?



Which would you buy?

	Birth Wt	PwWT	Pfat	Pemd
Single	0.21	12.0	-0.5	1.8
Triplet	0.28	12.2	-0.9	1.8

What are ASBV's

Raw measurements on animals are adjusted for differences in

- environment (birth date and type, dam age, sex, rearing type etc) &
- management groups.

The aim is to determine how progeny would have performed if they had

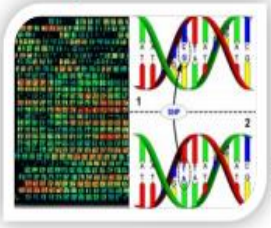
- all been born as singles
- on the same day and
- raised in exactly the same way.

How an ASBV is Calculated

MERINOSELECT ASBV

LAMBPLAN ASBV

Heritability



ENETICS

MEAT & LIVESTOCK AUSTRALIA

The role of ASBV's

- With climate change/variability heat stress is likely to have an increasingly greater impact on:
  - fertility and embryo/lamb survival,
  - forage feed values and/or availability and
  - growth rates due to appetite suppression.

- ASBV's can assist producers to
  - improve production efficiencies,
  - improve profit margins and to
  - mitigate the impacts of a changing climate

The role of ASBV's

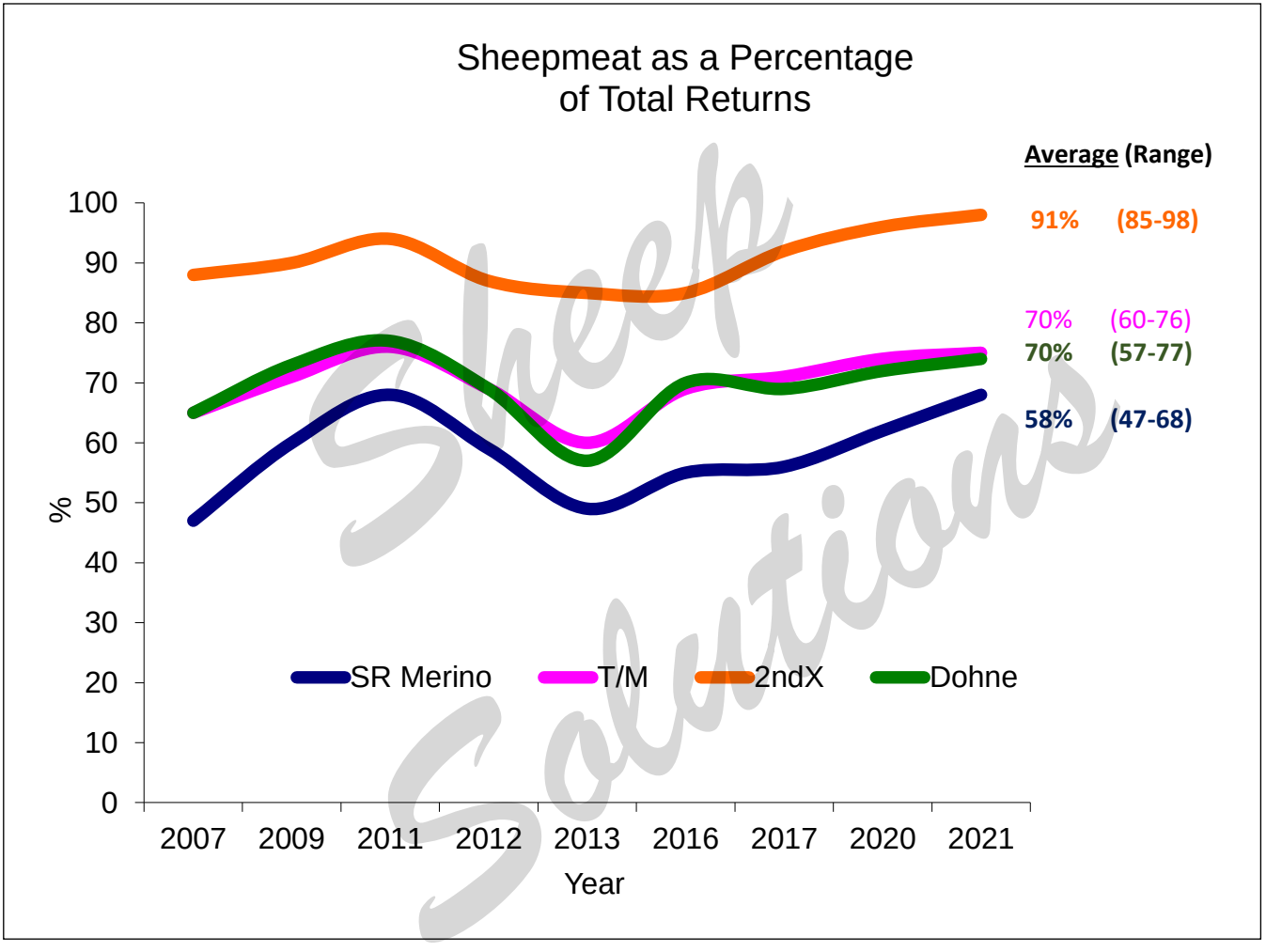
- Selection on carcase traits for example can:
  - increase lamb birthweight, survival and growth rates,
  - reduce turn-off time for sale stock, have ewe progeny reach mature weights earlier
  - increase joining/conception rates
  - improve dressing percentages
  - improve feed conversion efficiencies and,
  - produce more resilient breeding ewes and progeny.

To maximise the benefits when using ASBV's you should …

- Have a clear, measurable breeding objective
- Know your primary profit drivers
- Place emphasis on those traits that are important to your
  - breeding and production objectives;
  - targeted market(s) and
  - environment
- Select replacement sires on both structural and genetic 'merit'

What are your primary profit drivers?

- Wool price
- Wool cut
- Sheep meat prices
- Weaning %
- Kg of product produced per ha/DSE/ewe;
- Cost of production


Sheepmeat as a Percentage
of Total Returns
Average (Range)
91% (85-98)
70% (60-76)
70% (57-77)
58% (47-68)
100
90
80
70
60
50
40
30
20
10
0
%
SR Merino
T/M
2ndX
Dohne
2007
2009
2011
2012
2013
2016
2017
2020
2021
Year
Sheep Solutions

What are ASBV's

Traits are expressed as an abbreviation of the trait name

Wt = weight
EMD = eye muscle depth
CFW = clean fleece weight

Trait ASBVs are based around 0. This baseline represents the average of traits in 1990 (for Terminal) and 2000 for the Merino/Dohne databases. Databases are managed by **Sheep Genetics Australia**

ASBVs are expressed as either positive or negative deviations from an average.

Negative ASBVs are not always bad

What ASBV traits are available ?

Carcase/Reproduction

Birth Weight
Weaning, Post Weaning, Yearling, Hogget and Adult Weights
Maternal Weaning Weight
Fat, Eye Muscle Depth
LMY and IMF
Dress and ShrF5
Number of Lambs Born
Number of Lambs Weaned
Scrotal Circumference

Fleece/Worms

Fleece Weight
Fibre Diameter
Diameter CoV
Staple Length
Staple Strength
Curvature
Scouring and dags
Breech wrinkle
Breech cover
Worm Egg Count

Understanding the 'terms'

Age based prefixes

- **B**irth
- **W**eaning (6-16 weeks)
- **P**ost-weaning (7-10 months)
- **Y**earling (10-13 months)
- **H**ogget (13-18 months)
- **A**dult (>18 months)
- **E**arly or **L**ate

BWt = Birth Weight

PFat = Post-weaning fat depth

YCfw = Yearling clean fleece weight

EBWr = Early Breech wrinkle

Percentile Bands

- Percentile bands show the range of ASBVs across all animals in the current year drop.
- This allows you to see where an animal ranks for that trait within the breed or analysis group.
- For example, if an animal's trait ASBV
  - is in the **1st percentile** it is one of the highest performing animals for that trait,
  - if in the **50th percentile** it is "average" or "median" for that trait

‘0’ = the ‘average’ of traits in 2000

ASBV and Index Percentile Band Table

Analysis **MERINO** Run date **07-Feb-21**

Animals born in 2019

Band	Yfd	Ycfw	Yfdcv	Ysl	Yss	NLW	Ysc	Ywec	Pwt	Ywt	Yfat	Yemd			
	u	%	%	mm	Nktex	%	cm	%	kg	kg	mm	mm	DP+	MP+	FP+
0	-6.1	54.6	-4.5	42.5	13.5	25	6.7	-97	14.3	17.6	3.4	4.8	252.3	232.9	205.9
1	-5.5	36.8	-2.7	22.6	7.1	15	5.0	-71	9.8	12.6	2.1	3.1	200.2	193.9	178.6
2	-3.1	34.7	-2.5	20.9											
3	-2.9	33.3	-2.4	19.9											
4	-2.8	32.2	-2.2	19.0											
5	-2.7	31.3	-2.1	18.3											
10	-2.3	28.4	-1.8	16.0											
15	-2.0	26.4	-1.6	14.5											
20	-1.8	24.7	-1.5	13.2											
25	-1.7	23.3	-1.4	12.2											
30	-1.5	22.1	-1.2	11.3											
35	-1.4	20.9	-1.1	10.4											
40	-1.3	19.8	-1.0	9.7	1.3	3	2.1	-23	4.5	6.5	0.4	0.8	156.3	154.4	144.0
45	-1.2	18.6	-0.9	8.9	1.0	2	2.0	-19	4.2	6.1	0.3	0.7	153.9	151.9	142.2
50	-1.0	17.6	-0.8	8.2	0.6	1	1.8	-16	3.8	5.7	0.2	0.5	151.5	149.5	140.3
55	-0.9	16.4	-0.7	7.4	0.3	1	1.6	-13	3.5	5.3	0.1	0.4	149.0	147.1	138.3
60	-0.8	15.3	-0.6	6.7	0.0	0	1.5	-9	3.2	4.9	0.0	0.3	146.6	144.6	136.3
65	-0.7	14.1	-0.5	5.9	-0.4	-1	1.3	-5	2.8	4.4	-0.1	0.1			
70	-0.6	12.8	-0.3	5.0	-0.7	-1	1.2	-1	2.4	4.0	-0.2	0.0			
75	-0.4	11.4	-0.2	4.1	-1.1	-2	1.0	4	2.0	3.5	-0.3	-0.2			
80	0.2	9.8	0.0	2.9	-1.5	-3	0.8	10	1.6	2.9	-0.4	-0.3			
85	0.0	7.9	0.2	1.6	-2.1	-4	0.6	16	1.0	2.3	-0.6	-0.5			
90	0.2	5.4	0.4	-0.2	-2.7	-5	0.3	26	0.4	1.5	-0.7	-0.8			
95	0.7	1.1	0.8	-2.2	-3.8	-8	-0.1	42	-0.6	0.3	-1.0	-1.1			
96	0.9	-0.4	0.9	-4.1	-4.1	-8	-0.2	46	-0.9	0.0	-1.1	-1.2			
97	1.2	-2.3	1.1	-5.4	-4.5	-9	-0.3	52	-1.3	-0.4	-1.2	-1.3			
98	1.5	-5.2	1.3	-7.0	-5.1	-10	-0.5	59	-1.8	-1.0	-1.3	-1.5			
99	2.3	-10.4	1.6	-9.3	-6.0	-13	-0.9	74	-2.5	-1.9	-1.5	-1.8	88.7	80.3	75.0
100	6.3	-42.9	3.7	-22.7	-11.8	-39	-2.9	160	-7.3	-7.2	-2.8	-3.5	11.2	20.8	10.9

“Band” indicates where individual traits and/or rankings fall in relation to all Merino sires tested in Australia

50 Percentile values = the ‘median’ values of Merino traits tested in Australia

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What is an Index?

- Combines the ASBVs for several traits into one value
- Available to suit a range of different breeding programs
- Quick selection guide to narrow down which sires to look at
- While indexes are useful tools, it is important to always consider individual trait ASBVs to ensure they are 'balanced' and will meet your breeding objective goals

Check ASBV's

For example – which of these rams best suits your production objectives

ASBV and Index Percentile Band Table

Analysis **MERINO** Run date **07-Apr-21**

Animals born in 2019

Band	Yfd	Ycfw	Yfdcv	Ysl	Yss	NLW	Ysc	Ywec	Pwt	Ywt	Yfat	Yemd	DP+	MP+	FP+
	u	%	%	mm	Nktex	%	cm	%	kg	kg	mm	mm			
0	-6.7	55.3	-4.4	42.6	13.7	26	6.6	-97	14.4	17.9	3.3	4.9	259.1	239.0	204.6
1	-3.4	36.8	-2.7	22.3	7.0	15	4.8	-71	9.7	12.6	2.1	3.1	201.8	194.8	179.0
2	-3.0	34.6	-2.5	20.6	6.2	14	4.5	-66	9.1	11.9	1.9	2.9	195.6	189.7	174.3
3	-2.8	33.3	-2.3	19.6	5.7	13	4.3	-62	8.7	11.4	1.7	2.7	191.4	186.3	171.2
4	-2.7	32.2	-2.2	18.7	5.3	12	4.1	-59	8.3	11.0	1.6	2.5	188.5	183.7	168.9
5	-2.6	31.3	-2.1	18.0	5.0	11	3.9	-56	8.1	10.7	1.5	2.4	186.2	181.6	167.0
10	-2.2	28.3	-1.8	15.7	4.0	9	3.3	-48	7.1	9.6	1.2	2.0	178.1	174.6	160.4
15	-2.0	26.3	-1.7	14.2	3.3	7	3.0	-42	6.5	8.9	1.0	1.8	172.8	169.8	156.2
20	-1.8	24.7	-1.5	13.0	2.8	6	2.7	-37	6.0	8.3	0.9	1.5	168.6	166.1	153.2
25	-1.6	23.3	-1.4	12.0	2.4	5	2.5	-34	5.6	7.7	0.7	1.3	165.1	163.0	150.7
30	-1.5	22.1	-1.3	11.1	2.0	4	2.3	-30	5.2	7.3	0.6	1.2	162.0	160.1	148.5
35	-1.3	20.9	-1.1	10.3	1.6	4	2.1	-26	4.8	6.9	0.5	1.0	159.2	157.4	146.4
40	-1.2	19.7	-1.0	9.5	1.3	3	2.0	-23	4.5	6.4	0.4	0.8	156.5	154.8	144.5
45	-1.1	18.6	-0.9	8.7	1.0	2	1.8	-19	4.1	6.0	0.3	0.7	154.0	152.4	142.6
50	-1.0	17.5	-0.8	7.9	0.6	1	1.6	-15	3.8	5.6	0.2	0.5	151.5	149.8	140.7
55	-0.9	16.4	-0.7	7.2	0.3	1	1.5	-12	3.5	5.2	0.1	0.4	149.1	147.4	138.7
60	-0.8	15.2	-0.6	6.4	0.0	0	1.3	-9	3.1	4.8	0.0	0.2	146.5	144.8	136.6
65	-0.7	14.0	-0.5	5.5	-0.3	-1	1.2	-5	2.8	4.4	-0.1	0.1	144.0	142.2	134.4
70	-0.5	12.8	-0.3	4.6	-0.7	-1	1.0	-1	2.4	3.9	-0.2	0.0	141.4	139.5	132.0
75	-0.4	11.4	-0.2	3.6	-1.1	-2	0.9	4	1.9	3.4	-0.3	-0.2	138.6	136.5	129.4
80	-0.2	9.8	0.0	2.5	-1.5	-3	0.7	10	1.5	2.8	-0.4	-0.4	135.3	133.1	126.5
85	0.0	7.9	0.2	1.1	-2.0	-4	0.5	17	0.9	2.2	-0.6	-0.6	131.3	129.1	122.9
90	0.2	5.3	[illegible]	[illegible]	[illegible]	-5	0.2	26	0.2	1.4	-0.8	-0.8	125.9	123.8	118.2
95	0.7	1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	116.8	114.7	110.1
96	0.9	-0.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	113.6	111.5	107.1
97	1.1	-2.4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	109.4	106.6	102.7
98	1.6	-5.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	102.9	99.7	95.3
99	2.4	-10.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	89.6	83.8	75.3
100	6.3	-43.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24.1	20.7	10.9

2 Rams
DP Index (141)

Tag	Ywt	Yfat	Yemd	Ycfw	Micron
12	6.5	0.0	0.3	15.3	- 1.3
115	6.4	- 0.6	- 0.4	25.1	- 0.4

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Correlated Traits

- Selecting for a particular genetic trait may result in changes in other traits. This is said to be a genetic correlation between the traits

- Genetic correlations can be positive or negative.

- If the correlation is positive, then there is an improvement in both traits. If the correlation is negative, 1 trait shows improvement while the other deteriorates.

Correlated Traits

GROWTH

- LEANNESS
- REPRODUCTION
- LEAN MEAT YIELD
- FLEECE WT

- REDUCED MEQ
- FIBRE DIAMETER
- BIRTH WEIGHT
- ADULT WT

FAT

- IMF
- FERTILITY
- BIRTH WEIGHTS
- LAMBS WEANED
- FCE

- INCREASE BODY FAT
- LOWER FLEECE WEIGHT

MUSCLE

- LEANNESS
- REPRODUCTION
- LEAN MEAT YIELD
- INCREASE FLEECE WT
- WORM RESISTANCE

- REDUCED MEQ
- FIBRE DIAMETER
- BIRTH WEIGHT
- MATURE ADULT WT

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Do ASBV's work?

- The short answer is '**YES**'.
- A summary of 'Proof of Profit' research and on-farm trials can be found at Sheep Genetics Australia website.
- 'Actual' outcomes generally exceed 'predicted' or 'expected' outcomes!

"Proof of Profit"

Producers: Dennis & Geoff Hogan, Glen Innes NSW

Objective:

Investigate the difference in value of lambs sired by rams with PwWt (growth) breeding values in the **top 10%** versus industry **average** (50 percentile)

Average EBV's for each sire group

Sire Group	Birth Weight BWT	Growth PwWT	Post weaning fat Pfat	Muscle depth PEMD
HIGH PWWT	0.36	14.2	[illegible]	
AVE PWWT	0.22	7.7	-0.73	

Current Industry Average is 14.3

Expected Response ??

- (14.2 - 7.7) = 6.50 kg
- (6.5)/2 = 3.25 kg

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Average live weight of lambs at 3 different growth points

Sire Group	Weaning 1st week of Jan '11	1st week of Feb	Selling 2nd week of March
Expected Response = 3.25kg			57.1
Actual Response = 5.10kg			52.0

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High PWWt sired lambs :

- 5.1kg heavier = 2.5kg extra carcass weight (48% dress)
- Lambs sold for $6.20/kg = extra $15.50 per lamb
- Hogan's averaged 100 lambs per ram joined
- They returned an extra $1,550 per ram in the first year

If you average 70 lambs per ram at $7.50/kg you would generate an extra $1312.50 per ram extra in one year OR $5250 per ram more over its lifetime when compared to industry average for PWWt

Good Genetics Pays !!!

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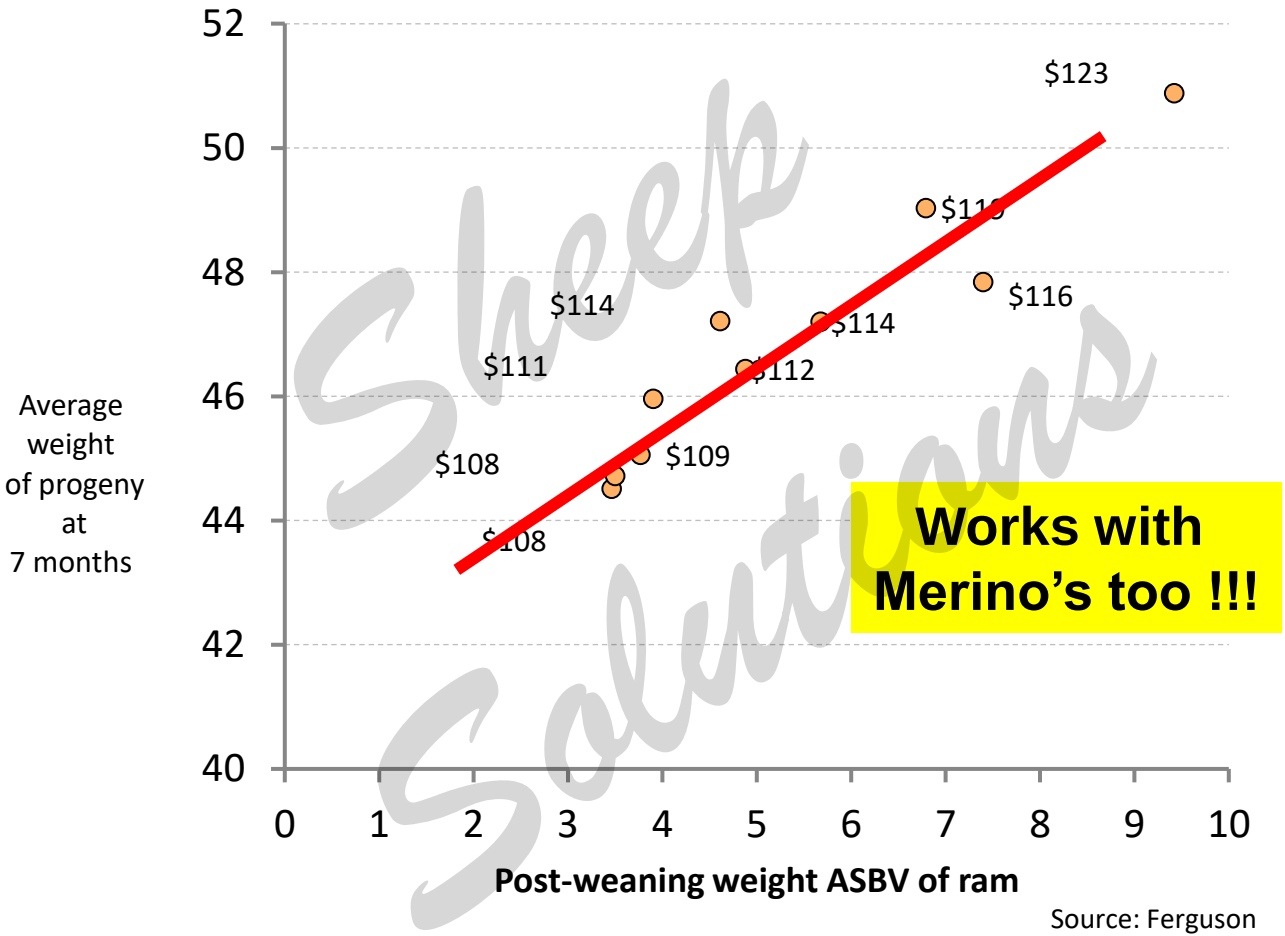
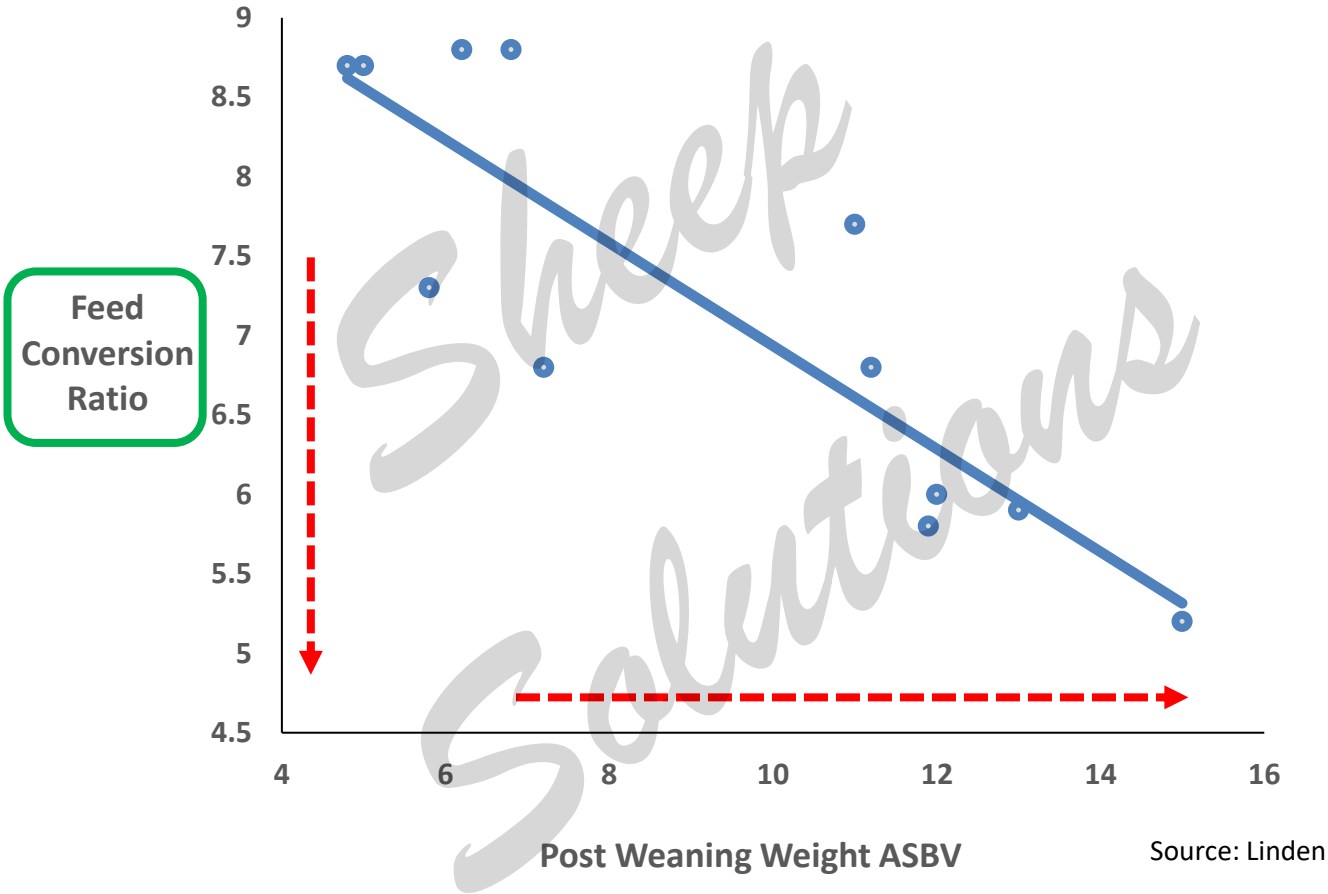
Post-weaning weight (PWT)

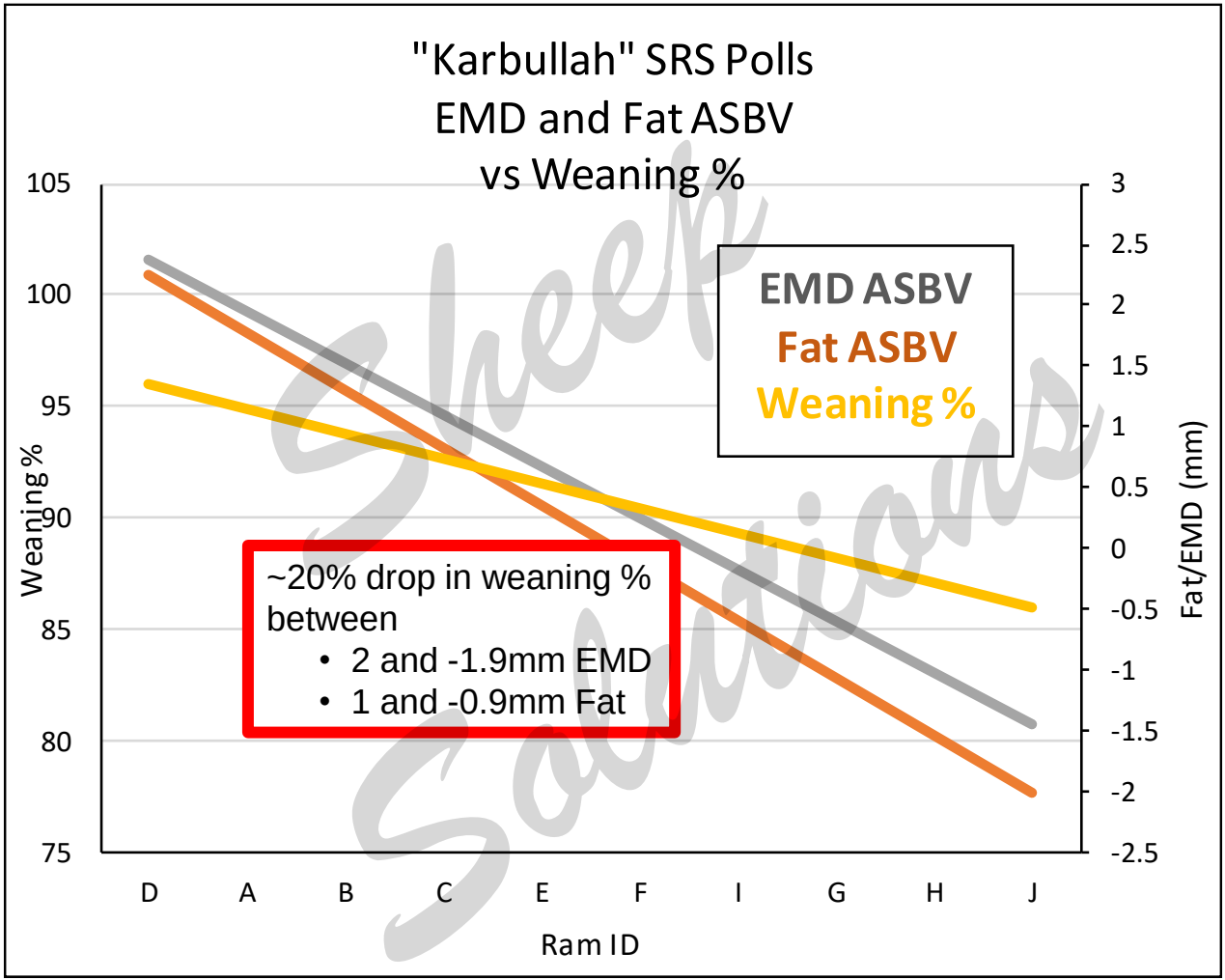


Source: Ferguson

Feed Conversion and Sire ASBV (PwWt)



Source: Linden


"Karbullah" SRS Polls
EMD and Fat ASBV
vs Weaning %
EMD ASBV
Fat ASBV
Weaning %
~20% drop in weaning % between
• 2 and -1.9mm EMD
• 1 and -0.9mm Fat
Weaning %
105
100
95
90
85
80
75
Fat/EMD (mm)
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
D
A
B
C
E
F
I
G
H
J
Ram ID
Sheep Solutions

What is a ram worth ?

- Sires have a significant and extended impact on your system particularly if self-replacing.
- They cost you little in terms of their 'cost' per lamb produced.
- A $1500 ram that produces 70 lambs per joining over 4 joining's 'costs' $**5.36** per live lamb
- A ewe, valued at $250, may produce 6 lambs over her lifetime. This equates to a gross cost per lamb attributed to the ewes of $**41.67** ($250/6)

What is a ram worth ?

- It is possible to estimate a ram's value against an individual stud's 'average' commercial ram price OR the 'average' price for ram's with ASBV's at or near the 50 percentile trait values
- The following slides
  - Show screenshots of an Excel based calculator developed by myself and Murray Long *(Clearview Consulting)* that can be used to pre-predict a rams value based on growth and wool cut ASBV's
  - Illustrate predicted maximum ram values compared to $1000 'grade' rams (with 50 percentile ASBV's for Ywt and Ycfw) for a range of trait percentile values and carcass returns

Valuing Dual Purpose Rams	Enter Your Values in White Cells	
Ram %	2	
Ewes mated per ram	50	
Expected Weaning %	85%	
Years Ram used	4	
Total Sired	170	
Ewe Lambs (Total)	85	Times Shorn
Ewe Lambs Retained (number)	110	5
Wether Lambs	85	1
Wether Lambs Retained (number)	0	
Total Slaughter Lambs	60	
Total Fleeces		535

	Carcase Wt (kg)	Wool (%)	Current wool Cut (kg)
Rams ASBV:	6.1	26.3%	5.0
Flock/Industry Average ASBV	3.8	17.5%	
Gain	2.3	8.8%	
Predicted difference in progeny	1.15	4.4%	
Yields (%)	42%	100.0%	
Predicted gain / lamb sired	0.5	0.22	

	Carcase Wt ($)	YCFW (cents)
Value of Product	$7.00	1350
Total ($) gain over Rams Lifetime	$203	$1,588.95

Additional value of rams ASBV's over his lifetime	$1,792

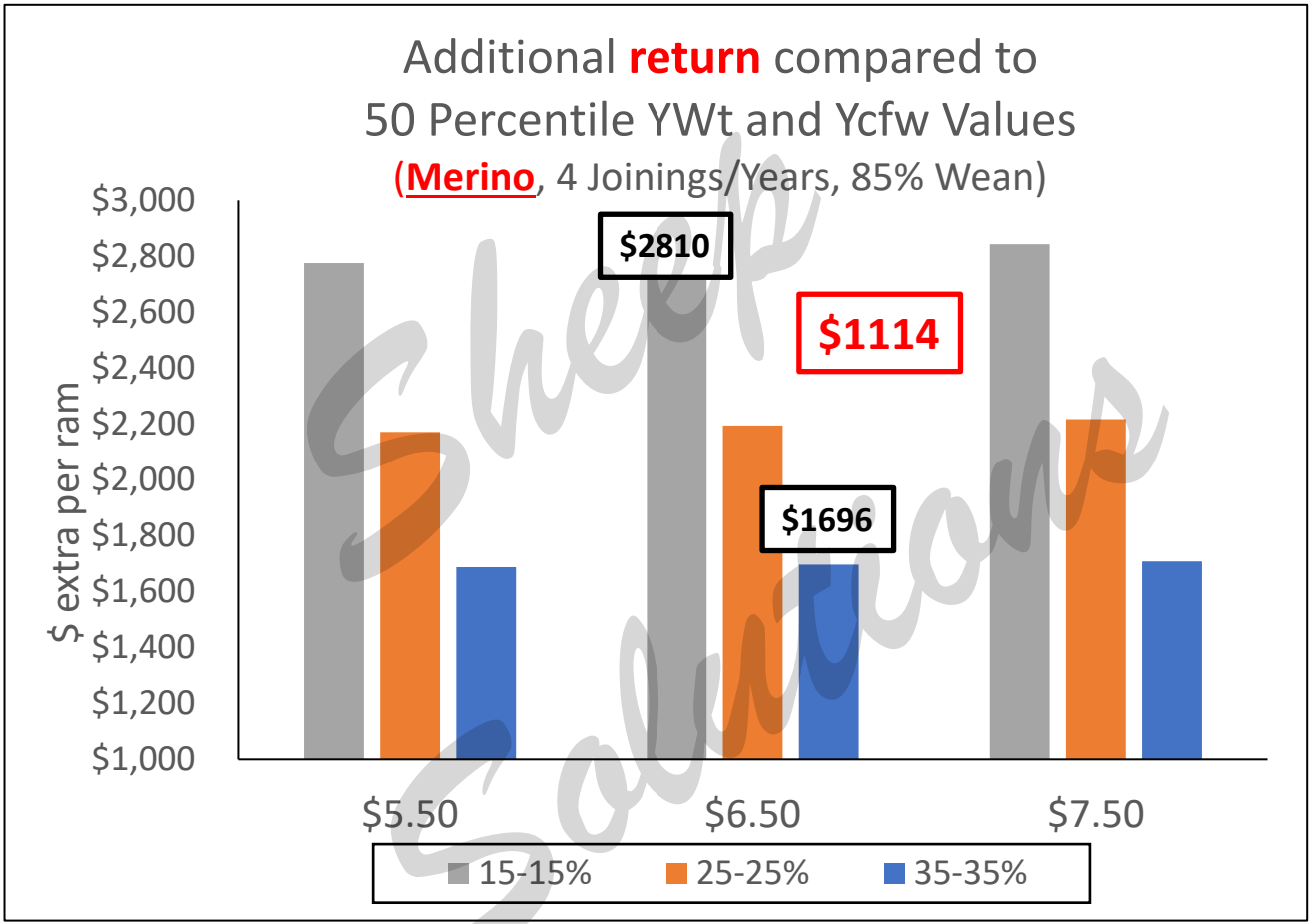
Average Ram Value ($)	$1,000

Maximum Ram Value ($)	$2,792
Extra Value per year ram used	$448

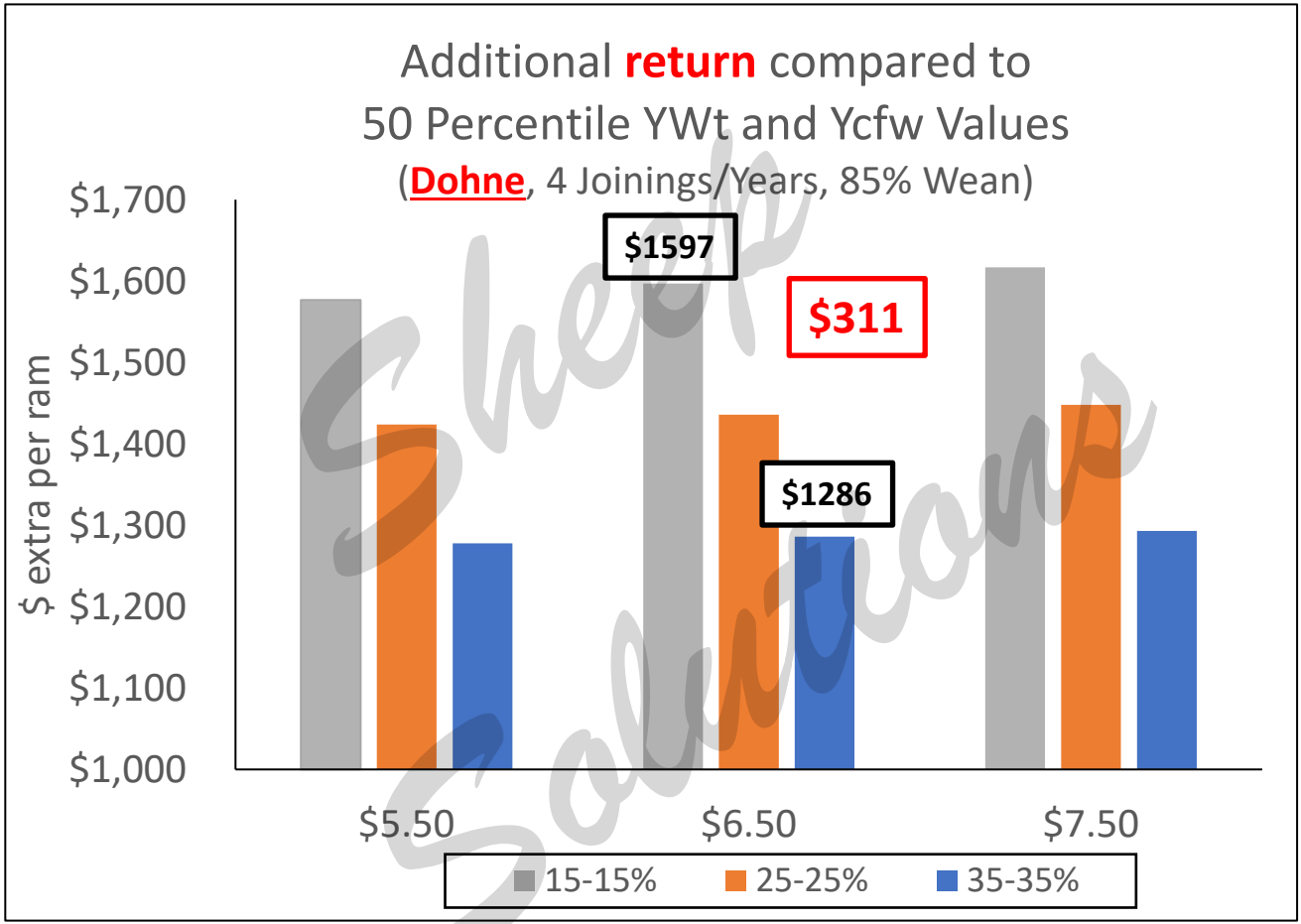
ASBV's Check

	Ycfw	YFD	YWT	Yfat	Yemd	NLW	DP Index
Ram info	**26.3**	**-0.5**	**6.1**	**0.3**	**0.9**	**0.0**	**160.3**
50 percentile April 2021	17.5	-1.0	3.8	0.2	0.5	1.0	151.5
Percentile minimum	40%	50%	25%	50%	50%	40%	50%

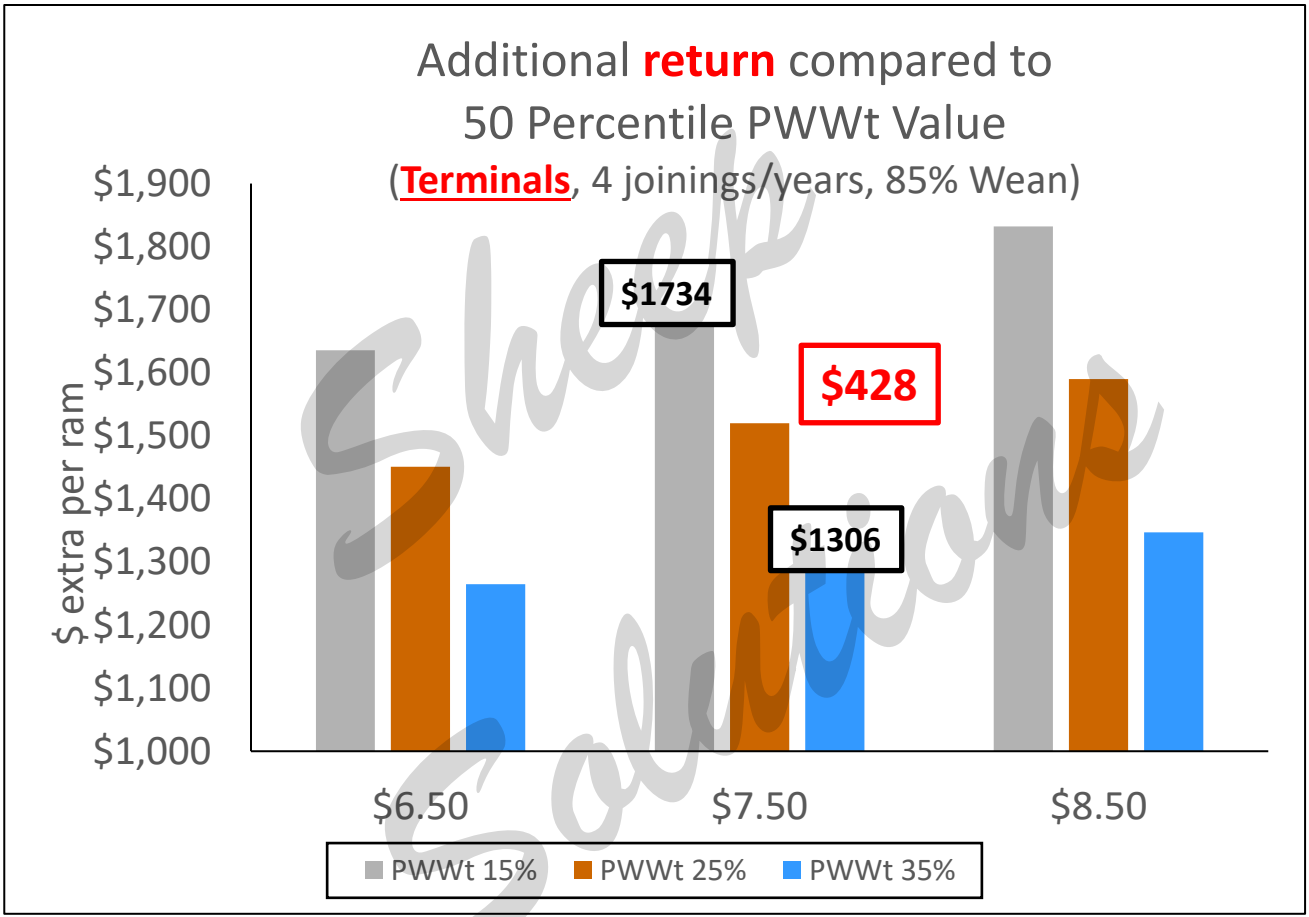
DP	Ycfw	YFD	YWT	Yfat	Yemd	NLW	DP Index
	OK	OK	OK	CHECK	OK	CHECK	OK



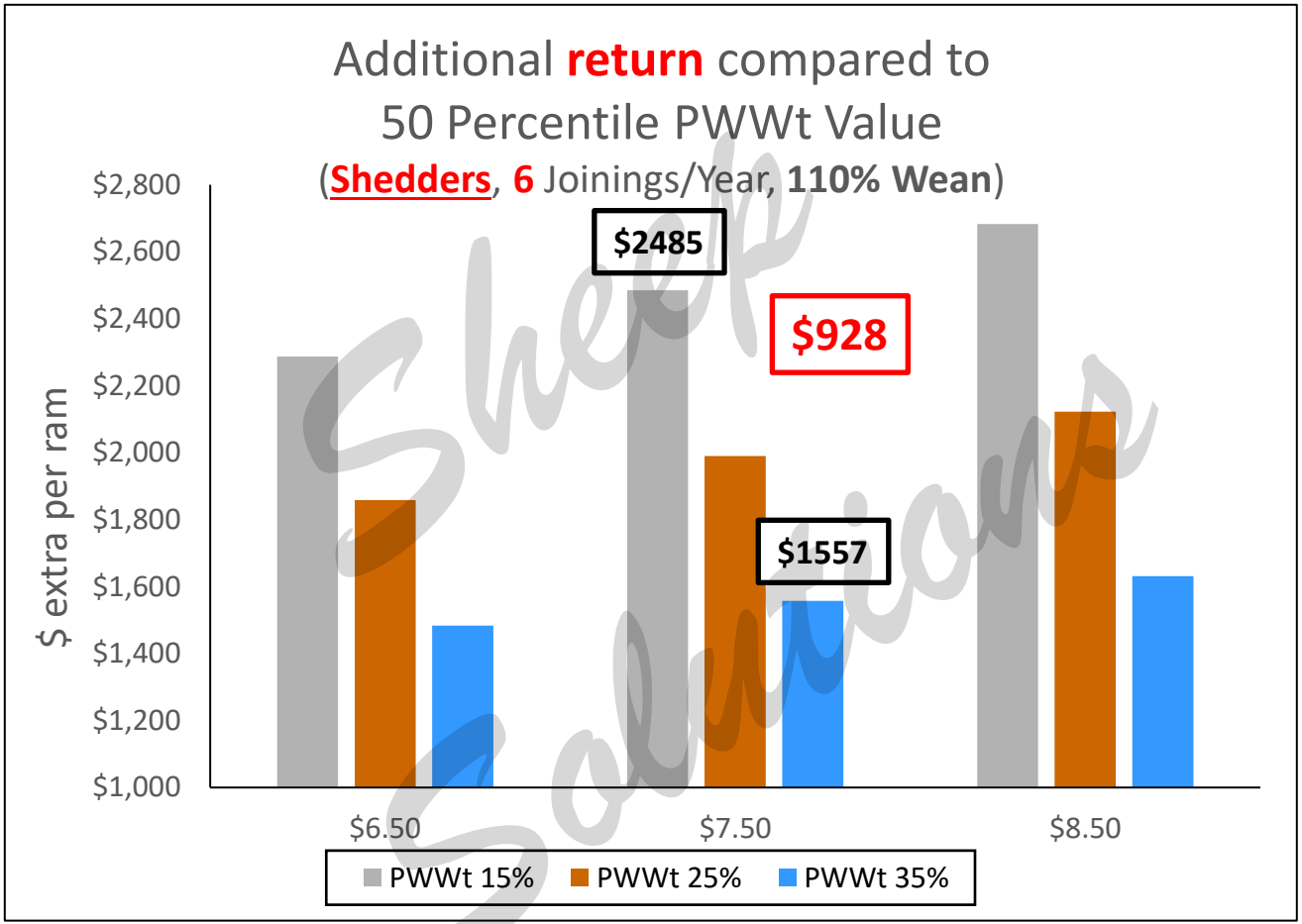
'Average' or 50 percentile rams valued @ $1000; Cut 5.0 kg, 19 micron @ 1350c/kg clean



'Average' or 50 percentile rams valued @ $1000; Cut 3.5 kg, 20 micron @ 1250c/kg clean



'Average' or 50 percentile rams valued @ $1000



'Average' or 50 percentile rams valued @ $1000

In Summary

- ASBV's are a tool that can be used to improve lamb number and survival, growth rates, feed conversion, carcass and wool incomes and breeding ewe efficiencies

- The key is 'balance' – identify what your primary profit drivers are, define your breeding goals and use ASBV's to meet both!

Take Home Messages

- Have a clear, measurable breeding objective
- Select replacement sires on both structural and genetic 'merit'
- Place emphasis on those traits that are important to your
  - flock/herd breeding and production objectives;
  - targeted market(s) and
  - environment

Thanks – and good luck !!

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Australian Wool Innovation Limited

SA SHEEP INDUSTRY FUND

Government of South Australia
Department of Primary Industries and Regions

Tools and Resources

- MLA's Genetic Hub https://genetics.mla.com.au/
- NSW DPI "Using EBVs and selection indexes to meet your Merino breeding objective" (https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0014/150512/Primefact-580---Using-EBVs-and-selection-indexes-to-meet-your-Merino-breeding-objective.pdf)
- Sheep Genetics Australia
  - Brochures and Factsheets https://www.sheepgenetics.org.au/Resources/Brochures-and-fact-sheets
  - A Pocket Guide to ASBV's (Australian Sheep Breeding Values) https://www.sheepgenetics.org.au/globalassets/sheep-genetics/resources/brochures-and-fact-sheets/2018_pocket-guide.pdf
  - ASBV's and Indexes Explained https://www.sheepgenetics.org.au/Getting-started/ASBVs-and-Indexes